Office of
Energy
Projects

December 2014

FERC/EIS-F-0244

# Final Environmental Impact Statement
# For Hydropower License

## Volume 1:
## Main Text

**Upper Drum-Spaulding Hydroelectric Project**
**Project No. 2310-193 – California**

**Lower Drum Hydroelectric Project**
**Project No. 14531-000 – California**

**Deer Creek Hydroelectric Project**
**Project No. 14530-000 – California**

**Yuba-Bear Hydroelectric Project**
**Project No. 2266-102 – California**

**Federal Energy Regulatory Commission**
**Office of Energy Projects**
**Division of Hydropower Licensing**
**888 First Street, NE**
**Washington, DC 20426**

FERC/EIS-F-0244

# FINAL ENVIRONMENTAL IMPACT STATEMENT FOR HYDROPOWER LICENSE

Upper Drum-Spaulding Hydroelectric Project—FERC Project No. 2310-193
Lower Drum Hydroelectric Project—FERC Project No. 14531-000
Deer Creek Hydroelectric Project—FERC Project No. 14530-000

Yuba-Bear Hydroelectric Project—FERC Project No. 2266-102

California

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426

OFFICE OF ENERGY PROJECTS

To the Agency or Individual Addressed:

**Reference: Final Environmental Impact Statement**

Attached is the final environmental impact statement (final EIS) for the Upper Drum-Spaulding Hydroelectric Project (FERC No. 2310-193), Lower Drum Hydroelectric Project (FERC No. 14531-000), Deer Creek Hydroelectric Project (FERC No. 14530-000), and the Yuba-Bear Hydroelectric Project (FERC No. 2266-102), located on the Middle Yuba, South Yuba, and Bear Rivers and the North Fork of the North Fork American River in Sierra, Nevada, and Placer Counties, California.

This final EIS documents the view of governmental agencies, nongovernmental organizations, affected Indian tribes, the public, the license applicant, and Federal Energy Regulatory Commission (Commission) staff. It contains staff evaluations on the applicants' proposals and alternatives for relicensing the proposed projects.

Before the Commission makes a licensing decision, it will take into account all concerns relevant to the public interest. The final EIS will be part of the record from which the Commission will make its decision. The final EIS was sent to the U.S. Environmental Protection Agency and made available to the public on or about December 19, 2014.

Copies of the final EIS are available for review in the Commission's Public Reference Branch, Room 2A, located at 888 First Street, N.E., Washington DC 20426. The final EIS also may be viewed on the Internet at www.ferc.gov/docs-filing/elibrary.asp. Please call (202) 502-8222 for assistance.

Any comments should be filed by February 9, 2015, and should reference Project No. 2310-193, 14531-000, 14530-000, and/or 2266-102. Comments may be filed electronically via the Internet. See 18 Code of Federal Regulations 385.2001(a)(1)(iii) and the instructions on the commission's web site: http://www.ferc.gov/docs-filing/elibrary.asp. Commenters can submit brief comments up to 6,000 characters without prior registration, using the eComment system at http://www.ferc.gov/docs-filing/ecomment.asp. You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support. Although the Commission strongly encourages electronic filing, documents may also be paper-filed. To paper-file, mail an original to: Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, 888 First Street, N.E., Washington, DC 20426.

Attachment: Final Environmental Impact Statement

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## COVER SHEET

a. Title: Relicensing the Upper Drum-Spaulding Hydroelectric Project, FERC No. 2310-193; Lower Drum Hydroelectric Project, FERC No. 14531-000; Deer Creek Hydroelectric Project, FERC No. 14530-000; and Yuba-Bear Hydroelectric Project, FERC No. 2266-102

b. Subject: Final Environmental Impact Statement

c. Lead Agency: Federal Energy Regulatory Commission

d. Abstract: The Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects are located in Nevada and Placer Counties, California. The existing projects affect 978.3 acres within the Tahoe National Forest, which is administered by the U.S. Department of Agriculture, Forest Service; 5.1 acres that are administered by the U.S. Department of the Interior, Bureau of Reclamation; and 10.6 acres that are administered by the U.S. Department of the Interior, Bureau of Land Management.

Pacific Gas & Electric (PG&E) proposes to split the current Drum-Spaulding Project (FERC No. 2310-193) into two three licensed projects: the Lower Drum Project, Deer Creek Project, and the remaining Drum-Spaulding Project (referred to as the Upper Drum-Spaulding Project). PG&E also proposes to retire Alta powerhouse unit 2; modify flow-release facilities; decommission the Jordan Creek diversion; build new recreation facilities; rehabilitate existing recreation facilities; modify the project boundary to include all of part of project trails and primary project roads; and implement measures to protect and enhance environmental conditions, including proposed minimum flow releases.

The staff's recommendation is to relicense the projects as proposed, with certain modifications, and additional measures recommended by the agencies.

The Yuba-Bear Project (FERC No. 2266-102) is located in Sierra, Nevada, and Placer Counties, California. The existing project occupies 1,540.8 acres within the Tahoe National Forest administered by the Forest Service and 208.5 acres that are managed by the Bureau of Land Management.

Nevada Irrigation District (NID) proposes to construct one new powerhouse on NID-owned land adjacent to the existing Rollins powerhouse; add five new streamflow gages; replace, upgrade, or install new recreation facilities; decommission two non-project roads; modify the project boundary to encompass some roads and recreation areas; and implement measures to protect and enhance environmental conditions, including proposed minimum flow releases.

The staff's recommendation is to relicense the project as proposed, with certain modifications, and additional measures recommended by the agencies.

e. Contact: Alan Mitchnick
Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street, N.E.
Washington, DC 20426
(202) 502-6074

f. Transmittal: This final environmental impact statement to relicense the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Hydroelectric Projects is being made available for public comment on or about December 19, 2014, as required by the National Environmental Policy Act of 1969[1] and the Commissions Regulations Implementing the National Environmental Policy Act (18 CFR, Part 380).

[1] National Environmental Policy Act of 1969, amended (Public Law [Pub. L.] 91-190, 42 United States Code [U.S.C.] 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), September 13, 1982).

## FOREWORD

The Federal Energy Regulatory Commission (Commission), pursuant to the Federal Power Act (FPA)[2] and the U.S. Department of Energy Organization Act,[3] is authorized to issue licenses for up to 50 years for the construction and operation of non-federal hydroelectric development subject to its jurisdiction, on the necessary conditions:

> That the project adopted...shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section 4(e)...[4]

The Commission may require such other conditions not inconsistent with the FPA as may be found necessary to provide for the various public interests to be served by the project.[5] Compliance with such conditions during the licensing period is required. The Commission's Rules of Practice and Procedure allow any person objecting to a licensee's compliance or noncompliance with such conditions to file a complaint noting the basis for such objection for the Commission's consideration.[6]

[2] 16 U.S.C. §§ 791(a)-825(r), as amended by the Electric Consumers Protection Act of 1986, Pub. L. 99-495 (1986), the Energy Policy Act of 1992, Pub. L. 102-486 (1992), and the Energy Policy Act of 2005, Pub. L. 109-58 (2005).

[3] Pub. L. 95-91, 91 Stat. 556 (1977).

[4] 16 U.S.C. § 803(a).

[5] 16 U.S.C. § 803(g).

[6] 18 CFR § 385.206 (2012).

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| | |
|---|---|
| Advisory Council | Advisory Council on Historic Preservation |
| APE | area of potential effects |
| APLIC | Avian Protection on Powerline Interaction Committee |
| ATL | Advisory Tissue Level |
| Basin Plan | Fourth Edition of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| BP | before present |
| °C | degrees Celsius |
| California Boating | California Department of Boating and Waterways |
| California DWR | California Department of Water Resources |
| California Fish and Wildlife | California Department of Fish and Wildlife |
| California Water Board | California State Water Resources Control Board |
| Central Valley Water Board | Central Valley Regional Water Quality Control Board |
| CFR | Code of Federal Regulations |
| CFR model | channel flow response model |
| cfs | cubic feet per second |
| Commission | Federal Energy Regulatory Commission |
| Corps | U.S. Army Corps of Engineers |
| CZMA | Coastal Zone Management Act |
| DFA | Demonstration Flow Assessment |
| DO | dissolved oxygen |
| DPS | distinct population segment |
| EFH | essential fish habitat |
| EIS | Environmental Impact Statement |
| El. | elevation |
| EPA | U.S. Environmental Protection Agency |
| EPAct | Energy Policy Act of 2005 |
| ESA | Endangered Species Act |
| ESU | evolutionarily significant unit |
| °F | degrees Fahrenheit |
| FERC | Federal Energy Regulatory Commission |
| FCMA | Forest Carnivore Management Area |
| FRFH | Feather River Fish Hatchery |
| Forest Service | U.S. Department of Agriculture Forest Service |
| FPA | Federal Power Act |
| FWS | U.S. Fish and Wildlife Service |
| GIS | geographic information system |
| GWh | gigawatt-hours |
| HEA | habitat exceedance analysis |
| HEC | Hydrologic Engineering Center |
| HFAM | Hydrocomp Forecast and Analysis Modeling |
| HPETP | Historic Properties Evaluation and Treatment Plan |
| HPMP | Historic Properties Management Plan |
| HPTP | Historic Properties Treatment Plan |
| I-80 | Interstate 80 |
| IBI | index of biotic integrity |

| | |
|---|---|
| Interior | U.S. Department of the Interior |
| kV | kilovolt(s) |
| LRMP | Land and Resource Management Plan |
| LWD | large woody debris |
| Magnuson-Stevens Act | Magnuson-Stevens Fishery Conservation and Management Act |
| MCL | maximum contaminant level |
| mg/L | milligram(s) per liter |
| MMI | multi-metric index |
| mph | mile(s) per hour |
| msl | mean sea level |
| MW | megawatt(s) |
| National Register | National Register of Historic Places |
| NEPA | National Environmental Policy Act |
| NERC | North American Electric Reliability Corporation |
| NFS | National Forest System |
| NGVD29 | National Geodetic Vertical Datum of 1929 |
| NHPA | National Historic Preservation Act |
| NID | Nevada Irrigation District |
| NMFS | U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service |
| NTU | nephelometric turbidity units |
| O&M | operation and maintenance |
| OEHHA | California Office of Environmental Health Hazard Assessment |
| OHV | off-highway vehicle |
| PA | Programmatic Agreement |
| PAOT | people-at-one-time |
| PCE | pri,ary constituent element |
| PCWA | Placer County Water Agency |
| PG&E | Pacific Gas and Electric |
| ppm | parts per million |
| RD | recreational day |
| Reclamation | Bureau of Reclamation |
| ResSim | Reservoir Simulation |
| RM | river mile |
| ROS | Recreation Opportunity Spectrum |
| RPS | Renewable Portfolio Standards |
| RV | recreational vehicle |
| SD1 | scoping document |
| SD2 | revised scoping document |
| SHPO | California State Historic Preservation Officer |
| SMCL | secondary maximum contaminant level |
| SSTEMP | Stream Segment Temperature |
| TCP | Traditional Cultural Property |
| THPO | Tribal Historic Preservation Officers |
| U.S.C. | United States Code |
| UAIC | United Auburn Indian Community |
| USGS | United States Geological Survey |
| VAOT | vehicles-at-one-time |
| VELB | valley elderberry longhorn beetle |
| VQO | visual quality objective |

| | |
|---|---|
| VRC | Visual Resource Class |
| WECC | Western Electricity Coordinating Council |
| WUA | Weighted Useable Area |
| YCWA | Yuba County Water Agency |

# EXECUTIVE SUMMARY

This final environmental impact statement (EIS) addresses the effects of Pacific Gas and Electric Company's (PG&E's) Upper-Drum-Spaulding, Lower Drum, and Deer Creek Projects and Nevada Irrigation District's (NID's) Yuba-Bear Project.

Before filing its license application, PG&E and NID conducted pre-filing consultation under the Integrated Licensing Process. The intent of the Commission's pre-filing process is to initiate public involvement early in the project planning process and to encourage citizens, governmental entities, tribes, and other interested parties to identify and resolve issues prior to application filing.

Before preparing the draft EIS, we conducted scoping to determine what issues and alternatives should be addressed. On March 22, 2008, we distributed a scoping document to interested parties, soliciting comments, recommendations, and information on the project. We held two scoping meetings on June 24, 2008, in Auburn, California, and Grass Valley, California, to request oral comments on the project. On September 25, 2008, we distributed a revised scoping document. On January 19, 2011, we issued notice that the application was ready for environmental analysis and requested conditions and recommendations. On February 29, 2012, we extended the deadline for filing conditions and recommendations until July 31, 2012.

Following publication of the draft EIS on May 17, 2013, we held two public meetings on August 14, 2013, in Auburn, California to receive oral comments on the draft EIS. On June 28, 2013, we granted an extension of the public comment period from July 23, 2013 to August 22, 2013. In the same letter we extended the deadline for filing modified terms and conditions to October 21, 2013.

## DRUM-SPAULDING PROJECT

### Existing Project

On April 12, 2011, PG&E filed an application for a new major license to operate and maintain the Drum-Spaulding Hydroelectric Project (Project No. 2310) and to retire its Alta powerhouse unit 2 that would reduce the project's licensed capacity from 192.5 megawatts (MW) to 191.5 MW. The existing project includes 10 developments located on the South Yuba River, the Bear River, South Fork of Deer Creek, and the North Fork of the North Fork American River in Nevada and Placer Counties, California. The entire project occupies 5,520.2 acres of which 994.0 acres are federal land: 978.3 acres within Tahoe National Forest, which is administered by the U.S. Department of Agriculture, Forest Service (Forest Service); 5.1 acres administered by the U.S. Department of the Interior (Interior), Bureau of Reclamation (Reclamation); and 10.6 acres administered by the Interior, Bureau of Land Management (BLM).

PG&E filed a license application amendment on June 18, 2012, which included a proposal to relicense the Drum-Spaulding Project's Deer Creek Development separately. On May 31, 2013, PG&E again amended its proposal to now split the currently licensed Drum-Spaulding Project into three new licensed projects: the Lower Drum Project, the Deer Creek Project, and the remaining Drum-Spaulding Project (referred to in this document as the Upper Drum-Spaulding Project).

The separation of the existing Drum-Spaulding Project into three individually licensed projects is an administrative procedure that has no environmental effect; therefore, we conclude that the protections offered by the PM&E measures proposed by PG&E, and recommended by us, are not lessened by the separation of the Drum-Spaulding Project into three individually licensed projects.

We describe each proposed project in sections 2.2.1 and 2.2.2 and evaluate the economics and environmental effects of each of the three projects throughout this final EIS.

## UPPER DRUM-SPAULDING PROJECT

### Proposed Action

PG&E requests that the Commission relicense the following developments as a separate project called the Upper Drum-Spaulding Project: Spaulding No. 3 (5.8-MW installed capacity), Spaulding No. 1 and No. 2 (11.4-MW installed capacity), Alta (2-MW installed capacity), Drum No. 1 and No. 2 (105.9-MW installed capacity), and Dutch Flat No. 1 (22-MW installed capacity). The Upper Drum-Spaulding Project encompasses about 4,220 total acres of which 949 acres are federal lands administered by Forest Service; no other federal or state lands are located within the project.

### Project Description

Among the 5 developments, there are 26 reservoirs, 4 water conduits, 6 powerhouses, 4 transmission lines, and appurtenant facilities and structures, including recreation facilities. Each of the developments is described further in section 2.1.1.1, *Existing Project Facilities, Drum-Spaulding Project*, of this final EIS.

### Proposed Facilities

PG&E proposes some modifications to existing project facilities, most notably the permanent retirement of Alta powerhouse unit 2, which has not operated since 2007. PG&E also proposes to remove the Jordan Creek diversion and associated conveyance system, which are not needed for Upper Drum-Spaulding Project operation and have not been used for many years. PG&E proposes to build new recreation facilities and rehabilitate existing facilities at the following sites in the Upper Drum-Spaulding Project: Meadow Lake, Lake Sterling, Fordyce Lake, Lake Spaulding, Lower Lindsey Lake, Fuller Lake, Rucker Lake, Lower Peak Lake, Lake Valley reservoir, White Rock Lake, Blue Lake, Carr Lake, Kelly Lake, Kidd Lake, Middle Lindsey Lake, Culbertson Lake, Lower Rock Lake, Upper Rock Lake, and Bear Valley.

### Proposed Operation

PG&E proposes to modify project operations affecting minimum streamflows, spills from project canals and conduits, and the rate of flow fluctuations following spill events to provide environmental benefits to project-affected resources as described below. In conjunction with these flow modifications, PG&E also proposes the following new or modified flow-release facilities at the Upper Drum-Spaulding Project:

- Spaulding dam—modify Lake Spaulding dam low-level outlet to release a minimum streamflow of 90 cubic feet per second (cfs), add control valves, improve gage YB-29, and modify and improve control systems.

- Lake Valley reservoir dam—modify gage YB-104 for full flow, add energy dissipater, and modify downstream channel; Towle canal diversion dam—modify existing gates to release increased minimum streamflow of 3 cfs and modify existing weir.

- Drum canal at YB-137—install minimum flow release control orifices to release 1 to 2 cfs to Bear River upstream of Drum afterbay.

**Proposed Environmental Measures**

PG&E proposes the following environmental measures.

*General Measures*

- Consult annually with the Forest Service to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize staff with special status species, noxious weeds, and sensitive areas known to occur within the project boundary on Forest Service land, and the procedures for reporting to the agency.

- Develop and implement a Coordinated Operations Plan for the Upper Drum-Spaulding, Deer Creek, Lower Drum, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

*Geology and Soils*

- Implement an Erosion and Sediment Control and Management Plan and Canal Release Point Plan (filed April 11, 2014) to minimize and control project-related erosion; the plans would provide for project-wide implementation of best management practices (BMPs) to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and development and implementation of repair and restoration plans, as necessary.

- During winter to minimize potential adverse effects of high flows on channel morphology, bank stability, and aquatic and riparian habitat of the Bear River: limit operational flow releases from the Drum canal; implement ramping rates; and limit water spilled from the Drum canal to the upper Bear River through Bear Valley Meadow when the Drum afterbay is forecast to spill and the Dutch Flat no. 1 and no. 2 powerhouses are fully loaded.

- During facility outages that last more than 30 days: operate multiple spill gates from the Drum canal to more evenly distribute flows through Bear Valley Meadow; implement a 2-day ramping rate; and notify the appropriate agencies.

*Aquatic Resources*

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98 in this EIS.

- To enhance aquatic habitat and protect resident aquatic species, provide the same or increased minimum streamflows to six project-affected reaches and provide new minimum streamflows to three project-affected reaches not included in the existing license, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 of this EIS as listed below.

| **Project-affected Reach** | **Table No. in Appendix A-2** |
|---|---|
| Fordyce Creek – below Fordyce Lake dam | 3-115 |
| South Yuba River – below Kidd Lake dam and Lower Peak Lake dam | 3-120 |
| South Yuba River – below Lake Spaulding dam | 3-121 |
| North Fork of the North Fork American River – below Lake Valley Reservoir dam | 3-126 |
| North Fork of the North Fork American River – below Lake Valley canal diversion dam | 3-129 |
| Bear River – at Highway 20 crossing | 3-133 |
| Bear River – below Drum afterbay | 3-140 |
| Canyon Creek – below Towle canal diversion dam | 3-136 |
| Little Bear River – below Alta powerhouse tailrace | 3-139 |

- Periodically set the low-level outlet at 16 remote Upper Drum-Spaulding Project dams to provide the same or increased minimum streamflows in nine project reaches and new minimum streamflows in seven project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 of this EIS as listed below.

| **Project-affected Reach** | **Table No. in Appendix A-2** |
|---|---|
| Texas Creek – below Upper Rock Lake dam | 3-102 |
| Texas Creek – below Lower Rock Lake dam | 3-103 |
| Unnamed tributary – below Culbertson Lake dam | 3-104 |
| Lindsey Creek – below Middle Lindsey Lake dam | 3-105 |
| Lindsey Creek – below Lower Lindsey Lake dam | 3-106 |
| Lake Creek – below Feeley Lake dam | 3-107 |
| Lake Creek – below Carr Lake dam | 3-108 |
| Rucker Creek – below Blue Lake dam | 3-109 |
| Rucker Creek – below Rucker Lake dam | 3-110 |
| Unnamed tributary – below Fuller Lake dam | 3-111 |

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Unnamed tributary – below Meadow Lake dam | 3-112 |
| White Rock Creek – below White Rock diversion dam | 3-113 |
| Bloody Creek – below Lake Sterling dam | 3-114 |
| Unnamed tributary – below Kidd Lake dam | 3-118 |
| Cascade Creek – below Lower Peak Lake dam | 3-119 |
| Sixmile Creek – below Kelly Lake dam | 3-128 |

- Notify licensing participants at an annual consultation meeting of all annual planned and non-routine planned canal outages. Implement modified minimum streamflows in project canal-affected stream reaches during the first 30 days of canal outages, as shown in appendix A-2, table 3-181 of this EIS. For canal outages anticipated to extend past 30 days, consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in the event of an emergency outage. Drum and Bear River canals would not be taken out of service at the same time.

- To expand recreational whitewater boating opportunities and support supplemental flow releases downstream from Lake Spaulding to the South Yuba River, draw down Fordyce Lake beginning in late spring with an initially high target flow (250 to 450 cfs) until the lake reaches 29,000 acre-feet of remaining storage and then make equally apportioned releases throughout the rest of the year to reach an end-of-year storage of 7,500 to 10,000 acre-feet.

- Construct and operate two 1-cfs flow release devices near the existing spillway at the Drum canal to provide controllable minimum streamflows to the Bear River upstream of the Drum afterbay.

- To reduce the risk of stranding of aquatic resources below Lake Spaulding dam, adhere to Lake Spaulding spill cessation schedules and minimize flow fluctuations in the South Yuba River below Lake Spaulding, as shown in appendix A-2, table 3-182 and table 3-183 of this EIS.

- Implement Supplemental Flow releases below Lake Spaulding dam to maintain the water temperature of south Yuba River above the confluence of Canyon Creek at 20°C to benefit resident rainbow trout and protect foothill yellow-legged frog populations.

- Implement a Canal Outage Fish Rescue Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Design and install new or modify existing streamflow gages to measure new minimum streamflows, as described in Forest Service/BLM Gaging Plan (filed April 11, 2014) and shown in appendix A-2, table 3-188 of this EIS.

- Implement an aquatic monitoring program to assess the effects of the proposed flow modifications on aquatic resources in selected project-affected stream reaches, as described in the Fish Population Monitoring Plan (filed November 21, 2013), Foothill Yellow-legged Frog Monitoring Plan (filed November 21, 2013), Channel Morphology Monitoring Plan (filed November 21, 2013), Forest Service/BLM Water Temperature and Stage Monitoring Plan (filed April 11, 2014), and Forest Service/BLM Riparian Vegetation Monitoring Plan (filed April 11, 2014). Also, monitor incidental occurrence of western pond turtle.

- Develop and implement an aquatic invasive species management and monitoring plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

- Develop and implement a monitoring plan for Aquatic Benthic Macroinvertebrates to assess the response of the benthic macroinvertebrate community to instream flow changes.

- Develop and implement a large woody debris management program to enhance aquatic habitat.

*Terrestrial Resources*

- Implement an Integrated Vegetation Management Plan (filed November 21, 2013) that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and controls the spread of non-native invasive species.

- Monitor animal losses from drowning in project canals.

- Consult with California Fish and Wildlife and the Forest Service when replacing wildlife escape and crossing facilities.

- Retrofit existing footbridges or construct new wildlife crossings on Drum canal, at specified locations, to minimize wildlife injury and mortality associated with movement across this project canal.

- Implement measures to protect the channel morphology and riparian vegetation of Bear River upstream of Forest Service lands, to include modifications to Drum canal winter operations and outage spills and assessment of baseline conditions in Bear Valley meadow.

- Implement a Bald Eagle Management Plan (filed November 21, 2013) to protect nesting bald eagles from disturbance during project operations and maintenance and project-related recreational activities.

- Implement bat management measures, including provisions for monitoring and installing exclusion devices to minimize disturbance during project operation and maintenance.

- Record annually all incidental observations of bird collision/electrocutions along project powerlines and replace or retrofit problem power poles as appropriate.

Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality.

- Monitor activities associated with annual planned outages and non-routine planned outages along the South Yuba canal. Record activities that may generate noise disturbances that occur between February 15 through September 15 within 0.25 mile of California spotted owl and northern goshawk Protected Activity Centers.

*Threatened and Endangered Species*

- Implement valley elderberry longhorn beetle conservation measures as outlined in Integrated Vegetation Management Plan (filed November 21, 2013) to avoid or minimize the loss of elderberry shrubs.

*Recreation Resources*

- Implement September 2013 Recreation Plan (filed November 18, 2013) for upgrades, maintenance, and development of new project recreation facilities.

- Develop a plan to provide real-time streamflow information in cfs at 15-minute intervals to the public via the internet for Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam (at Cisco Grove), South Yuba River below Lake Spaulding (at Lang's Crossing), and the Bear River at Highway 20. Implement Water Temperature and Stage Monitoring Plan (filed April 11, 2014) that includes installing a monitoring station in the South Yuba River upstream of, but as close as possible to, Canyon Creek within 3 years that would monitor river stage at15-minute intervals and transmit the readings hourly; the readings would be available in real-time (hourly) to the public via the internet.

- To expand recreational whitewater boating opportunities and support Supplemental Flow releases downstream from Lake Spaulding to the South Yuba River, draw down Fordyce Lake beginning in late spring with an initially high target flow (250 to 450 cfs) until the lake reaches 29,000 acre-feet of remaining storage and then make equally apportioned releases throughout the rest of the year to reach an end-of-year storage of 7,500 to 10,000 acre-feet.

- Maintain flows in Fordyce Creek at 50 cfs for a 10-day period beginning about the third week of August to enhance stream crossing for an off-highway vehicle event.

- Pay up to a maximum of $15,000 per year to the California Department of Fish and Wildlife (California Fish and Wildlife) for fish stocking in Lake Spaulding to support recreational angling, provided such stocking is performed.

- Provide a one-time payment of $95,000 to BLM for BLM recreation improvements on the South Yuba River downstream of Lake Spaulding and provide $30,000 annually to BLM to fund the annual operation, maintenance, and administrative costs to BLM.

*Cultural Resources*

- Implement a Historic Properties Management Plan (HPMP) (filed September 23, 2013) to protect resources eligible for inclusion in the National Register of Historic Places.

*Land Use and Aesthetic Resources*

- Revise project boundaries to reflect separation of proposed Upper Drum-Spaulding Project from the existing Drum-Spaulding Project.

- Develop and implement a Hazardous Substances Plan to identify acceptable prevention and mitigation measures and to ensure that hazardous substances are promptly contained or cleaned up.

- Implement a Transportation Management Plan for Primary Project Roads (filed August 29, 2012) to ensure that project roads are adequately maintained.

- Implement a Fire Prevention and Response Plan (filed November 21, 2013) on federal project lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project.

- Implement a Visual Resource Management Plan (filed June 18, 2012) on federal land to protect visual and aesthetic resources on and adjacent to project lands.

- Revise the project boundary to remove the Jordan Creek diversion and conveyance system and to include certain primary project roads, and new and rehabilitated recreation facilities after the facilities are decommissioned.

**Alternatives Considered**

This final EIS analyzes the effects of continued project operation and recommends conditions for any new license that may be issued for the project. In addition to PG&E's proposal, as outlined above, we consider two alternatives: (1) a staff alternative and (2) no action—continued operation with no changes.

*Staff Alternative*

Under the staff alternative, the project would be operated and maintained as proposed by PG&E, with the following revisions and additional measures:

- Implement extreme critically dry water year type flows in the second year of two sequential critically dry years in three specified project-affected reaches.

- Develop and implement a Large Woody Debris (LWD) Management Plan that would monitor existing conditions and guide development of stream-reach and facility-specific management plans to pass LWD at project dams and diversions for protection and enhancement of downstream aquatic habitat.

- Develop and implement a Bear River Management Plan to assess riparian vegetation and bank stability conditions in the Bear River above the Drum

afterbay on Forest Service lands that may be affected by high flow pulses during winter spills from Drum canal. As part of the plan, provide baseline and long-term monitoring of riparian vegetation, erosion and bank stability, and fixed geomorphic baseline channel transects.

- Modify measures to protect channel morphology and riparian vegetation of the Bear River upstream of Forest Service lands to include use of level loggers and monumented cross-sections.

- Provide additional summer flows to the South Yuba River below Lake Spaulding dam (Spaulding No. 1 and No. 2 Development) to manage water temperature for resident aquatic resources by implementing the Supplemental Flow Schedule specified by Forest Service condition 29.

- Establish a Consultation Group to support implementation, review, and management of the South Yuba River supplemental flow releases below Lake Spaulding dam.

- Develop and implement a Jordan Creek diversion decommissioning plan for the proposed removal of water diversion and transport structures that have not been used for project operations for many years.

- Modify the proposed Integrated Vegetation Management Plan to extend management to accessible non-federal project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and include the protection of culturally significant plant species after consultation with the tribes.

- Prepare and implement a Wildlife Crossing Management Plan that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.

- Develop and implement an Avian Management Plan that includes provisions for raptor monitoring and protection and limited operating periods (LOPs) for the protection of special-status birds and their habitat.

- Incorporate proposed bat management measures into a Bat Management Plan.

- Modify the Recreation Plan with regard to the implementation schedule, trail development, campground upgrades, accessibility improvements, parking and road improvements, signage, water systems, maintenance, and recreation monitoring to exclude provisions for campground hosts or added amenities at campground host sites, and to exclude enhancements to trails, trailheads, or trail facilities that do not serve a project purpose.

- In lieu of funding California Fish and Wildlife for fish stocking, develop and implement a fish stocking plan for the project to ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs (replaces PG&E's proposal to pay for fish stocking). The fish stocking plan would include: (1) a provision for annual stocking in Lake Spaulding, Lake Valley reservoir, Fuller Lake, and Lower

Lindsey Lake; (2) a provision for stocking every other year until the first Form 80 reporting year after plan implementation in Fordyce Lake and Meadow Lake; and (3) provisions for stocking fish in the project's Carr, Culbertson, Feeley, Upper Lindsey, Lower Rock, Upper Rock, Blue and White Rock Lakes, and Lake Sterling reservoirs based on monitoring of recreational use and angling pressure over the term of the new license.

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet to include 15-minute interval reporting of streamflow information for these reaches: Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam [at Cisco Grove], South Yuba River below Lake Spaulding at Lang's Crossing, and the Bear River at Highway 20.

- Revise the Fire Prevention and Response Plan to include all project lands within the plan's geographic scope and to include a provision for the periodic review and update of the plan.

- Revise the Hazardous Substances Plan to apply to all project lands.

*No-action Alternative*

Under the no-action alternative, PG&E would continue to operate the project as part of the Drum-Spaulding Project as it currently does, without making any of its proposed modifications to project facilities, including new recreation facilities. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

**Areas of Concern**

The primary issues associated with relicensing the project are erosion control and restoration measures, flow regimes in project-affected reaches for aquatic resources, spill cessation schedules following high-flow periods to mimic natural conditions and for whitewater boating opportunities, protection of wildlife resources, recreation enhancements, and protection of cultural resources.

**Staff Alternative**

*Geology and Soils*

Water spilled from project canals during normal project operation and during canal outages can result in slope and channel destabilization and erosion. The Forest Service and California Fish and Wildlife have identified several stream reaches of the upper Bear River upstream of Drum afterbay (known as Bear Meadow or Bear Valley) where aquatic and riparian habitat may be adversely affected by high flow releases from Drum canal during winter operations and canal outages. In addition, construction and maintenance associated with the extensive network of project recreation facilities can also cause erosion and sedimentation, potentially affecting project lakes, reservoirs, and stream reaches.

Implementation of a project-wide Erosion and Sediment Control and Management Plan and Canal Release Plan, including a survey to identify steep slopes and areas below project canals that have been affected by spills and canal operations, would minimize the potential for future project operations to cause erosion impacts and prioritize previously affected sites for restoration.

Implementing the proposed and recommended measures for Bear River Management on federal and non-federal lands would document baseline aquatic and riparian conditions in the upper Bear River area and monitor the effects of high flows from Drum canal on the Bear River channel, bank stability, and riparian vegetation. Review of data generated through this monitoring would guide development of any future mitigation and restoration measures that may be necessary. Interim management measures and spill flow limits would minimize potential future effects during this ongoing monitoring.

*Aquatic Resources*

Flow diversions and fluctuations associated with project operation can result in a variety of effects on aquatic resources downstream of the project. Project operations and diversions reduce the seasonal and interannual flow variability in natural systems that can influence water temperature and the dynamics and diversity of aquatic ecosystems. The dams at many project lakes and reservoirs are operated to capture and store water from spring snowmelt to support water delivery and project operations through the summer and into fall. Implementing the proposed minimum streamflow schedules would result in higher flows in 16 project-affected stream reaches and minimum streamflows in 12 additional project-affected stream reaches that had no minimum streamflow requirement under the existing license. In project reaches with higher flows, seasonal flow variability more typical of unregulated flow conditions would be introduced with the minimum streamflow schedule. Six water year types ranging from extreme critically dry to wet based on the California Department of Water Resources (DWR) Bulletin 120 estimate of full unimpaired flows for the Yuba River Basin would be used to introduce inter-annual variability to minimum streamflows in larger stream reaches.

Mutual operations of the Upper Drum-Spaulding, Deer Creek, Lower Drum, and Yuba-Bear Projects could affect streamflows and the ability to provide specified minimum streamflows in some project-affected reaches. Development and implementation of a Coordinated Operations Plan would ensure that both PG&E and NID are able to comply with minimum streamflow requirements downstream of their respective project facilities.

Under typical operations to maximize water storage, when high spring flows begin to decrease and spills at project dams terminate, flows in stream reaches downstream decrease rapidly, which can cause stranding of aquatic organisms. Implementing the proposed Spill Cessation and Minimization of Flow Fluctuations measure would provide a gradual reduction of flows over a period of up to 21 days following major spills at Lake Spaulding dam to the South Yuba River that would protect aquatic resources.

Water temperature requirements differ among aquatic resources utilizing project-affected reaches. For example, the colder water temperatures preferred by resident rainbow trout in the South Yuba River below Lake Spaulding dam could adversely affect reproduction and development of populations of foothill yellow-legged frog (a special-status species). The Supplemental Flow Schedule for water temperature management in the South Yuba River would be implemented at Lake Spaulding dam to protect and enhance cold water habitat for resident rainbow trout while still ensuring adequate water temperatures for reproduction and development of foothill yellow-legged frog. Monitoring water temperature and aquatic resources in this stream reach would provide information to evaluate the effectiveness of the Supplemental Flow Schedule releases for protection and enhancement of both of these species.

The Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects contain a network of canals; these canals are taken out of service for planned annual and unplanned maintenance and during emergency situations. During an outage when a canal is drained, fish

within the canal can be stranded and die. Implementing the proposed measures during canal outages would ensure appropriate notification of resource agencies and passage of natural streamflows at a minimum in affected stream reaches. The Canal Fish Rescue Plan would provide protection to fish in project canals when the canals are drained during an outage and would coordinate these operations with the appropriate resource agencies.

An effective program would be needed to monitor compliance with any streamflow license requirements. Implementation of the Gaging Plan (filed April 11, 2014) would provide procedures and resources to demonstrate compliance or non-compliance with the various flow measures proposed in each project-affected stream reach. LWD can be an important component of aquatic habitat complexity and diversity in some stream reaches; operation of some project dams reduce or prevent the downstream passage and dispersal of LWD generated in upstream portions of watersheds. LWD can be trapped in some project reservoirs where existing procedures are to remove the LWD and stockpile it for subsequent burning or disposal offsite. A survey would identify locations and quantity of LWD collected and identification of appropriate locations for reintroduction of LWD.

The diversion of water by the project between watersheds and extensive and intensive recreational use of project waters have the potential to exacerbate the geographic dispersal and expansion of invasive aquatic species which could degrade aquatic habitat and adversely affect native species. Development and implementation of an Aquatic Invasive Species Management Plan would minimize the spread of aquatic invasive species resulting from project operation and recreational use of project waters.

Implementation of monitoring plans for fish populations, foothill yellow-legged frog, channel morphology, water temperature and stage, riparian vegetation and documentation of incidental observations of western pond turtle would provide information necessary to evaluate the effects of proposed flow modifications.

*Terrestrial Resources*

Project operation and maintenance (O&M) activities may have a negative effect on plant species present within the project boundary. The spread of invasive plant species may be inadvertently encouraged through the disturbance of soil and existing vegetation associated with proposed construction of recreation areas while sensitive and culturally significant plant species may also be negatively affected by construction, clearing, or herbicide application used to control invasive species. Implementing the Integrated Vegetation Management Plan, as modified to include provisions for non-federal project lands and protection of culturally significant species, would minimize the potential for negative effects associated with project O&M activities.

Wildlife mortality associated with drowning in project canals has been an issue for some of the target species (e.g., mule deer) using habitats within the project boundary. Implementing the proposed and recommended alternative wildlife crossing conditions that provide for monitoring of animal losses in canals and constructing new deer bridges and retrofitting existing bridges would minimize wildlife mortality associated with the attempted crossing of these project features by target wildlife species and improve wildlife movement through the project area.

Project power lines may adversely affect raptors through injury or mortality associated with electrocution and collisions. Monitoring of collisions/electrocutions along the project's Bowman-Spaulding transmission line would assist in the identification of problem transmission line components that could be replaced or retrofitted to reduce or eliminate the risk to raptors.

*Threatened and Endangered Species*

The interbasin transfer of flows associated with the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project may adversely affect the Central Valley spring-run Chinook salmon distinct population segment (DPS), Central Valley steelhead DPS, and southern DPS of the green sturgeon downstream of Englebright dam. Project dams on the Middle Yuba and South Yuba Rivers divert water from the river to many canals and conduits where power generation occurs and where water is delivered to NID and Placer County Water Agency (PCWA) at many points along the system. These diversions, in combination with operations of the Yuba River Project (FERC No. 2246), have the potential to cumulatively affect listed species. We will initiate formal consultation for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects after our evaluation of recommended measures, including flow releases, associated with relicensing of the Yuba River Project.

*Recreation*

Project lakes and reservoirs, project-affected stream reaches and project lands provide a wide range of recreational opportunities. Recreation facilities and opportunities in some portions of the project receive heavy use that can adversely affect environmental and recreational resources. The proposed Recreation Plan would provide additional or improved camping opportunities, including new campgrounds or primitive campsites at Lake Valley, Lake Spaulding, Lindsey Creek, Fordyce Lake, Lower Peak Lake, and Lake Sterling; reconstruction of Meadow Lake shoreline campground, Meadow Lake campground, Meadow Knolls group campground, Carr Lake walk-in campground, and Lower Lindsay Lake campground; improvements at Lake Spaulding campground, Bear Valley group campground, Kidd Lake group campground, Lodgepole campground, and Rucker Lake campground; and improvements of primitive campsites at White Rock Lake, Blue Lake, Middle Lindsey Lake, Culbertson Lake, Lower Rock Lake, and Upper Rock Lake. The proposed Recreation Plan would also provide additional trails at the project recreation facilities at Meadow Lake, Rucker Lake, Blue Lake, and Carr Lake. Implementing PG&E's proposed Recreation Plan would provide additional and improved boating opportunities at the project and include the conversion of the existing informal boat launch at Rucker Lake into a formal car-top boat launch, development of an informal boat launch at the Carr Lake walk-in campground, and extension of the boat ramp at the Silvertip boat launch at Lake Valley reservoir to make the boat ramp usable at lower reservoir water levels.

We recommend that the Recreation Plan not include provisions for campground hosts, added amenities at campground host sites, and enhancements to trails, trailheads, or trail facilities that do not serve a project purpose. Implementing the Recreation Plan with recommended modifications would enhance recreational opportunities at the project and ensure operation and adequate maintenance of existing and proposed project recreational facilities.

Angling is one of the primary recreational activities at the project. Fish stocking is necessary to sustain populations of game fish in project waters with high angler use. Development and implementation of a staff-recommended fish stocking plan would ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs. This plan would address annual stocking in project waters that currently receive heavy angling pressure, including Lake Spaulding, Lake Valley reservoir, Fuller Lake, and Lower Lindsey Lake, and stocking every other year until the first Form 80 reporting year after plan implementation in Fordyce Lake and Meadow Lake. This plan would also include provisions for stocking fish in additional project reservoirs (such as Carr, Culbertson, Feeley, Upper Lindsey, Lower Rock, Upper Rock, Blue and White Rock Lakes, and Lake Sterling) in the

future to address changes in recreational use and angling pressure during the term of the new license.

Certain streamflow measures, specifically flow reductions during spill cessation at Lake Spaulding and Fordyce Lake drawdown, would provide more predictable and extended periods of high flow, enhancing existing whitewater boating opportunities at the project. A special event flow proposed by PG&E during the Fordyce Lake drawdown would enhance opportunities for off-highway vehicle crossing of Fordyce Creek.

*Cultural Resources*

Through implementation of PG&E's final HPMP, as revised based on SHPO and tribal comments, and staff review, project-related adverse effects on historic properties would be avoided, reduced, or mitigated.

*Land Use*

Project land use activities have the potential to affect environmental resources in the project area. Implementing the proposed Transportation Management Plan would ensure that all project roads are maintained to current, applicable standards, would improve access to the project, and would minimize the potential for adverse environmental effects due to road use and road maintenance. The plan would also clarify PG&E's road management responsibilities within the project boundary.

Continued operation of project's facilities (e.g., transmission lines, generators, and construction equipment) and increased recreational use over the term of a new license may contribute to fire danger in the project areas. Fires can affect, among other things, public safety, property, aesthetics, and air quality. Implementing the staff recommended Fire Prevention and Response Plan would improve planning, management, and coordination of wildfire protection. Implementation of the plan would also lead to a reduction in the occurrence of wildfires in the project area and the need for suppression by implementing measures for prevention (including fuels treatment), reporting, emergency response, and investigation of fires related to project operations and use, minimizing damage to environmental resources and other potential effects.

Potential spill of hazardous substances within the project boundary could impact area resources. Implementation of the staff-recommended Hazardous Substances Plan would ensure that spills of hazardous substances are promptly contained and cleaned up to avoid/minimize the potential extent of adverse environmental effects, including impacts to water quality.

*Aesthetics*

Implementation of the Visual Resource Management Plan, which includes identifying those project facilities that would be painted a darker color to reduce visual contrast and establishes a process to evaluate future activities at the project that may result in changes to the visual environment, would reduce color contrast, make project facilities more consistent with established visual quality objectives, and improve overall visual quality in the project area. Consultation, as required under the plan, would ensure that any new facilities or enhancements to existing facilities are designed and constructed to be consistent with applicable visual quality objectives.

### No-action Alternative

Under the no-action alternative, PG&E would continue to operate the project as it currently does as part of the Drum-Spaulding Project, without making any of its proposed modifications to project facilities, including new recreation facilities. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

### Conclusions

Based on our analysis, we recommend licensing the Upper Drum-Spaulding Project as proposed by PG&E, with some staff modifications and additional measures.

In section 4.1.2 of the EIS, we estimate the likely cost of alternative power for each of the three alternatives identified above. Our analysis shows that during the first year of operation under the no-action alternative, project power would cost $48,043,000, or $84.08 per megawatt-hour (MWh), less than the likely alternative cost of power. Under the proposed action alternative, project power would cost $56,686,000, or $111.15/MWh, more than the likely alternative cost of power. Under the staff alternative, project power would cost $57,064,000, or $111.89/MWh more than the likely alternative cost of power. Under the staff alternative with mandatory conditions, project power would cost $57,958,000, or $113.64/MWh, more than the likely alternative power would cost.

We chose the staff alternative as the preferred alternative because: (1) the project would provide a dependable source of electrical energy for the region (510,000 MWh annually); (2) the project's 146.1-MW electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; and (3) the recommended environmental measures proposed by PG&E, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

## LOWER DRUM PROJECT

### Proposed Action

The proposed Lower Drum Project would be separated from the existing Drum-Spaulding Project and would operate under a new license. This new project would include the following developments: Halsey (11-MW installed capacity), Wise (14-MW installed capacity), Wise No. 2 (3.2-MW installed capacity), and Newcastle (11.5-MW installed capacity). The proposed Lower Drum Project would encompass about 697 acres of which about 5 acres are federal lands administered by Reclamation. Another 20 project acres are on State or county lands.

### Project Description

The Lower Drum Project includes: three reservoirs, four canals, four powerhouses, one distribution line, one transmission line, and appurtenant facilities and structures, including recreation facilities. The project diverts water from the Bear River at the Bear River canal diversion dam below the Yuba-Bear Project's Rollins dam. Water diverted from the Bear River moves through the Lower Drum Project for power generation and delivery at various locations for consumptive water use by NID and PCWA. Water is transferred first to the Halsey Development via the Bear River canal to the Halsey forebay and powerhouse. From the Halsey afterbay water is transferred via the Upper Wise canal through Rock Creek reservoir and via the Lower Wise

canal to the Wise forebay and through the Wise and Wise No. 2 powerhouses. The two Wise powerhouses discharge to South canal which transfers water to the Newcastle headerbox and powerhouse for discharge to Mormon Ravine and Folsom reservoir (non-project). The Lower Drum Project facilities affect flows in Dry Creek below Halsey afterbay, Rock Creek below Rock Creek reservoir, Auburn Ravine below South canal, and Mormon Ravine below Newcastle powerhouse. Each of the developments is described further in section 2.1.1.1, *Existing Project Facilities, Drum-Spaulding Project*, of this final EIS.

**Proposed Facilities**

PG&E does not propose to build new or modify any of these existing facilities. PG&E proposes to develop a parking area at Wise forebay and to make improvements at existing recreation facilities at Halsey forebay.

**Proposed Operation**

PG&E does not propose to change the existing operation of any of the four developments as described above. Scheduled maintenance of project canals would not be changed.

**Proposed Environmental Measures**

PG&E proposes the following environmental measures.

*General Measures*

- Consult annually with Reclamation to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.
- Conduct annual employee training to familiarize staff with special status species, noxious weeds, and sensitive areas known to occur within the project boundary on Reclamation land, and the procedures for reporting to each agency.
- Develop and implement a Coordinated Operations Plan for the Upper Drum-Spaulding, Lower Drum, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

*Geology and Soils*

- Implement the Erosion and Sediment Control and Management Plan and Canal Release Point Plan (filed April 11, 2014) to minimize and control project-related erosion; the plans would provide for project-wide implementation of BMPs to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and development and implementation of repair and restoration plans, as necessary.

*Aquatic Resources*

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98 of this EIS.

- To enhance aquatic habitat and protect resident aquatic species, provide the minimum streamflows to four project-affected reaches as described in section 3.3.2.2.1, *Water Quantity*, and shown in the tables of appendix A-2 of the EIS as listed below.

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Dry Creek – below Halsey afterbay dam | 3-142 |
| Rock Creek – below Rock Creek diversion dam | 3-143 |
| Auburn Ravine | 3-144 |
| Mormon Ravine | 3-146 |

- Coordinate operations with the Yuba-Bear Project at Rollins dam and Bear River canal diversion dam to ensure maintenance of minimum streamflows downstream in the lower Bear River.

- Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Implement modified minimum streamflows in project canal-affected stream reaches during the first 30 days of canal outages, as shown in appendix A-2, table 3-181 of this EIS. For canal outages anticipated to extend past 30 days, consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage. Drum and Bear River canals would not be taken out of service at the same time.

- Provide minimum streamflows and canal outage minimum flows in Auburn Ravine below the Wise and Wise No. 2 Developments and South canal release point, as shown in appendix A-2, table 3-144 of this EIS, to protect and enhance resident aquatic resources and their habitat.

- Implement a Canal Outage Fish Rescue Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Design and install new or modify existing streamflow gages to measure new minimum streamflows, as described in Forest Service/BLM Gaging Plan (filed April 11, 2014) and shown in appendix A-2, table 3-188 of this EIS.

- Implement an aquatic monitoring program to assess the effects of the proposed flow modifications on aquatic resources in selected project-affected stream reaches, as described in the Fish Population Monitoring Plan (filed November 21, 2013). Also, monitor incidental occurrence of western pond turtle.

- Develop and implement an aquatic invasive species management and monitoring plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

*Terrestrial Resources*

- Implement an Integrated Vegetation Management Plan (filed November 21, 2013) that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and controls the spread of non-native invasive species.

- Monitor animal losses from drowning in project canals.

- Consult with California Fish and Wildlife and the Forest Service when replacing wildlife escape and crossing facilities.

- Develop a wildlife crossing plan for the Bear River and South canals to minimize mortality and improve wildlife movement.

- Implement a Bald Eagle Management Plan (filed November 21, 2013) to protect nesting bald eagles from disturbance during project operations and maintenance and project-related recreational activities.

- Implement bat management measures, including provisions for monitoring and installing exclusion devices to minimize disturbance during project operation and maintenance.

- Record annually all incidental observations of bird collision/electrocutions along project powerlines and replace or retrofit problem power poles as appropriate. Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality.

- Monitor activities associated with annual planned outages and non-routine planned outages along the South Yuba canal. Record activities that may generate noise disturbances that occur between February 15 and September 15 within 0.25 mile of California spotted owl and northern goshawk Protected Activity Centers.

*Threatened and Endangered Species*

- Implement valley elderberry longhorn beetle conservation measures as outlined in Integrated Vegetation Management Plan (filed November 21, 2013) to avoid or minimize the loss of elderberry shrubs.

*Recreation Resources*

- Implement the September 2013 Recreation Plan (filed November 18, 2013) to develop and maintain a parking area at Wise forebay and improve and maintain Halsey forebay picnic area.

*Cultural Resources*

- Implement a HPMP (filed September 23, 2013) to protect resources eligible for inclusion in the National Register of Historic Places.

*Land Use and Aesthetic Resources*

- Revise project boundaries to reflect separation of the Lower Drum Project from the existing Drum-Spaulding Project.

- Develop and implement a Hazardous Substances Plan to identify acceptable prevention and mitigation measures and to ensure that hazardous substances are promptly contained or cleaned up.

- Implement a Transportation Management Plan for Primary Project Roads (filed August 29, 2012) to ensure that project roads are adequately maintained.

- Implement a Fire Prevention and Response Plan (filed November 21, 2013) on federal project lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project.

- Implement a Visual Resource Management Plan (filed June 18, 2012) on federal land to protect visual and aesthetic resources on and adjacent to project lands.

**Alternatives Considered**

This final EIS analyzes the effects of continued project operation and recommends conditions for any new license that may be issued for the project. In addition to PG&E's proposal, as outlined above, we consider two alternatives: (1) a staff alternative and (2) no action—continued operation with no changes.

*Staff Alternative*

Under the staff alternative, the project would be operated and maintained as proposed by PG&E, with the following revisions and additional measures:

- Develop and implement an Aquatic Benthic Macroinvertebrate Plan to assess the response of benthic macroinvertebrate community to instream flow changes.

- Develop and implement a Water Temperature and Stage Monitoring Plans to monitor effects of flow and operational changes on aquatic habitats.

- Modify the proposed Vegetation Management Plan to extend management to accessible non-federal project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and include the protection of culturally significant plant species after consultation with the tribes.

- Prepare and implement a Wildlife Crossing Management Plan that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.

- Develop and implement an Avian Management Plan that includes provisions for raptor monitoring and protection.

- Incorporate proposed bat management measures into a Bat Management Plan.

- Develop and implement a Fish Stocking Plan for the project to ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs. The fish stocking plan would address annual stocking in Halsey forebay, and includes provisions for stocking fish in additional project reservoirs, including Rock Creek, based on monitoring of recreational use and angling pressure over the term of the new license.

- Revise the Fire Prevention and Response Plan to include all project lands within the plan's geographic scope and to include a provision for the periodic review and update of the plan.

- Revise the Hazardous Substances Plan to apply to all project lands.

*No-action Alternative*

Under the no-action alternative, PG&E would continue to operate the project as part of the Drum-Spaulding Project as it currently does, without making any of its proposed modifications to project facilities, including new recreation facilities. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

**Areas of Concern**

The primary issues associated with relicensing the project are erosion control and restoration measures, flow regimes in project-affected reaches for aquatic resources, protection of wildlife resources; recreation enhancements, and protection of cultural resources.

**Staff Alternative**

*Geology and Soils*

Water spilled from project canals during normal project operation and during canal outages can result in slope and channel destabilization and erosion. In addition, construction and maintenance associated with the extensive network of project recreation facilities can also cause erosion and sedimentation, potentially affecting project lakes, reservoirs, and stream reaches.

Implementation of a project-wide Erosion and Sediment Control and Management Plan and Canal Release Point Plan, including a survey to identify steep slopes and areas below project canals that have been affected by spills and canal operations, would minimize the potential for future project operations to cause erosion impacts and prioritize previously affected sites for restoration.

*Aquatic Resources*

Flow diversions and fluctuations associated with project operation can result in a variety of effects on aquatic resources downstream of project. Project operations and diversions reduce the seasonal and interannual flow variability in natural systems that can influence water temperature and the dynamics and diversity of aquatic ecosystems. The dams at many project

lakes and reservoirs are operated to capture and store water from spring snowmelt for water delivery and project operations. Implementing the proposed minimum streamflow schedules would provide for streamflow releases in 4 project-affected stream reaches that had no minimum streamflow requirement under the existing license. Six water year types ranging from extreme critically dry to wet based on the California DWR Bulletin 120 estimate of full unimpaired flows for the Yuba River Basin would be used to introduce inter-annual variability to minimum streamflows in larger stream reaches.

Mutual operations of the Upper Drum-Spaulding, Lower Drum, and Yuba-Bear Projects could affect streamflows and the ability to provide specified minimum streamflows in some project-affected reaches. Development and implementation of a Coordinated Operations Plan would ensure that both PG&E and NID are able to comply with minimum streamflow requirements downstream of their respective project facilities.

Monitoring water temperature and aquatic resources in selected stream reaches would provide information to evaluate the effectiveness of the proposed minimum streamflows for protection and enhancement of fish and benthic macroinvertebrate populations.

The Upper Drum- Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects contain a network of canals; these canals are taken out of service for planned annual and unplanned maintenance and during emergency situations. During an outage when a canal is drained, fish within the canal can be stranded and die. Implementing the proposed measures during canal outages would ensure appropriate notification of resource agencies and passage of natural streamflows at a minimum in affected stream reaches. The Canal Fish Rescue Plan would provide protection to fish in project canals when the canals are drained during an outage and would coordinate these operations with the appropriate resource agencies.

An effective program would be needed to monitor compliance with various proposed streamflow measures. Implementation of the Gaging Plan and Flow Setting Plan would demonstrate compliance or non-compliance with the various flow measures proposed in each project-affected stream reach.

The diversion of water by the project between watersheds and extensive and intensive recreational use of project waters have the potential to exacerbate the geographic dispersal and expansion of invasive aquatic species which could degrade aquatic habitat and adversely affect native species. Implementation of proposed measures would minimize the spread of aquatic invasive species resulting from project operation and recreational use of project waters.

Implementation of Fish Populations and Water Temperature and Stage monitoring plans, and staff-recommended Aquatic Benthic Macroinvertebrate Monitoring Plan would provide information necessary to evaluate the effects of proposed flow modifications.

*Terrestrial Resources*

Project O&M activities may have a negative effect on the plant species present within the project boundary. The spread of invasive plant species may be inadvertently encouraged through the disturbance of soil and existing vegetation associated with proposed construction of recreation areas while sensitive and culturally significant plant species may also be negatively affected by construction, clearing, or herbicide application used to control invasive species. Implementing the Integrated Vegetation Management Plan, as modified to include non-federal project lands within its scope and provisions for the protection of culturally significant species, would minimize the potential for negative effects associated with project O&M activities.

Wildlife mortality associated with drowning in project canals has been an issue for some of the target species (e.g., mule deer) using habitats within the project boundary. Implementing the proposed and recommended alternative wildlife crossing conditions that provide for monitoring of animal losses in canals and constructing new deer bridges and retrofitting existing bridges would minimize wildlife mortality associated with the attempted crossing of these project features by target wildlife species and improve wildlife movement through the project area.

Project power lines may adversely affect raptors through injury or mortality associated with electrocution and collisions. Monitoring of collisions/electrocutions along the project's transmission lines would assist in the identification of problem transmission line components that would be replaced or retrofitted to reduce or eliminate the risk to raptors.

*Threatened and Endangered Species*

The interbasin transfer of flows associated with the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project may adversely affect the Central Valley spring-run Chinook salmon DPS, Central Valley steelhead DPS, and southern DPS of the green sturgeon downstream of Englebright dam. Project dams on the Middle Yuba and South Yuba Rivers divert water from the river to many canals and conduits where power generation occurs and where water is delivered to NID and PCWA at many points along the system. These diversions, in combination with operations of the Yuba River Project, have the potential to cumulatively affect listed species. We will initiate formal consultation for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects after our evaluation of recommended measures, including flow releases, associated with relicensing of the Yuba River Project.

*Recreation*

The project provides a picnic area at Halsey forebay and shoreline angling opportunities at Halsey forebay and Wise forebay. Recreational use at recreation facilities can adversely affect environmental and recreational resources. Implementing the Recreation Plan would enhance recreational opportunities at the project and ensure operation and adequate maintenance of existing and proposed project recreational facilities.

Angling is one of the primary recreational activities at the project. Fish stocking is necessary to sustain populations of game fish in project waters with high angler use. Development and implementation of a staff-recommended fish stocking plan would ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs. This plan would include: (1) a provision for annual stocking in project waters that currently receive heavy angling pressure, such as Halsey forebay; and (2) provisions for stocking fish in additional project reservoirs in the future (such as Rock Creek Lake), to address changes in recreational use and angling pressure during the term of the new license.

*Cultural Resources*

Through implementation of PG&E's final HPMP, project-related adverse effects on historic properties would be avoided, reduced, or mitigated.

*Land Use*

Project land use activities have the potential to affect environmental and natural resources in the project area. Implementing the proposed Transportation Management Plan would ensure

that all project roads are maintained to current, applicable standards, would improve access to the project, and would minimize the potential for adverse environmental effects due to road use and road maintenance. The plan would also clarify PG&E's road management responsibilities within the project boundary.

Continued operation of project's facilities (e.g., transmission lines, generators, and construction equipment) and increased recreational use over the term of a new license may contribute to fire danger in the project areas. Fires can affect, among other things, public safety, property, aesthetics, and air quality. Implementing the staff recommended Fire Prevention and Response Plan would improve planning, management, and coordination of wildfire protection. Implementation of the plan would also lead to a reduction in the occurrence of wildfires in the project area and the need for suppression by implementing measures for prevention (including fuels treatment), reporting, emergency response, and investigation of fires related to project operations and use, minimizing damage to environmental resources and other potential effects.

The potential exists for there to be hazardous substances spills within the project boundary, which would adversely affect environmental resources at and near the project. Implementation of the staff-recommended Hazardous Substances Plan would ensure that spills of hazardous substances are promptly contained and cleaned up to avoid/minimize the potential extent of adverse environmental effects, including impacts to water quality.

*Aesthetics*

Implementation of the proposed Visual Resource Management Plan, which includes provisions for identifying those project facilities that would be painted a darker color to reduce visual contrast and establishing a process to evaluate future activities at the project that may result in changes to the visual environment, would reduce color contrast, make project facilities more consistent with established visual quality objectives, and improve overall visual quality in the project area.

**No-action Alternative**

Under the no-action alternative, PG&E would continue to operate the project as part of the Drum-Spaulding Project as it currently does, without making any of its proposed modifications to project facilities, including new recreation facilities. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

**Conclusions**

Based on our analysis, we recommend licensing the Lower Drum Project as proposed by PG&E, with some staff modifications and additional measures.

In section 4.2.2 of the final EIS, we estimate the likely cost of alternative power for each of the three alternatives identified above. Our analysis shows that during the first year of operation under the no-action alternative, project power would cost $7,989,000, or $51.41/MWh, less than the likely alternative cost of power. Under the proposed action alternative, project power would cost $8,573,000, or $60.33/MWh, more than the likely alternative cost of power. Under the staff alternative and staff alternative with mandatory conditions, project power would cost $9,012,000, or $63.42/MWh more than the likely alternative cost of power.

We chose the staff alternative as the preferred alternative because: (1) the project would provide a dependable source of electrical energy for the region (142,100 MWh annually); (2) the

project's 39.7-MW electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; and (3) the recommended environmental measures proposed by PG&E, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

## DEER CREEK PROJECT

### Proposed Action

PG&E requests that the Commission relicense the 5.7-MW Deer Creek development as a separate project that would be called the Deer Creek Project. The Deer Creek Project encompasses about 335 acres of which about 180 acres are federal lands administered by Forest Service and about 6 acres administered BLM. No other federal or state lands are within the Deer Creek Project.

### Project Description

The Deer Creek Project includes: (1) the South Yuba canal and Chalk Bluff canal; (2) Deer Creek forebay; (3) Deer Creek powerhouse penstock; (4) Deer Creek powerhouse; (4) Deer Creek–Drum transmission line; and (5) appurtenant facilities and structures, including one recreation facility. The project diverts water at the Spaulding No. 2 powerhouse via the South Yuba canal to the Chalk Bluff canal, and from there to the Deer Creek powerhouse which discharges to the South Fork of Deer Creek.

### Proposed Facilities

PG&E proposes no changes to project facilities. PG&E proposes to install directional signs to and from the Highway 20 junction to Deer Creek forebay and continue ongoing improvements and maintenance of the angler access parking area, the only recreation facility associated with the Deer Creek Project, over the license term. The Deer Creek Development is described further in section 2.1.1.1, *Existing Project Facilities, Drum-Spaulding Project*, of this final EIS.

### Proposed Operation

PG&E does not propose any changes to operation of the Deer Creek Project compared to historical operation of the Deer Creek Development under the existing Drum-Spaulding Project license.

### Proposed Environmental Measures

PG&E proposes the following environmental measures.

*General Measures*

- Consult annually with the Forest Service and BLM to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize staff with special status species, noxious weeds, and sensitive areas known to occur within the project boundary on Forest Service or BLM land, and the procedures for reporting to each agency.

- Develop and implement a Coordinated Operations Plan for the Upper Drum-Spaulding, Deer Creek, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

*Geology and Soils*

- Implement an Erosion and Sediment Control and Management Plan and Canal Release Point Plan (filed April 11, 2014) to minimize and control project-related erosion; the plans would provide for project-wide implementation of BMPs to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and development and implementation of repair and restoration plans, as necessary.

*Aquatic Resources*

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98 of the EIS.

- To enhance aquatic habitat and protect resident aquatic species, provide minimum streamflows to South Fork Deer Creek as described in section 3.3.2.2.2, *Instream Flows*, and shown in the table 3-125 of appendix A of the EIS.

- Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Implement modified minimum streamflows in project canal-affected stream reaches during the first 30 days of canal outages. For canal outages anticipated to extend past 30 days, consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage. Drum and Bear River canals would not be taken out of service at the same time.

- Implement a Canal Outage Fish Rescue Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Design and install new or modify existing streamflow gages to measure new minimum streamflows, as described in Forest Service/BLM Gaging Plan (filed April 11, 2014).

- Develop and implement an Aquatic Invasive Species Management and Monitoring Plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

*Terrestrial Resources*

- Implement an Integrated Vegetation Management Plan (filed November 21, 2013) that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and controls the spread of non-native invasive species.

- Monitor animal losses from drowning in project canals. Consult with California Fish and Wildlife and the Forest Service when replacing wildlife escape and crossing facilities. Retrofit existing footbridges or construct new wildlife crossings on South Yuba canal, at specified locations, to minimize wildlife injury and mortality associated with movement across these project canals.

- Implement a Bald Eagle Management Plan (filed November 21, 2013) to protect nesting bald eagles from disturbance during project operations and maintenance and project-related recreational activities.

- Implement bat management measures, including provisions for monitoring and installing exclusion devices to minimize disturbance during project operation and maintenance.

- Record annually all incidental observations of bird collision/electrocutions along project powerlines and replace or retrofit problem power poles as appropriate. Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality.

- Monitor activities associated with annual planned outages and non-routine planned outages along the South Yuba canal. Record activities that may generate noise disturbances that occur between February 15 and September 15 within 0.25 mile of California spotted owl and northern goshawk Protected Activity Centers.

*Threatened and Endangered Species*

- Implement valley elderberry longhorn beetle conservation measures as outlined in Integrated Vegetation Management Plan (filed November 21, 2013) to avoid or minimize the loss of elderberry shrubs.

*Recreation Resources*

- Implement the September 2013 Recreation Plan (filed November 18, 2013) to improve and maintain Deer Creek forebay access and parking area, and install directional signs to and from the Highway 20 junction to the Deer Creek forebay.

- Provide a contact for BLM whenever planning or constructing recreation facilities and routine maintenance activities are taking place on BLM lands.

*Cultural Resources*

- Implement HPMP (filed September 23, 2013) to protect resources eligible for inclusion in the National Register of Historic Places.

*Land Use and Aesthetic Resources*

- Revise project boundaries to reflect separation of proposed Deer Creek Project from the existing Drum-Spaulding Project.

- Develop and implement a Hazardous Substances Plan to identify acceptable prevention and mitigation measures and to ensure that hazardous substances are promptly contained or cleaned up.

- Implement a Transportation Management Plan for Primary Project Roads (filed August 29, 2012) to ensure that project roads are adequately maintained.

- Implement a Fire Prevention and Response Plan (filed November 21, 2013) on federal project lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project.

- Implement a Visual Resource Management Plan (filed June 18, 2012) on federal land to protect visual and aesthetic resources on and adjacent to project lands.

**Alternatives Considered**

This final EIS analyzes the effects of continued project operation and recommends conditions for any new license that may be issued for the project. In addition to PG&E's proposal, as outlined above, we consider two alternatives: (1) a staff alternative and (2) no action—continued operation with no changes.

*Staff Alternative*

Under the staff alternative, the project would be operated and maintained as proposed by PG&E, with the following revisions and additional measures:

- Modify the proposed Integrated Vegetation Management Plan to extend management to accessible non-federal project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and include the protection of culturally significant plant species after consultation with the tribes.

- Prepare and implement a Wildlife Crossing Management Plan that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.

- Develop and implement an Avian Management Plan that includes provisions for raptor monitoring and protection.

- Incorporate proposed bat management measures into a Bat Management Plan.

- Revise the Fire Prevention and Response Plan to include all project lands within the plan's geographic scope and to include a provision for the periodic review and update of the plan.

- Revise the Hazardous Substances Plan to apply to all project lands.

*No-action Alternative*

Under the no-action alternative, PG&E would continue to operate the project as it currently does as part of the Drum-Spaulding Project, without making any of its proposed modifications to project facilities. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

**Areas of Concern**

The primary issues associated with relicensing the project are erosion control and restoration measures; flow regimes in project-affected reaches for aquatic resources; protection of wildlife resources; recreation enhancements; and protection of cultural resources.

**Staff Alternative**

*Geology and Soils*

Water spilled from project canals during normal project operation and during canal outages can result in slope and channel destabilization and erosion. In addition, construction and maintenance associated with the extensive network of project recreation facilities can also cause erosion and sedimentation, potentially affecting project lakes, reservoirs, and stream reaches.

Implementation of a project-wide Erosion and Sediment Control and Management Plan and Canal Release Point Plan, including a survey to identify steep slopes and areas below project canals that have been affected by spills and canal operations, would minimize the potential for future project operations to cause erosion impacts and prioritize previously affected sites for restoration.

*Aquatic Resources*

Flow diversions and fluctuations associated with project operation can result in a variety of effects on aquatic resources downstream of project. Project operations and diversions reduce the seasonal and interannual flow variability in natural systems that can influence water temperature and the dynamics and diversity of aquatic ecosystems. Six water year types ranging from extreme critically dry to wet based on the California DWR Bulletin 120 estimate of full unimpaired flows for the Yuba River Basin would be used to introduce inter-annual variability to minimum streamflows in larger stream reaches.

Mutual operations of the Upper Drum-Spaulding, Deer Creek, Lower Drum, and Yuba-Bear Projects could affect streamflows and the ability to provide specified minimum streamflows in some project-affected reaches. Development and implementation of a Coordinated Operations Plan would ensure that both PG&E and NID are able to comply with minimum streamflow requirements downstream of their respective project facilities.

The Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects contain a network of canals; these canals are taken out of service for planned annual and unplanned maintenance and during emergency situations. During an outage when a canal is drained, fish within the canal can be stranded and die. Implementing the proposed measures during canal outages would ensure appropriate notification of resource agencies and passage of natural streamflows at a minimum in affected stream reaches. The Canal Fish Rescue Plan would provide protection to fish in project canals when the canals are drained during an outage and would coordinate these operations with the appropriate resource agencies.

An effective program would be needed to monitor compliance with these various proposed streamflow measures. Implementation of the Gaging Plan would provide procedures and resources to demonstrate compliance or non-compliance with the various flow measures proposed in each project-affected stream reach.

The diversion of water by the project between watersheds and extensive and intensive recreational use of project waters have the potential to exacerbate the geographic dispersal and expansion of invasive aquatic species which could degrade aquatic habitat and adversely affect native species. Implementation of proposed measures would minimize the spread of aquatic invasive species resulting from project operation and recreational use of project waters.

*Terrestrial Resources*

Project O&M activities may have a negative effect on the plant species present within the project boundary. The spread of invasive plant species may be inadvertently encouraged through the disturbance of soil and existing vegetation associated with proposed construction of recreation areas while sensitive and culturally significant plant species may also be negatively affected by construction, clearing, or herbicide application used to control invasive species. Implementing the Integrated Vegetation Management Plan, as modified to include provisions for including non-federal project lands with the plan's scope and protection of culturally significant species, would minimize the potential for negative effects associated with project O&M activities.

Wildlife mortality associated with drowning in project canals has been an issue for some of the target species (e.g., mule deer) using habitats within the project boundary. Implementing the proposed and recommended alternative wildlife crossing conditions that provide for monitoring of animal losses in canals and constructing new deer bridges and retrofitting existing bridges would minimize wildlife mortality associated with the attempted crossing of these project features by target wildlife species and improve wildlife movement through the project area.

Project power lines may adversely affect raptors through injury or mortality associated with electrocution and collisions. Monitoring of collisions/electrocutions along the project's transmission line would assist in the identification of problem transmission line components that would be replaced or retrofitted to reduce or eliminate the risk to raptors.

*Threatened and Endangered Species*

The interbasin transfer of flows associated with the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project may adversely affect the Central Valley spring-run Chinook salmon DPS, Central Valley steelhead DPS, and southern DPS of the green sturgeon downstream of Englebright dam. Project dams on the Middle Yuba and South Yuba Rivers divert water from the river to many canals and conduits where power generation occurs and where water is delivered to NID and PCWA at many points along the system. These diversions, in combination with operations of the Yuba River Project, have the potential to cumulatively affect listed species. We will initiate formal consultation for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects after our evaluation of recommended measures, including flow releases, associated with relicensing of the Yuba River Project.

*Recreation*

The Project provides an angler access parking area at the Deer Creek forebay. Recreational use at recreation facilities can adversely affect environmental resources. Implementing the Recreation Plan would enhance recreational opportunities at the project and

ensure operation and adequate maintenance of existing and proposed project recreational facilities.

*Cultural Resources*

Through implementation of PG&E's final HPMP, project-related adverse effects on historic properties would be avoided, reduced, or mitigated.

*Land Use*

Project land use activities have the potential to affect environmental resources in the project area. Implementing the proposed Transportation Management Plan would ensure that all project roads are maintained to current, applicable standards, would improve access to the project, and would minimize the potential for adverse environmental effects due to road use and road maintenance. The plan would also clarify PG&E's road management responsibilities within the project boundary.

Continued operation of project's facilities (e.g., transmission lines, generators, and construction equipment) and increased recreational use over the term of a new license may contribute to fire danger in the project areas. Fires can affect, among other things, public safety, property, aesthetics, and air quality. Implementing the staff recommended Fire Prevention and Response Plan would improve planning, management, and coordination of wildfire protection. Implementation of the plan would also lead to a reduction in the occurrence of wildfires in the project area and the need for suppression by implementing measures for prevention (including fuels treatment), reporting, emergency response, and investigation of fires related to project operations and use, minimizing damage to environmental resources and other potential effects.

The potential exists for there to be hazardous substances spills within the project boundary, which would adversely affect environmental resources at and near the project. Implementation of the staff-recommended Hazardous Substances Plan would ensure that spills of hazardous substances are promptly contained and cleaned up to avoid/minimize the potential extent of adverse environmental effects, including impacts to water quality.

*Aesthetics*

Implementation of the proposed Visual Resource Management Plan, which includes provisions for identifying those project facilities that would be painted a darker color to reduce visual contrast and establishing a process to evaluate future activities at the project that may result in changes to the visual environment, would reduce color contrast, make project facilities more consistent with established visual quality objectives, and improve overall visual quality in the project area.

**No-action Alternative**

Under the no-action alternative, PG&E would continue to operate the project as it currently does as part of the Drum-Spaulding Project, without making any of its proposed modifications to project facilities, including new recreation facilities. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

### Conclusions

Based on our analysis, we recommend licensing the Deer Creek Project as proposed by PG&E, with some staff modifications and additional measures.

In section 4.3.2 of the final EIS, we estimate the likely cost of alternative power for each of the three alternatives identified above. Our analysis shows that during the first year of operation under the no-action alternative, project power would cost $5,339,000, or $236.22/MWh, less than the likely alternative cost of power. Under the proposed action alternative, project power would cost $5,704,000, or $254.64/MWh, more than the likely alternative cost of power. Under the staff alternative, project power would cost $5,909,000, or $263.80/MWh more than the likely alternative cost of power. Under the staff alternative with mandatory conditions, project power would cost $5,924,000, or $264.47/MWh, more than the likely alternative cost of power.

We chose the staff alternative as the preferred alternative because: (1) the project would provide a dependable source of electrical energy for the region (22,400 MWh annually); (2) the project's 5.7-MW electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; and (3) the recommended environmental measures proposed by PG&E, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

## YUBA-BEAR PROJECT

### Proposed Action

On April 15, 2011, NID filed an application for a new major license to operate and maintain the Yuba-Bear Hydroelectric Project (Project No. 2266) that would increase its licensed capacity from 79.32 MW to 90.72 MW. An amended application was filed on June 18, 2012. The project includes four developments located on the Middle Yuba River, the South Yuba River, and the Bear River in Sierra, Nevada, and Placer Counties, California. The project would encompass 1,749.3 acres of federal land: 1,540.8 acres within the Tahoe National Forest administered by the Forest Service and 208.5 acres administered by BLM.

### Project Description

The Yuba-Bear Project's developments include: Bowman (3.6-MW installed capacity), Dutch Flat No. 2 (24.6-MW installed capacity), Chicago Park (39 MW installed capacity), and Rollins (12.2-MW installed capacity). Among these four developments, there are 13 main dams; 11 reservoirs or impoundments; 4 major water conduits; 4 powerhouses with associated switchyards with a combined authorized installed capacity of 79.32 MW; one 9-mile-long, 60-kilovolt transmission line; and appurtenant facilities and structures, including recreation facilities. Each of the developments is described further in section 2.1.1.2, *Existing Project Facilities, Yuba-Bear Project*, of this final EIS.

### Proposed Facilities

NID proposes to construct a new powerhouse (the Rollins upgrade) that would be located within the existing FERC project boundary on NID-owned land adjacent to the existing Rollins powerhouse. The Rollins upgrade would increase the installed capacity of the project from 79.32 MW to 90.72 MW. NID's proposed project also includes modifications to the existing FERC

project boundary to encompass some roads and environmental measures, including proposed minimum flow releases.

NID proposes to build new facilities and rehabilitate existing facilities at the following recreation areas: Jackson Meadows reservoir, Milton diversion impoundment, Bowman Lake, Sawmill Lake, Canyon Creek, Dutch Flat no. 2 forebay, and Dutch Flat afterbay.

Finally, NID proposes to remove a segment of Chicago Park Forebay Road and the unnamed recreation road that provides access to the Jackson Meadows administrative site.

**Proposed Operation**

NID proposes to modify project operations affecting minimum streamflows, spills from project canals and conduits, and the rate of flow fluctuations following spill events to provide environmental benefits to project-affected resources as described below. In conjunction with proposed new minimum streamflows, NID also proposes the following new or upgraded flow monitoring facilities:

- Texas, Clear, Fall, Trap, and Rucker Creek diversion dams at Bowman-Spaulding diversion conduit—install gages YB-317, YB-318, YB-319, YB-320, and YB-321;

- French dam, Faucherie dam, and Sawmill dam—improve flow rating of the USGS gages 11414410, 11414500, and 11414470 in Canyon Creek;

- Dutch Flat afterbay dam—improve flow rating of the USGS gage 11421790 in the Bear River.

**Proposed Environmental Measures**

NID proposes the following environmental measures.

*General Measures*

- Consult annually with the Forest Service and BLM to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize project staff with special-status species, non-native invasive plants, and sensitive areas known to occur within the project boundary on Forest Service or BLM land, and the procedures for reporting to each agency.

- Annually review special status species lists and assess potential impacts to newly listed species on federal project lands.

- Consult with the Forest Service, BLM, or, as appropriate, California Fish and Wildlife, to determine potential project-related effects of any proposed future ground-disturbing activity on federal project land.

- Prepare and submit a biological evaluation examining the potential impacts to special status species or their critical habitats from the construction of new

project features on Forest Service or BLM land, and consult with California Fish and Wildlife, as appropriate.

- Develop and implement a Coordinated Operations Plan for the Upper Drum-Spaulding, Lower Drum, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

- Obtain prior written approval of the Forest Service or BLM, as appropriate, for the use of pesticides or herbicides on or affecting public land.

*Geology and Soils*

- Develop and implement an Erosion and Sediment Control and Management Plan to prevent adverse effects on environmental resources associated with erosion during the Rollins upgrade construction.

- Implement an Erosion and Sediment Control and Management Plan (filed April 11, 2014) to prevent adverse effects on environmental resources associated with erosion during recreation facility construction.

- Implement a Clear and Trap Creeks Channel Stabilization Plan (filed June 18, 2012) to stabilize existing erosion effects from spills in two stream channels and one spill channel directly downstream of the Bowman-Spaulding canal.

- Implement an Erosion and Sediment Control and Management Plan and Canal Release Point Plan (filed April 11, 2014) to identify the means to inventory, record, treat, and monitor potentially significant project-related erosion and sedimentation impacts on federal project lands and minimize future erosion and sedimentation.

*Aquatic Resources*

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98 of this EIS.

- To enhance aquatic habitat and support and protect resident aquatic species, provide minimum streamflows to project-affected reaches as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 of this EIS as listed below.

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Middle Yuba River – below Jackson Meadows dam | 3-149 |
| Middle Yuba River – below Milton diversion dam | 3-151 |
| Wilson Creek – below Wilson Creek diversion dam | 3-155 |
| Jackson Creek – below Jackson dam | 3-156 |
| Canyon Creek – below French dam | 3-157 |

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Canyon Creek – below Faucherie dam | 3-159 |
| Canyon Creek - below Sawmill dam | 3-161 |
| Canyon Creek – below Bowman-Spaulding diversion dam | 3-163 |
| Texas Creek – below Texas Creek diversion dam | 3-167 |
| Clear Creek – below Bowman-Spaulding diversion conduit | 3-168 |
| Trap Creek – below Bowman-Spaulding diversion conduit | 3-173 |
| Rucker Creek – below Bowman-Spaulding diversion conduit | 3-174 |
| Bear River – below Dutch Flat afterbay dam | 3-175 |
| Bear River – below Rollins dam | 3-178 |

- Notify licensing stakeholders at the annual consultation meeting of all annual planned and non-routine planned canal outages in the Bowman-Spaulding diversion conduit. Provide minimum streamflow or inflow, whichever is less during canal outages in Bowman-Spaulding conduit and Drum-Spaulding Project's Drum canal. Consult with licensing stakeholders if the outage is anticipated to extend past 30 days and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage.

- Implement overwintering minimum streamflow adjustments below Milton diversion dam and Bowman-Spaulding diversion dam in response to extended periods of low regional precipitation, as described in section 3.3.2.2.2, *Instream Flows*.

- Measure streamflows as specified in the Forest Service/BLM Gaging Plan (filed April 11, 2014) for documenting compliance with the proposed minimum streamflow requirements listed above and described in section 3.3.2.2.2, *Instream Flows*, as shown in appendix A-2, table 3-189 of this EIS.

- Implement the periodic minimum streamflow settings at Wilson Creek diversion dam, as described in section 3.3.2.2.2, *Instream Flows*.

- From May 1 through September 15, avoid non-routine planned outages and operate the turbine/generator unit in Chicago Park powerhouse in a synchronous condense mode when the unit is not generating electricity. During non-routine planned outages that would cause Dutch Flat afterbay dam to spill to the downstream Bear River, make a good faith effort to motor the Chicago Park powerhouse until the increased flows from the Dutch Flat afterbay dam reach the

tailrace of Chicago Park powerhouse to prevent a sharp decrease in flows in the Bear River downstream of the Chicago Park powerhouse.

- To reduce the risk of stranding of aquatic resources, implement spill cessation schedules and minimize flow fluctuations at Milton and Bowman-Spaulding diversion dams and Dutch Flat afterbay dam, as described in section 3.3.2.2.2, *Instream Flows*, as shown in appendix A-2, tables 3-184, 3-185, 3-186, and 3-187 of this EIS.

- To prevent rapid flow fluctuations in the lower Bear River below Rollins dam, balance inflow from upstream Bear River with outflows when the Rollins reservoir water surface elevation is within the top 2 to 3 feet of the reservoir.

- Implement minimum streamflows for the Fall Creek diversion dam, as described in section 3.3.2.2.2, *Instream Flows*, as shown in appendix A-2, table 3-170 of this EIS.

- Implement a Canal Outage Fish Rescue Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Develop and implement a Fish Entrainment Protection Plan including design, installation, and seasonal operation of fish screen at entrance to Milton–Bowman conduit in Milton diversion dam impoundment.

- Annually in October, relocate LWD that has accumulated on the upstream side of Rollins dam spillway log boom to the downstream side of the log boom. Allow the LWD between the log boom and spillway to pass over the spillway when the reservoir spills to enhance aquatic habitat in the Bear River below Rollins dam.

- Survey and identify project dams where LWD is blocked from passing downstream and identify opportunities and locations for reintroduction of LWD to downstream stream reaches. Ensure that LWD passes beyond Jackson Meadows dam, Milton Diversion dam, Sawmill dam, French dam, Faucherie dam, and Bowman dam. Develop and implement a LWD Management Plan for Dutch Flat afterbay dam.

- Implement an aquatic monitoring program to assess the effects of the proposed flow modifications on aquatic resources in selected project-affected stream reaches, as described in the Fish Population Monitoring Plan (filed November 21, 2013), Foothill Yellow-legged Frog Monitoring Plan (filed November 21, 2013), Channel Morphology Monitoring Plan (filed November 21, 2013), Forest Service/BLM Water Temperature and Stage Monitoring Plan (filed April 11, 2014), and Forest Service/BLM Riparian Vegetation Monitoring Plan (filed April 11, 2014). Also, monitor incidental occurrence of western pond turtle.

- Implement aquatic invasive species management measures included in Aquatic Invasive Species Prevention Guidelines of Non-Native Invasive Plant Management Plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

*Terrestrial Resources*

- Implement an Integrated Vegetation Management Plan (filed November 21, 2013) on federal project lands to restore native vegetation in areas disturbed by project operation and maintenance through revegetation.

- Record annually all incidental observations of bird collisions/electrocutions at the Bowman-Spaulding transmission line. Consult with the Forest Service, U.S. Fish and Wildlife Service, and California Fish and Wildlife concerning measures needed to ensure the protection of birds where incidental observations of bird collisions/electrocutions illustrate a problem pole or transmission structure. Replace or retrofit poles with substantial raptor-project interaction issues.

- Maintain wildlife crossings on Bowman-Spaulding canal.

- Consult with the Forest Service or BLM, as appropriate, prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings along project canals, and consult with California Fish and Wildlife regarding specifications and design. Assess existing wildlife escape facilities annually to ensure they are functional and in proper working order.

- Record animal losses from drowning in all project canals. Provide this information to California Fish and Wildlife, the Forest Service, or BLM, as appropriate, as well as to the Commission. In consultation with the appropriate resource agencies, develop additional measures to address suspected project-related causes of mortality if there is an increasing trend in wildlife mortalities in a canal.

- Document all known bat roosts within project buildings, dams, or other structures. Provide inspection results to California Fish and Wildlife, the Forest Service, and BLM, as appropriate. If bats or signs of roosting are present where project personnel routinely work, place humane exclusion devices to prevent occupation of the structure by bats.

- Implement a Bald Eagle Management Plan (filed November 21, 2013) to protect nesting bald eagles from disturbance during project operations and recreational activities.

- Monitor the foothill yellow-legged frog population in Steephollow Creek from the confluence with the Bear River for a distance of 1,000 meters (1,094 yards) upstream, to assess if spills from the Chicago Park conduit result in adverse effects on the foothill yellow-legged frog population in Steephollow Creek and, if necessary, to facilitate the development of mitigation measures.

- Conduct event-based monitoring of the foothill yellow-legged frog populations in Steephollow Creek beginning the second full calendar year after a spill event and repeat in the third year following that spill event, and submit a monitoring report to BLM, California Fish and Wildlife, and the California Water Board.

*Recreation Resources*

- Implement an alternative Recreation Plan (filed August 29, 2012) for upgrades, maintenance, and development of new project recreation facilities.

- Pay California Fish and Wildlife annually for the stocking of up to 20,000 trout fry and 25,000 kokanee fry in Bowman Lake and the stocking of up to 10,000 catchable rainbow trout, 10,000 catchable brown trout, and 25,000 kokanee fry in Rollins reservoir.

- Develop a rehabilitation plan with BLM to block, gate, and rehabilitate roads and trails at Chicago Park powerhouse and to annually meet with BLM to discuss the following year's projects.

- Enter into a Recreation Operation and Maintenance Agreement with BLM to provide BLM $30,000 annually for operation, maintenance, law enforcement patrolling, and administration.

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet for the Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam.

- Provide reservoir storage information via the internet for the following locations: Jackson Meadows reservoir; French Lake; Faucherie Lake; Sawmill Lake; Jackson Lake; Bowman Lake; and Rollins Lake.

- Provide supplemental flows (target streamflow of between 120 and 150 cfs over a continuous 24-hour period as measured at gage YB-306) in Canyon Creek below French dam for whitewater boating starting between September 1 and September 30 of each year, until the date that French Lake elevation reaches 6,638 feet msl.

- Provide recreational streamflow events (continuous mean daily target streamflow of 300 cfs for at least 6 continuous days as measured at USGS gage 11408550 [Middle Yuba River below Milton diversion dam]) in any years in which spill at Milton diversion dam is 300 cfs or greater after May 1.

- Provide recreational streamflow events (continuous mean daily target streamflow of 275 cfs for at least 5 continuous days as measured at gage 11416500 [Canyon Creek downstream of the Bowman-Spaulding diversion dam] after April 1) in any years in which flow as measured at USGS gage 11416500 is 275 cfs or greater.

*Cultural Resources*

- Implement an HPMP (filed October 15, 2012) to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register of Historic Places.

*Land Use and Aesthetic Resources*

- Implement a Transportation Management Plan (filed August 29, 2012) to rehabilitate and maintain primary project roads to ensure that project roads are adequately maintained.

- Implement a Fire Prevention and Response Plan (filed November 21, 2013) on federal land, to provide fire prevention procedures, reporting, and safe fire practices for NID personnel and contractors responsible for operating and maintaining the project.

- Revise the project boundary to remove the mineral survey area south of the Dutch Flat afterbay and the administrative site at Jackson Meadows reservoir and the recreation road that provides access to it and to include certain primary project roads, and new and rehabilitated recreation facilities.

- Develop and implement a Hazardous Materials Spill Prevention, Control, and Countermeasure Plan for the Rollins upgrade construction.

- Develop and implement a Recreation Facilities Construction Hazardous Materials Spill Prevention, Control, and Countermeasure Plan.

- Implement a Visual Resource Management Plan (filed June 18, 2012) on federal lands to improve the visual quality of the project by reducing the visual contrast of existing and proposed project facilities.

**Alternatives Considered**

This draft EIS analyzes the effects of continued project operation and recommends conditions for a new license that may be issued for the project. In addition to NID's proposals, we consider two alternatives: (1) staff alternative; and (2) no action—continued operation with no changes.

*Staff Alternative*

Under the staff alternative, the project would include most of NID's proposed measures, as outlined above (excluding preparation of biological assessments) with the following revisions and additional measures:

- Implement extreme critically dry water year type flows in the second year of two sequential critically dry years for Bear River below the Rollins dam.

- Prepare and implement a LWD management plan to ensure passage of LWD at project dams and diversions to support downstream aquatic habitat, as necessary, including the Middle Yuba River below Jackson Meadows dam, Canyon Creek below Bowman dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins dam.

- Implement minimum streamflows below Fall Creek diversion dam to protect and enhance aquatic habitat.

- Develop and implement an aquatic invasive species management and monitoring plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

- Modify the Integrated Vegetation Management Plan to extend management to accessible non-federal project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and include the protection of culturally significant plant species after consultation with tribes.

- Prepare and implement a Wildlife Crossing Management Plan that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.

- Develop and implement an Avian Management Plan that includes provisions for raptor monitoring and protection and LOPs for the protection of special-status birds and their habitat.

- Incorporate proposed bat management measures into a Bat Management Plan.

- In lieu of funding California Fish and Wildlife for fish stocking, develop and implement a fish stocking plan for the project to ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs (replaces NID's proposal to pay for fish stocking). The fish stocking plan would include provisions for annual stocking in Rollins reservoir, Jackson Meadows reservoir, Bowman Lake, and Faucherie Lake; stocking Sawmill Lake every other year until the first Form 80 reporting year after implementation of the plan; and fish stocking in additional project reservoirs (such as French Lake) based on changes in recreational use and angling pressure over the term of the new license.

- Modify the Recreation Plan with regard to the implementation schedule, trail development, campground upgrades, accessibility, parking and road improvements, boat launches, water systems, and monitoring, to: (1) exclude provisions for campground hosts or added amenities at campground host sites; and (2) exclude enhancements to trails, trailheads, or trail facilities that do not serve a project purpose.

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet to include 15-minute interval reporting of streamflow information for Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam, and to require submittal of streamflow information plan to the Commission for approval.

- Provide reservoir storage information for Jackson Meadows reservoir, French Lake, Faucherie Lake, Sawmill Lake, Jackson Lake, Bowman Lake, and Rollins Lake to the public via the internet year-round to enhance recreational boating opportunities.

- Modify the proposed Fire Prevention and Response Plan to include all project lands with its geographic scope and to include a provision for the periodic review and revision of the plan.

- Modify the Recreation Facilities Construction Hazardous Materials Spill Prevention, Control, and Countermeasure Plan to apply to all project lands.

*No-action Alternative*

Under the no-action alternative, NID would continue to operate the project as it currently does, without making any of its proposed modifications to project facilities, including new recreation facilities. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

**Areas of Concern**

The primary issues associated with relicensing the project are erosion control and restoration measures; flow regimes in project-affected reaches for aquatic resources; spill cessation schedules following high-flow periods to mimic natural conditions and for whitewater boating opportunities; protection of wildlife resources; recreation enhancements; and protection of cultural resources.

**Staff Alternative**

*Geology and Soils*

Water spilled from project canals during normal operation and during canal outages can result in slope and channel destabilization and erosion; this has specifically been a problem below spill gates in the Bowman-Spaulding conduit in several stream reaches transected by the conduit. In addition, construction and maintenance associated with the proposed Rollins Development upgrade and the extensive network of project recreation facilities also have the potential to result in erosion and sedimentation potentially affecting project lakes, reservoirs, and stream reaches.

Implementing a project-wide Erosion and Sediment Control and Management Plan and Canal Release Plan, including a survey to identify steep slopes and areas below project canals that have been affected by spills and canal operations, would minimize the potential for future project operations to cause erosion impacts and prioritize previously affected sites for restoration. Specific plans would be implemented for erosion control during the Rollins Development upgrade and for construction activities at existing or proposed recreation facilities. Development and implementation of the proposed Clear and Trap Creeks Channel Stabilization Plan specifically addresses the stabilization and repair of areas previously affected by erosion as a result of spills from the Bowman-Spaulding conduit.

*Aquatic Resources*

Flow diversion and fluctuations associated with project operation can result in a variety of effects on aquatic resources downstream of the project. Project operation alters the natural hydrograph of project-affected stream reaches reducing the seasonal and interannual flow variability observed in natural systems which can influence water temperature and the dynamics and diversity of aquatic ecosystems. The dams at many project lakes and reservoirs are operated to capture and store water from spring snowmelt for water delivery and project operations. Implementing the proposed minimum streamflow schedules would result in similar or higher

flows in six project-affected stream reaches and minimum streamflows in nine additional project-affected stream reaches which previously had no minimum streamflow requirement. In project reaches with higher flows, interannual flow variability would be introduced with the minimum streamflow schedule set dependent on six water year types ranging from extreme critically dry to wet based on the California DWR Bulletin 120 estimate of fully unimpaired flows for the Yuba River Basin.

Implementation of the Fish Population Monitoring Plan, Foothill Yellow-legged Frog Monitoring Plan, Channel Morphology Monitoring Plan, Water Temperature and Stage Monitoring Plan, Riparian Vegetation Monitoring Plan and documentation of incidental observations of western pond turtle would provide information that would be used to evaluate if implementation of these flow measures is protective of aquatic resources in project-affected reaches, including resident rainbow trout and foothill yellow-legged frog. Development and implementation of an Aquatic Benthic Macroinvertebrate Monitoring Plan would also support such an evaluation.

Mutual operations of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects could affect streamflows in some project-affected reaches. A Coordinated Operations Plan would ensure that both NID and PG&E are able to comply with minimum flows where mutual operations could affect streamflows. A specific proposal to coordinate operations at Rollins dam (Yuba-Bear Project) and Bear River canal diversion dam (Lower Drum Project) would ensure that NID is able to comply with minimum streamflows in Bear River below these two project features.

Under typical operations to maximize water storage, when high spring flows begin to decrease and spills at project dams terminate, flows in stream reaches downstream decrease rapidly that can result in stranding of aquatic organisms. The proposed Spill Cessation and Minimization of Flow Fluctuations measure sets a schedule for the gradual reduction of flows over a period of 3 to 21 days (depending on the location and duration of the spill) following major spills at Milton diversion dam to Middle Yuba River, at Bowman dam to Canyon Creek, and at Dutch Flat afterbay to the Bear River for the protection of aquatic resources. Similarly, flow fluctuations in the lower Bear River below Rollins dam would be minimized by balancing inflow with outflow when Rollins reservoir is within 3 feet of full pool.

An effective program would be needed to monitor compliance with these various proposed streamflow measures. Implementation of the Gaging Plan would provide procedures and resources to demonstrate compliance or non-compliance with the various flow measures proposed in each project-affected stream reach.

The Upper Drum-Spaulding, Deer Creek, Lower Drum, and Yuba-Bear Projects contain a network of canals; these canals are taken out of service for planned annual and unplanned maintenance and during emergency situations. During an outage when the canal is drained, fish within the canal can be stranded and die. Implementation of proposed measures during canal outages would ensure appropriate notification of resource agencies and passage of natural streamflows at a minimum in affected stream reaches. The Canal Outages Fish Rescue Plan would provide protection to fish in project canals when the canals are drained during an outage and would coordinate these operations with the appropriate resource agencies.

Entrainment of fish (particularly juvenile trout) into project canals could reduce the populations of these species in the stream reach from which the diversion is made. A proposed Mitigation for Fish Entrainment Plan to be implemented at the Milton diversion dam on Middle

Yuba River would result in the design, construction, and operation of fish screens to minimize entrainment of juvenile fish into the Milton-Bowman conduit during summer and fall.

LWD is an important component of aquatic habitat complexity and diversity; operation of some project dams reduce or prevent the natural downstream passage and dispersal of LWD generated in upstream portions of watersheds. LWD can be trapped in some project reservoirs where standard procedure is to remove LWD and stockpile it for subsequent burning or disposal offsite. A survey would identify stream reaches that require LWD management. Initially, specific LWD management plans would be developed for Rollins reservoir, Jackson Meadows reservoir, and Dutch Flat afterbay to enhance aquatic habitat in the Middle Yuba River and Bear River.

The diversion of water by the project between watersheds and extensive and intensive recreational use of project waters have the potential to exacerbate the geographic dispersal and expansion of invasive aquatic species which could degrade aquatic habitat and adversely affect native species. Development and implementation of an Aquatic Invasive Species Control and Management Plan would minimize the risk that project operations would cause or speed the spread of aquatic invasive species. Educational and preventive measures would be established to reduce the likelihood that aquatic invasive species are spread as a result of recreational use of project waters.

*Terrestrial Resources*

Project O&M activities can have a negative effect on the plant species present within the project boundary. The spread of invasive plant species may be inadvertently encouraged through the disturbance of soil and existing vegetation associated with proposed construction of recreation areas while sensitive and culturally significant plant species may also be negatively affected by construction, clearing, or herbicide application used to control invasive species. Implementation of the Integrated Vegetation Management Plan, as modified to include non-federal project lands within its scope and a provision for the protection of culturally significant species, would minimize the potential for negative effects associated with project O&M activities.

Wildlife mortality associated with drowning in project canals has been an issue for some of the target species (e.g., mule deer) using the habitats within the project boundary. Implementation of the proposed and recommended alternative wildlife crossing conditions would minimize wildlife mortality associated with the attempted crossing of these project features by target wildlife species.

Project power lines may have a negative effect on raptors using the habitats within the project boundary as a result of injury or mortality associated with electrocution and collisions. Monitoring of collisions/electrocutions along the Bowman-Spaulding transmission line would assist in the identification of problem transmission line components that would be replaced or retrofitted to reduce or eliminate the risk to raptors.

*Threatened and Endangered Species*

The interbasin transfer of flows associated with the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project may adversely affect the Central Valley spring-run Chinook salmon DPS, Central Valley steelhead DPS, and southern DPS of the green sturgeon downstream of Englebright dam. Project dams on the Middle Yuba and South Yuba Rivers divert water from the river to many canals and conduits where power generation occurs and where water is delivered to NID and PCWA at many points along the system. These diversions, in

combination with operations of the Yuba River Project, have the potential to cumulatively affect listed species. We will initiate formal consultation for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects after our evaluation of recommended measures, including flow releases, associated with relicensing of the Yuba River Project.

*Recreation*

Numerous project lakes and reservoirs and project-affected reaches and the large percentage of the project that occurs on National Forest lands provide a wide range of recreational opportunities. Recreation facilities and opportunities in some portions of the project receive heavy public usage that can adversely affect environmental and recreational resources. Implementing NID's proposed Recreation Plan would provide additional or improved camping opportunities at the project, including a new campground at Sawmill Lake; the development of primitive campsites at the Milton Diversion impoundment and along the shoreline at Bowman Lake; and improvements at Canyon Creek campground, and at the existing campgrounds at Jackson Meadows reservoir. NID's proposed Recreation Plan would provide additional trails at the project, including the development of new trails at East Meadow campground, Pass Creek boat launch, Aspen group campground, and the Woodcamp complex trail system. Implementing NID's proposed Recreation Plan would provide additional and improved boating opportunities at the project and include improvements at the Woodcamp boat launch, extending the Pass Creek boat ramp to make the boat ramp usable at lower reservoir water levels, reconstructing the Pass Creek boat ramp, and developing a new hand launch at Milton Diversion impoundment.

In addition to the measures proposed by NID, we also recommend that the Recreation Plan include some trail development improvements, campground upgrades, accessibility improvements, parking and road improvements, and boat launch improvements that were not proposed by NID. We also recommend that the Recreation Plan not include provisions for campground hosts or added amenities at campground host sites, nor would it include enhancements to trails, trailheads, or trail facilities that do not serve a project purpose. Implementing the Recreation Plan with recommended modifications would enhance recreational opportunities at the project and ensure operation and adequate maintenance of existing and proposed project recreational facilities.

Angling is one of the primary recreational activities at the project. Fish stocking is necessary to sustain populations of game fish in project waters with high angler usage. Development and implementation of the staff-recommended fish stocking plan would ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs. This plan would include provisions for annual stocking in project waters that currently receive heavy angling pressure including Rollins reservoir, Jackson Meadows reservoir, Bowman Lake, and Faucherie Lake; and stocking Sawmill Lake every other year until the first Form 80 reporting year after implementation of the plan. This plan would also include provisions for stocking fish in additional project reservoirs (such as French Lake) in the future to address changes in recreational use and angling pressure during the term of the new license.

Flow reductions during spill cessation at Milton Diversion dam, Bowman-Spalding diversion dam, and Dutch Flat afterbay dam would provide more predictable and extended periods of high flow, enhancing existing whitewater boating opportunities at the project. NID's proposed supplemental flows for whitewater boating at the Milton diversion dam, French dam, and Bowman-Spaulding diversion dam would also significantly enhance whitewater boating opportunities in three project stream reaches.

*Cultural Resources*

Implementation of a final HPMP would avoid, reduce, or mitigate project-related adverse effects on historic properties.

*Land Use*

Project land use activities have the potential to affect environmental resources in the project area. Implementation of the Transportation Management Plan would ensure that all project roads are maintained to current, applicable standards, would improve access to the project, and would minimize the potential for adverse environmental effects due to road use and road maintenance. The plan also clarifies PG&E's road management responsibilities within the project boundary.

Continued operation of project's facilities (e.g., transmission lines, generators, and construction equipment) and increased recreational use over the term of a new license may contribute to fire danger in the project areas. Fires can affect, among other things, public safety, property, aesthetics, and air quality. Implementing the staff recommended Fire Prevention and Response Plan would improve planning, management, and coordination of wildfire protection. Implementation of the plan would also lead to a reduction in the occurrence of wildfires in the project area and the need for suppression by implementing measures for prevention (including fuels treatment), reporting, emergency response, and investigation of fires related to project operations and use, minimizing damage to environmental resources and other potential effects.

The potential exists for hazardous substances spills within the project boundary, which would adversely affect environmental resources at and near the project. Implementation of the staff-recommended Hazardous Substances Plan would ensure that spills of hazardous substances are promptly contained and cleaned up to avoid/minimize the potential extent of adverse environmental effects, including impacts to water quality.

*Aesthetics*

Implementation of the Visual Resource Management Plan, which includes provisions for identifying those project facilities that would be painted a darker color to reduce visual contrast and establishing a process to evaluate future activities at the project that may result in changes to the visual environment, would reduce color contrast, make project facilities more consistent with established visual quality objectives, and improve overall visual quality in the project area.

**No-action Alternative**

Under the no-action alternative, NID would continue to operate the project as it currently does without making any of its proposed modifications to project facilities, including new recreation facilities, and without constructing the proposed Rollins no. 2 powerhouse. Environmental conditions would remain the same, and no enhancement of environmental resources would occur.

**Conclusions**

Based on our analysis, we recommend licensing the project as proposed by NID, with some staff modifications and additional measures.

In section 4.4.2 of the final EIS, we estimate the likely cost of alternative power for each of the three alternatives identified above. Our analysis shows that during the first year of operation under the no-action alternative, project power would cost $8,470,000, or $31.84 per megawatt-hour (MWh) less than the likely alternative cost of power. Under the proposed action alternative, project power would cost $13,192,000, or $55.90/MWh more than the likely alternative cost of power. Under the staff alternative, project power would cost $13,768,000, or $58.34/MWh more than the likely alternative cost of power. Under the staff alternative with mandatory conditions, project power would cost $14,087,000, or $59.69/MWh more than the likely alternative cost of power.

We chose the staff alternative as the preferred alternative because: (1) the project would provide a dependable source of electrical energy for the region (236,000 MWh annually); (2) the project's 90.72-MW electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; and (3) the recommended environmental measures proposed by NID, as modified by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

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**FINAL ENVIRONMENTAL IMPACT STATEMENT**

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, DC

**Upper Drum-Spaulding Hydroelectric Project[1]**
**FERC Project No. 2310-193 – California**

**Lower Drum Hydroelectric Project**
**FERC Project No. 14531-000 – California**

**Deer Creek Hydroelectric Project**
**FERC Project No. 14530-000 – California**

**Yuba-Bear Hydroelectric Project**
**FERC Project No. 2266-102 – California**

# 1.0 INTRODUCTION

## 1.1 APPLICATIONS

On April 12, 2011, Pacific Gas and Electric (PG&E) filed an application to relicense its 191.5-megawatt (MW) Drum-Spaulding Project (Project No. 2310) with the Federal Energy Regulatory Commission (FERC or Commission). The existing Drum-Spaulding Project is located within three primary river basins, the South Yuba River, Bear River, and North Fork of the North Fork American River, in Nevada and Placer Counties, California (figure 1-1). The existing project consists of 10 developments: (1) Spaulding No. 3; (2) Spaulding Nos. 1 and 2; (3) Deer Creek; (4) Alta; (5) Drum Nos. 1 and 2; (6) Dutch Flat No. 1; (7) Halsey; (8) Wise; (9) Wise No. 2; and (10) Newcastle. These 10 developments include 29 reservoirs, 6 major water conduits, 12 powerhouses, and appurtenant facilities and structures. The project generates an annual average of approximately 794 gigawatt-hours (GWh). The existing project boundary encompasses 5,520.2 acres of land. The majority of the land, 3,443.9 acres, is owned by PG&E. There are 994.0 acres of federal land, 978.3 acres of which are managed by the U.S. Department of Agriculture, Forest Service (Forest Service), 5.1 acres of which are managed by the U.S. Department of the Interior (Interior), Bureau of Reclamation (Reclamation), and 10.6 acres of which are managed by the Interior, Bureau of Land Management (BLM). The remaining land within the project boundary is owned by the state (20.4 acres) and private landowners (1,061.9 acres).

PG&E does not propose any changes to the existing project facilities with the exception of the permanent retirement of Alta powerhouse unit 2, which has not been operating since 2007. Retirement of Alta powerhouse unit 2 would decrease the installed capacity of the project from 192.5 MW to 191.5 MW.

[1] As we describe below, PG&E is proposing to split the existing Drum-Spaulding Project into three separate projects: the Lower Drum Project, Deer Creek Project, and the remaining part of the project (referred to in this document as the Upper Drum-Spaulding Project). For the purposes of this document, the Drum-Spaulding Project refers to the entire project currently operated by PG&E, as currently licensed.

PG&E filed a license application amendment on June 18, 2012, which includes revisions to Exhibits A (Project Description), D (Project Costs and Financing), E (Environmental Report), and G (Project Maps). This amendment included a proposal to separate the Drum-Spaulding Project into a proposed Drum-Spaulding Project and a proposed Deer Creek Project. This amendment also included all proposed environmental measures that are analyzed in this environmental impact statement (EIS). PG&E also filed a license application amendment on August 30, 2012, which included implementation plans and updates to proposed environmental measures, streamflow modeling, economic analyses, environmental information, and Exhibit E.

On May 31, 2013 PG&E filed another license application amendment that includes revisions to Exhibit A (Project Description), D (Project Costs and Financing), E (Environmental Report), and G (Project Maps). As part of the amendment application, PG&E proposes to split the currently licensed Drum-Spaulding Project into three new licensed projects: the Lower Drum Project, the Deer Creek Project, and the remaining Drum-Spaulding Project (referred to in this document as the Upper Drum-Spaulding Project). We describe each project in sections 2.2.1 and 2.2.2 and evaluate the economics and environmental effects of each of the three projects throughout this final EIS.

On April 15, 2011, the Nevada Irrigation District (NID) filed an application to relicense its 79.32-MW Yuba-Bear Project (Project No. 2266) with FERC.[2] The Yuba-Bear Project is located within three major river basins, the Middle Yuba River, South Yuba River, and Bear River, in Sierra, Nevada, and Placer Counties, California (figure 1-1). The project consists of four developments: (1) Bowman; (2) Dutch Flat; (3) Chicago Park; and (4) Rollins. These four developments include the following: 13 main dams, 4 water conduits, and 4 powerhouses and switchyards; one 9-mile-long, 60-kilovolt transmission line; 17 campgrounds and associated boat launches, trails, and recreation facilities; and other appurtenant facilities and structures. The project generates an average of approximately 354 GWh of energy annually. The existing project boundary encompasses 6,252.6 acres of land. The majority of the land, 4,056.3 acres, is owned by NID. There are 1,749.3 acres of federal land, 1,540.8 acres of which are managed by the Forest Service and 208.5 acres of which are managed by BLM. The remaining land within the project boundary is owned by private landowners (447.0 acres).

NID proposes to construct one new powerhouse (the Rollins upgrade) that would be located within the existing project boundary on NID-owned land adjacent to the existing Rollins powerhouse. The Rollins upgrade would increase the installed capacity of the project from 79.32 MW to 90.72 MW. NID's proposed project also includes modifications to the existing project boundary to include all primary project access roads and several recreation sites and to remove two non-project areas. The area within the proposed project would be 170.4 acres less than the area within the existing FERC boundary, including a decrease of 82.7 acres of federal land.

Because all of the proposed projects are hydraulically and operationally interrelated and generally have the same physical features located in common watersheds; and because the existing two licensed projects have the same license expiration date (April 30, 2013), we prepared a multi-project EIS.[3]

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[2] NID filed a license application amendment on June 18, 2012, which includes revisions to Exhibits A (Project Description) and E (Environmental Report). This amendment included all proposed environmental measures that are analyzed in this EIS. NID also filed a license application amendment on August 17, 2012, which included updates to streamflow modeling, economic analyses, environmental information, and Exhibit E. NID also filed implementation plans on August 30, 2012.

[3] The Commission indicated its intention to prepare a multi-project EIS for the projects in Scoping Document 1, issued on May 22, 2008.


Figure 1-1. Drum-Spaulding and Yuba-Bear Projects location map. (Source: ESRI and Tele Atlas North America, Inc., 2006a and 2006b; ESRI and Bureau of Transportation Statistics, 2006; PG&E, 2011a; and NID, 2011a)

## 1.2 PURPOSE OF ACTION AND NEED FOR POWER

### 1.2.1 Purpose of Action

The purposes of the Drum-Spaulding and Yuba-Bear Projects are to provide a source of hydroelectric power and serve as a water supply for both domestic and irrigation purposes. Therefore, under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue licenses to PG&E for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects and to NID for the Yuba-Bear Project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the projects would be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or water supply), the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

Issuing new licenses for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects would allow PG&E and NID to continue to generate electricity at the projects for the terms of the new licenses, making electric power from a renewable resource available to their customers.

This final EIS assesses the effects associated with operation of the proposed projects, examines alternatives to the proposed projects, and makes recommendations to the Commission on whether to issue new licenses, and if so, recommends terms and conditions to become a part of any licenses issued.

In this final EIS, we assess the environmental and economic effects of continuing to operate the projects: (1) as proposed by PG&E and NID; and (2) with our recommended measures. We also consider the effects of the no-action alternative. Important issues that are addressed include establishing erosion control and restoration measures; establishing flow regimes in project-affected reaches for aquatic resources; establishing spill cessation schedules following high-flow periods to mimic natural conditions and for whitewater boating opportunities; measures for wildlife resources; implementing recreation plans at both projects; and cultural resources.

### 1.2.2 Need for Power

The Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects would continue to provide hydroelectric generation to meet part of California's power requirements, resource diversity, and capacity needs. The Upper Drum-Spaulding Project has an installed capacity of 147.4 MW and generates about 575 GWh per year. The Lower Drum Project has an installed capacity of 39.7 MW and generates about 196 GWh per year. The Deer Creek Project has an installed capacity of 5.7 MW and generates about 22 GWh per year. The Yuba-Bear Project has an installed capacity of 79.3 MW and generates about 266 GWh per year.

The projects are a significant power resource to the state of California and within the Western Electricity Coordinating Council (WECC), which includes the states west of the Rockies; portions of Texas, Nebraska, and Kansas; Alberta and British Columbia, Canada; and a portion of North Baja California, Mexico.

The projects are located within the Northern California Assessment Area of the WECC, a regional entity of the North American Electric Reliability Corporation (NERC). This assessment area has a significant summer peak demand. To see how the demand for electricity is expected to change in the region, Commission staff reviewed the projected regional need for power as reported by the NERC in its

*2013 Long-Term Reliability Assessment* (December 2013).[4] For the period from 2013 through 2023, NERC forecasts that the broader U.S. portion of the WECC is planning to install an additional 20,000 MW of capacity to meet projected load growth.[5]

We conclude that power from the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects would continue to meet a need for power and maintain the necessary reserve margins in the WECC region in both the short and long term. The projects provide low-cost power that may displace generation from non-renewable sources. Displacing the operation of non-renewable facilities may avoid some power plant emissions, thus creating an environmental benefit. Any new generation installed at the projects would help in meeting future energy and capacity needs.

## 1.3 STATUTORY AND REGULATORY REQUIREMENTS

The licenses for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects are subject to numerous requirements under the FPA and other applicable statutes. Major regulatory and statutory requirements are summarized in table 1-1 and described below.

Table 1-1. Major statutory and regulatory requirements for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects. (Source: staff)

| Requirement | Agency | Status |
|---|---|---|
| Section 18 of the FPA (Fishway Prescriptions) | Interior, U.S. Fish and Wildlife Service (FWS); U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) | FWS and NMFS reserved their authority to prescribe fishways for the Drum-Spaulding and Yuba-Bear Projects on July 31, 2012. |
| Section 4(e) of the FPA (land management conditions) | Forest Service; Reclamation; BLM | The Forest Service filed conditions for the Drum-Spaulding Project and for the Yuba-Bear Project on July 31, 2012; revised conditions on August 23, 2012; modified conditions on November 21, 2013, and revised modified conditions on April 14, 2014. Reclamation filed conditions for the Drum-Spaulding Project on July 31, 2012 and modified conditions on October 21, 2013. BLM filed conditions for the Drum-Spaulding and Yuba-Bear Projects on July 31, 2012; revised conditions on August 27, 2012; modified conditions on November 21, 2013, and revised modified conditions on April 15, 2014. |

[4] Available at http://www.nerc.com/pa/RAPA/ra/Reliability Assessments DL/2013_LTRA_FINAL.pdf.

[5] *Id*. at 159.

Table 1-1. Major statutory and regulatory requirements for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects. (Source: staff)

| Requirement | Agency | Status |
|---|---|---|
| Section 10(j) of the FPA | NMFS; California Department of Fish and Wildlife (California Fish and Wildlife) [a] | On July 31, 2012, NMFS provided recommendations for the Drum-Spaulding and Yuba-Bear Projects. California Fish and Wildlife provided recommendations for both projects on July 30, 2012. A 10(j) meeting was held between the Commission staff and California Fish and Wildlife on November 12, 2013. |
| Clean Water Act—water quality certification | California State Water Resources Control Board (California Water Board) | The California Water Board received applications for water quality certification from PG&E on February 28, 2012, February 6, 2013, and January 29, 2014, and from NID on March 15, 2012, March 1, 2013, and February 21, 2014. |
| Endangered Species Act (ESA) consultation | FWS for most species and NMFS for marine and anadromous species | We will seek concurrence from FWS and NMFS with our conclusions regarding federally listed species in this final EIS and request formal consultation with NMFS on listed fish species located downstream of Englebright dam. |
| Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) | NMFS | We will consult with NMFS on essential fish habitat (EFH) located downstream of Englebright dam. |
| Coastal Zone Management Act (CZMA) Consistency | California Coastal Commission | Relicensing the projects would not influence resources in the designated coastal zone. |
| National Historic Preservation Act (NHPA) consultation | California State Historic Preservation Officer (SHPO); Tribal Historic Preservation Officers (THPOs) | PG&E and NID have prepared Historic Properties Management Plans (HPMPs) for the Drum-Spaulding and Yuba-Bear Projects. We will prepare programmatic agreements for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects. |
| Wild and Scenic Rivers Act | Forest Service, BLM | The projects would not diminish the outstandingly remarkable values of the designated and eligible river. |

[a] Effective January 1, 2013, the California Department of Fish and Game was officially changed to the California Department of Fish and Wildlife.

### 1.3.1 Federal Power Act

#### 1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or the Interior. By letters filed July 31, 2012, Interior and NMFS request that a reservation of authority to prescribe fishways under section 18 be included in any licenses issued for the existing Drum-Spaulding and Yuba-Bear Projects. We consider the request for the Drum-Spaulding Project to apply to the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects.

#### 1.3.1.2 Section 4(e) Conditions

Section 4(e) of the FPA provides that any license issued by the Commission for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. The Forest Service filed conditions for the existing Drum-Spaulding and Yuba-Bear Projects on July 31, 2012, revised conditions for the projects on August 23, 2012, modified conditions on November 21, 2013, and revised modified conditions on April 14, 2014.[6] Reclamation filed conditions for the Drum-Spaulding Project on July 31, 2012 and modified conditions on October 21, 2013.[7] BLM filed conditions for the Drum-Spaulding and Yuba-Bear Projects on July 31, 2012, revised conditions on August 27, 2012, final conditions on November 21, 2013, and revised modified conditions on April 15, 2014 (errata filed May 19, 2014).[8] These conditions are described under section 2.2.4, *Modifications to the Applicant's Proposal—Mandatory Conditions*.

#### 1.3.1.3 Alternative Conditions under the Energy Policy Act of 2005

The Energy Policy Act of 2005 (EPAct) provides parties to these licensing proceedings the opportunity to propose alternatives to 4(e) conditions. On September 14, 2012, PG&E filed alternatives to BLM's conditions, Reclamation's conditions, and the Forest Service's conditions for the Drum-Spaulding Project. On September 14, 2012, NID filed alternatives to BLM's conditions and the Forest Service's conditions for the Yuba-Bear Project. On November 18, 2013, PG&E filed contingent

[6] Forest Service conditions and recommendations for the currently licensed Drum-Spaulding Project were filed as a single set of project conditions. Forest Service did not file separate conditions and recommendations for the Upper Drum-Spaulding, Lower Drum and Deer Creek Projects. To the extent that conditions and recommendations filed by Forest Service apply to the proposed Upper Drum-Spaulding, Lower Drum and Deer Creek Projects, we have considered them for each project, as appropriate.

[7] Reclamation conditions were filed as a single set of project conditions for the Drum-Spaulding Project. In a footnote to its October 21, 2013 letter, Reclamation notes that if a separate license is issued for the Lower Drum Project, then its conditions apply to the Lower Drum Project.

[8] BLM conditions and recommendations for the currently licensed Drum-Spaulding Project were filed as a single set of project conditions. BLM did not file separate conditions and recommendations for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. To the extent that conditions and recommendations filed by BLM apply to the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects, we have considered them for each project, as appropriate.

withdrawals of certain alternative conditions where agreement was reached with the Forest Service and BLM. On October 22, 2013, NID filed withdrawals of certain alternative conditions because agreement was reached with the Forest Service and BLM. On December 20, 2013, in response to final 4(e) conditions filed by the Forest Service and BLM, PG&E and NID filed letters that reaffirmed their previous alternatives, proposed new alternative conditions, or agreed with the Forest Service and BLM final conditions. On April 14 and 15, 2014, Forest Service and BLM filed revised modified conditions ("final conditions") for the Drum-Spaulding and Yuba-Bear Projects, respectively, which resolved many of the remaining issues. We analyze the remaining alternative conditions within the corresponding resource areas in section 3, *Environmental Analysis*, and sections 5.1.2, 5.2.2, 5.3.2, and 5.4.2, *Comprehensive Development and Recommended Alternative*, for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, respectively.

#### 1.3.1.4 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by a project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

California Fish and Wildlife and NMFS timely filed, on July 30, 2012, and July 31, 2012, respectively, recommendations under section 10(j) for the Drum-Spaulding and Yuba-Bear Projects. The recommendations, as they apply to the four individual projects are summarized for the Upper Drum-Spaulding Project in table 5-2, for the Lower Drum Project in table 5-5, for the Deer Creek Project in table 5-8, and for the Yuba-Bear Project in table 5-11, in sections 5.1.4.1, 5.2.4.1, 5.3.4.1, and 5.4.4.1, *Fish and Wildlife Agency Recommendations*, respectively. FWS did not file any recommendations under section 10(j). In a letter dated August 22, 2013, California Department of Fish and Wildlife requested a meeting to resolve inconsistencies. The Commission staff conducted a meeting with California Fish and Wildlife on November 12, 2013. A summary of the meeting was issued on December 17, 2013.

In sections 5.1.4, 5.2.4, 5.3.4, and 5.4.4, we discuss how we address the agency recommendations and comply with section 10(j).

### 1.3.2 Clean Water Act

Under section 401 of the Clean Water Act, a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the Clean Water Act. The Clean Water Act requires that action on a request for water quality certification must be taken within one year of the request. By letter dated February 27, 2012, PG&E submitted its application for water quality certification to the California Water Board for the Drum-Spaulding Project. By letter dated March 28, 2012, the California Water Board documented receipt of the application on February 28, 2012. Subsequently, PG&E withdrew and refiled its application, which was received by the California Water Board on February 6, 2013. The California Water Board acknowledged the withdrawal and refiling of application on March 7, 2013. PG&E again withdrew its application and refiled its water quality certification application for each of the three separated projects (Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects) on January 29, 2014, which was received by the California Water Board on the same date. The California Water Board has until January 29, 2015, to act on the request.

By letter dated March 15, 2012, NID submitted its application for water quality certification to the California Water Board for the Yuba-Bear Project. By letter dated March 29, 2012, the California Water Board documented receipt of the application on March 15, 2012. Subsequently, NID withdrew and refiled its application, which was received by the California Water Board on March 1, 2013. NID again withdrew its application and refiled its water quality certification application on February 21, 2014, which was received by the California Water Board on the same date. The California Water Board has until February 21, 2015, to act on the request.

Section 404 of the Clean Water Act establishes a program to control the discharges of dredged or fill material into waters of the United States, including wetlands. The licensees must apply for and obtain any permits, as necessary, under Section 404 of the Clean Water Act, for construction, operation, and maintenance activities at the projects.

### 1.3.3 Endangered Species Act

Section 7 of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. Although no federally listed species are known to occur in the projects' vicinities, five federally listed species have the potential to occur at the projects: Stebbins' morning glory (*Calystegia stebbinsii*) (Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects), Layne's butterweed (*Senecio layneae*) (Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects), California red-legged frog (*Rana draytonii*) (Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects), Sierra Nevada yellow-legged frog (*Rana sierrae*) (Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects), valley elderberry longhorn beetle (VELB) (*Desmocerus californicus dimorphus*) (Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects), and the Central Valley steelhead distinct population segment (DPS) (*Oncorhynchus mykiss irideus*) (Lower Drum-Spaulding Project). One species, the West Coast DPS of the fisher (*Pekania pennanti*) (Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects), was proposed for listing as threatened on September 7, 2014 (FWS, 2014b).[9]

The Central Valley spring-run Chinook salmon DPS (*O. tshawytscha*), Central Valley steelhead DPS, and southern DPS of the green sturgeon (*Acipenser medirostris*) are known to occur in the Yuba River downstream of the Yuba River Project (FERC Project No. 2246) and the U.S. Army Corps of Engineers' (Corps') Englebright dam.

Our analyses of project effects on threatened and endangered species are presented in section 3.3.4, *Threatened and Endangered Species*, and our recommendations in sections 5.1.2, 5.2.2, 5.3.2, and 5.4.2, *Comprehensive Development and Recommended Alternative*, for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, respectively.

We conclude that the interbasin transfer of flows associated with the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects may adversely affect the Central Valley spring-run Chinook salmon DPS (*O. tshawytscha*), Central Valley steelhead DPS, and southern DPS of the green sturgeon downstream of Englebright dam. Project dams on the Middle Yuba and South Yuba Rivers divert water from the river to many canals and conduits where power generation occurs and where water is delivered to NID and Placer County Water Agency (PCWA) at many points along the system. These diversions, in combination with operations of the Yuba River Project, have the potential to cumulatively

[9] The February 4, 2013 proposal to list the North American DPS of wolverine (*Gulo gulo luscus*) was withdrawn by FWS on August 13, 2014, after issuance of the draft EIS for the Drum-Spaulding and Yuba-Bear Projects.

affect listed species. We will initiate formal consultation on the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects after our evaluation of recommended measures, including flow releases, associated with relicensing of the Yuba River Project.

Further, we conclude that issuing a license for the Lower Drum Project would not likely adversely affect Central Valley steelhead DPS or critical habitat in Auburn Ravine. We will request concurrence from NMFS with our conclusions regarding this species.

We conclude that issuing a license for the Lower Drum Project, as proposed with staff-recommended measures, is likely to adversely affect the VELB. We also conclude that issuing licenses for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects would not likely adversely affect Stebbins' morning glory, Layne's butterweed, California red-legged frog, Sierra Nevada yellow-legged frog, or Central Valley steelhead DPS. The activities anticipated under a new license for the project that could potentially affect the VELB are already covered under FWS' June 2003 biological opinion (BO) covering PG&E's operation and maintenance activities. Given that the VELB conservation measures recommended in this EIS are consistent with the terms and conditions to minimize incidental take included in this BO, we do not believe that formal consultation is necessary. We also conclude that relicensing of the Yuba-Bear Project, as proposed with staff-recommended measures, is not likely to adversely affect Stebbins' morning glory, California red-legged frog, or Sierra Nevada yellow-legged frog. In a letter dated June 18, 2013, we requested concurrence from FWS on these conclusions[10] concerning the VELB, Stebbins' morning glory, and California red-legged frog and will request concurrence with FWS on the Sierra Nevada yellow-legged frog.

Finally, we conclude that issuing licenses for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects and Yuba-Bear Project would not jeopardize the continued existence of the proposed West Coast DPS of the Pacific fisher or destroy or adversely modify proposed critical habitat for the Sierra Nevada yellow-legged frog.

### 1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the CZMA, 16 United States Code (U.S.C.) § 1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

The projects are not located within the state-designated Coastal Management Zone, which extends from a few blocks to 5 miles inland from the sea (www.coastal.ca.gov), and the projects would not affect California's coastal resources. Therefore, the projects are not subject to California coastal zone program review and no consistency certification is needed for the action. A copy of the draft EIS was provided to the California Coastal Commission for review.

### 1.3.5 National Historic Preservation Act

Section 106 of the NHPA requires that every federal agency "take into account" how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties (TCPs), and objects significant in American history, architecture,

[10] FWS did not respond to our June 18, 2013 request for concurrence regarding listed plant species and the California red-legged frog (Drum-Spaulding and Yuba-Bear Projects).

engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

To meet the requirements of section 106, we intend to execute Programmatic Agreements (PAs) that would have PG&E (Drum-Spaulding) and NID (Yuba-Bear Project) implement their final HPMPs upon license issuances, contingent upon a decision from the Commission. NID filed a final HPMP with the Commission on November 15, 2012, and PG&E filed their final HPMP with the Commission on September 23, 2013.

### 1.3.6 Wild and Scenic Rivers Act

Section 7(a) of the Wild and Scenic Rivers Act requires federal agencies to make a determination as to whether the operation of a project under a new license would invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the designated river corridor. The projects do not include any river segments protected under the federal Wild and Scenic Rivers Act, but facilities at the existing Drum-Spaulding Project lie upstream of a reach of the North Fork American River that was designated under Public Law 95-11 (November 10, 1978) as a Wild and Scenic River because of its outstanding scenery, remote recreation, and historic gold mining values. The 38.3-mile-long designated reach, which runs from a point 0.3 mile above Heath Springs downstream to a point 1,000 feet upstream of the Colfax-Iowa Hill Bridge, is managed by the Forest Service and BLM. The Drum-Spaulding Project's Lake Valley canal diversion dam is located at river mile (RM) 13.4 on the North Fork of the North Fork American River. Additional PG&E facilities in the Drum-Spaulding Project that lie within this subwatershed are the Lake Valley reservoir and dam, Kelly Lake, the Towle diversion, and Towle canal diversion dam. An April 11, 1963, agreement between PG&E, the Forest Service, and California Fish and Wildlife that expired April 30, 2013 requires 1 cubic foot per second (cfs) in the North Fork of the North Fork American River below Lake Valley reservoir dam and 1 cfs below Lake Valley canal diversion dam. The current minimum flow, though, is 3 cfs per a water rights permit-related agreement in the mid-1980s with California Fish and Wildlife. PG&E proposes to increase the minimum streamflow requirement in the North Fork of the North Fork American River below Lake Valley reservoir dam from 1 cfs to 3 cfs during the months of June through September. Neither the Forest Service nor BLM filed any conditions or recommendations specific to this Wild and Scenic River.

The South Yuba River from Spaulding dam to Englebright reservoir has been designated as an Eligible and Suitable Federal Wild and Scenic River, as well as a State Wild and Scenic River under the California Wild and Scenic Rivers Act (Forest Service and BLM, 1999). This 41.1-mile-long segment has high quality scenic, historic, and recreational values. These "outstandingly remarkable" values were defined after the development of the project. The projects would have no effect on historic values, but would have a beneficial effect on scenic and recreational values due to proposed enhanced flow to the South Yuba River.

We conclude that none of the action alternatives would diminish the outstandingly remarkable values of the designated and eligible river segments.

### 1.3.7 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act requires federal agencies to consult with NMFS on all actions that may adversely affect EFH. EFH has been designated for Pacific salmon within the affected basins of the projects (50 Code of Federal Regulations [CFR] 660.4391 and 660.392). The designation does not identify specific salmon species or races (e.g., spring-run or fall-run). However, Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley fall- and late-fall-run Chinook salmon are species that occur in the Central Valley and are managed under the Pacific Coast Salmon Fisheries Management Plan. The area of the projects' cumulative effects in the South

Yuba River includes designated EFH for salmon. The Corps' Englebright dam prevents passage of anadromous fish into the project areas.

PG&E and NID provided an analysis of the projects' effects on Central Valley spring-run Chinook salmon and steelhead and their designated EFH. The applicants examined the effects of out-of-basin water diversions on seasonal flow and on water temperature and determined that summertime regulated conditions are essentially the same as unimpaired conditions and do not affect flow or temperature upstream or downstream of Englebright reservoir and therefore do not affect anadromous fish species or EFH. After reviewing the information provided by the applicants and NMFS, we conclude that the projects do not affect Pacific salmon EFH upstream of Englebright reservoir but could affect EFH downstream of Englebright dam. Therefore, we will initiate EFH consultation after our evaluation of recommended measures, including flow releases, associated with relicensing of the Yuba River Project.

## 1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 CFR sections 5.1-5.16) require that applicants consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the ESA, the NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

### 1.4.1 Scoping

Before preparing the draft EIS, we conducted scoping to determine what issues and alternatives should be addressed. A scoping document (SD1) was distributed to interested agencies and others on May 22, 2008. It was noticed in the Federal Register on June 2, 2008. Two scoping meetings, both advertised in local newspapers, were held on June 24, 2008, in Auburn, California, and Grass Valley, California, to request oral comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission's public record for the projects. We also conducted an environmental site review of the project areas on June 17 through 19, 2008, which was attended by several of the individuals who also attended the scoping meetings. A second site review was conducted on July 6 through 8, 2012. In addition to comments provided at the scoping meetings, the following entities provided written comments:

| Commenting entities | Date filed |
|---|---|
| Foothills Water Network (FWN) | August 10, 2008 |
| Forest Service, BLM, NMFS, National Park Service, California Fish and Wildlife, and California Water Board | August 11, 2008 |
| Colfax Todd's-Valley Consolidated Tribe | August 11, 2008 |
| Tyrone E. Gorre | August 11, 2008 |
| NMFS, Southwest Region | August 11, 2008 |
| Sackheim Consulting | August 11, 2008 |
| California Water Board | August 11, 2008 |
| Gail and David Mackenroth | August 11, 2008 |
| PCWA | August 11, 2008 |
| Social Alliance Network | August 11, 2008 |

| Commenting entities | Date filed |
|---|---|
| PG&E | August 11, 2008 |

A revised scoping document (SD2), addressing these comments, was issued on September 25, 2008.

### 1.4.2 Interventions

On January 19, 2012, the Commission issued notices that PG&E had filed an application to relicense the Drum-Spaulding Project and that NID had filed an application to relicense the Yuba-Bear Project. These notices set April 30, 2012, as the deadline for filing protests and notions to intervene. On February 28 and 29, 2012, the Commission extended the deadline for the filing of interventions until July 31, 2012. In response to these notices, the following entities filed motions to intervene for both projects, unless otherwise indicated, in these proceedings:

| Intervenors | Date filed |
|---|---|
| California Water Board | May 3, 2012 |
| Tyrone Gorre[a] | July 1, 2012 |
| PG&E (Yuba-Bear Project) | July 24, 2012 |
| NID (Drum-Spaulding Project) | July 27, 2012 |
| Interior | July 30, 2012 |
| Forest Service | July 30, 2012 |
| PCWA | July 30, 2012 |
| Yuba County Water Agency (YCWA) | July 30, 2012 |
| California Fish and Wildlife | July 30, 2012 |
| Interior | July 31, 2012 |
| Sackheim Consulting | July 31, 2012 |
| American River Watershed Institute, California Fly Fishers Unlimited, David Wright, Foothill Angler Coalition, John Gardiner, Gold Country Fly Fishers, Grace Hubley Foundation, Granite Bay Flycasters, North Fork American River Alliance, Placer Sierra Railroad Heritage Society, Spring Creek Guide Service, William Carnazzo, and Otis Wollan | July 31, 2012 |
| FWN, American Rivers, American Whitewater, California Sportfishing Protection Alliance, Friends of the River, Gold Country Fly Fishers, Northern California Council Federation of Fly Fishers, Ophir Property Owners Association, Save Auburn Ravine Salmon and Steelhead, Sierra Club, South Yuba River Citizens League, and Trout Unlimited | July 31, 2012 |
| Placer County | July 31, 2012 |
| NMFS | July 31, 2012 |
| Tyrone Gorre[a] | July 31, 2012 |

[a] Intervention in opposition.

### 1.4.3 Comments on the Applications

A notice requesting conditions and recommendations was issued on January 19, 2012. On February 28 and 29, 2012, the Commission extended the deadline for the filing conditions and recommendations until July 31, 2012.[11] The following entities commented:

| Commenting agencies and other entities | Date filed |
|---|---|
| Elyce Klein | March 12, 2012 |
| Tyrone Gorre | June 5, 2012 |
| United Auburn Indian Community (UAIC) | July 13, 2012 |
| PG&E | July 27, 2012 |
| NID | July 27, 2012 |
| Forest Service | July 30, 2012 |
| PCWA | July 30, 2012 |
| YCWA | July 30, 2012 |
| California Fish and Wildlife | July 30, 2012 |
| Interior | July 31, 2012 |
| Forest Service | July 31, 2012 |
| FWN | July 31, 2012 |
| PCWA | July 31, 2012 |
| NMFS | July 31, 2012 |
| Placer County | July 31, 2012 |
| California Fish and Wildlife | July 31, 2012 |
| California Water Board | July 31, 2012 |
| Forest Service | August 2, 2012 |
| NMFS | August 23, 2012 |
| Forest Service | August 23, 2012 |
| Forest Service | August 27, 2012 |
| BLM | August 27, 2012 |
| PG&E | August 30, 2012 |
| NID | August 30, 2012 |
| FWN | August 31, 2012 |
| FWN | September 12, 2012 |

[11] Several comments were received after the filing deadline, but are still considered in this EIS. Several of these comments were filed after the applicants submitted supplemental application information on August 30, 2012 (PG&E), and on August 17 and 30, 2012 (NID).

| Commenting agencies and other entities | Date filed |
|---|---|
| PCWA | September 14, 2012 |
| California Fish and Wildlife | September 14, 2012 |
| Forest Service | September 25, 2012 |

PG&E and NID filed reply comments on September 14, 2012.

### 1.4.4 Comments on PG&E's Application Amendment (Lower Drum Separation Project)

On July 3, 2013, we issued a notice requesting comments and recommendations concerning PG&E's request to separate the Drum-Spaulding Project into three separate projects. Comments were due by August 22, 2013. The following entities provided written comments:

| Commenting entities | Date filed |
|---|---|
| California Fish and Wildlife | July 5, 2013 |
| California Water Board | July 11, 2013 |
| NID | August 22, 2013 |
| PCWA | August 22, 2013 |
| FWN | August 22, 2013 |
| Interior | August 22, 2013 |

PG&E and FWN filed reply comments on September 23, 2013.

### 1.4.5 Comments on the Draft EIS

On May 17, 2013, Commission staff issued the draft EIS for the relicensing of the Drum-Spaulding and Yuba-Bear Hydropower Projects. Comments on the draft EIS were due by July 23, 2013 (extended to August 22, 2013).[12] In addition, the Commission accepted oral testimony on the draft EIS at two public meetings in Auburn, California, on August 14, 2013. The meetings were transcribed and are part of the public record. In accordance with 40 CFR §1503.4(a), in appendix A, we summarize the written and oral comments received; provide responses to those comments; and indicate, where appropriate, how we have modified the text of the final EIS.

[12] The U.S. Environmental Protection Agency (EPA) issued a notice of availability for the draft EIS in the Federal Register on May 24, 2013 (Vol. 78, no. 10149, p. 31,540), as amended on August 2, 2013 (Vol. 178, no. 149, p. 46,940).

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# 2.0 PROPOSED ACTION AND ALTERNATIVES

## 2.1 NO-ACTION ALTERNATIVE

We use the no-action alternative to establish baseline environmental conditions for comparison with the proposed action and other action alternatives. Under the no-action alternative, the existing Drum-Spaulding and Yuba-Bear Projects would continue to operate under the terms and conditions of the existing licenses, and no new environmental protection, mitigation, or enhancement measures would be implemented.

### 2.1.1 Existing Project Facilities

The Drum-Spaulding Project facilities and Yuba-Bear Project facilities are intermingled among the drainage basins of the Middle Yuba River, South Yuba River, Bear River, North Fork of the North Fork American River drainage basins, as shown in figure 2-1. A schematic of the project facilities depicting the functional relationship between the two projects and among the developments is provided in figure 2-2.[1] The projects involve the transfer of water between basins for water supply and power generation. Section 2.1.1.1 provides a description of the Drum-Spaulding Project's power, storage, conveyance, and recreational facilities, and section 2.1.1.2 provides a similar description for the Yuba-Bear Project's facilities.

#### 2.1.1.1 Drum-Spaulding Project

PG&E's Drum-Spaulding Project is located in the South Yuba River, Bear River, and North Fork of the North Fork American River drainage basins. All project facilities in the Yuba River Basin are located in the headwaters of the South Yuba River and are upstream of the U.S. Army Corps of Engineers' Englebright Lake and dam (a non-project facility). The project consists of 10 developments: Spaulding No. 3, Spaulding No. 1 and No. 2, Deer Creek, Alta, Drum No. 1 and No. 2, Dutch Flat No. 1, Halsey, Wise, Wise No. 2, and Newcastle. Among these 10 developments, there are 29 reservoirs; 6 major water conduits; 12 powerhouses with associated switchyards with a combined installed capacity of 192.5 MW; 6 transmission lines; 1 distribution line; and appurtenant facilities and structures, including recreation facilities. PG&E not only operates the Drum-Spaulding Project for power generation but, in some cases, to meet the downstream consumptive water demands of both NID and PCWA. Each of the developments is described below.

**Spaulding No. 3 Development**

The Spaulding No. 3 Development is composed of the following reservoirs and associated dams and spillways: Upper Rock Lake, Lower Rock Lake, Culbertson Lake, Upper Lindsey Lake, Middle Lindsey Lake, Lower Lindsey Lake, Feeley Lake, Carr Lake, Blue Lake, Rucker Lake, and Fuller Lake. The development also includes Spaulding no. 3 powerhouse penstock, Spaulding no. 3 powerhouse and switchyard, and the Spaulding no. 3–Spaulding no. 1 transmission line.

[1] Figure 2-2 is a combined schematic of the Drum-Spaulding and Yuba-Bear Projects. For a more detailed schematic of the Yuba-Bear Project, see figure 5.1.1-1 in Exhibit E (NID, 2011a).

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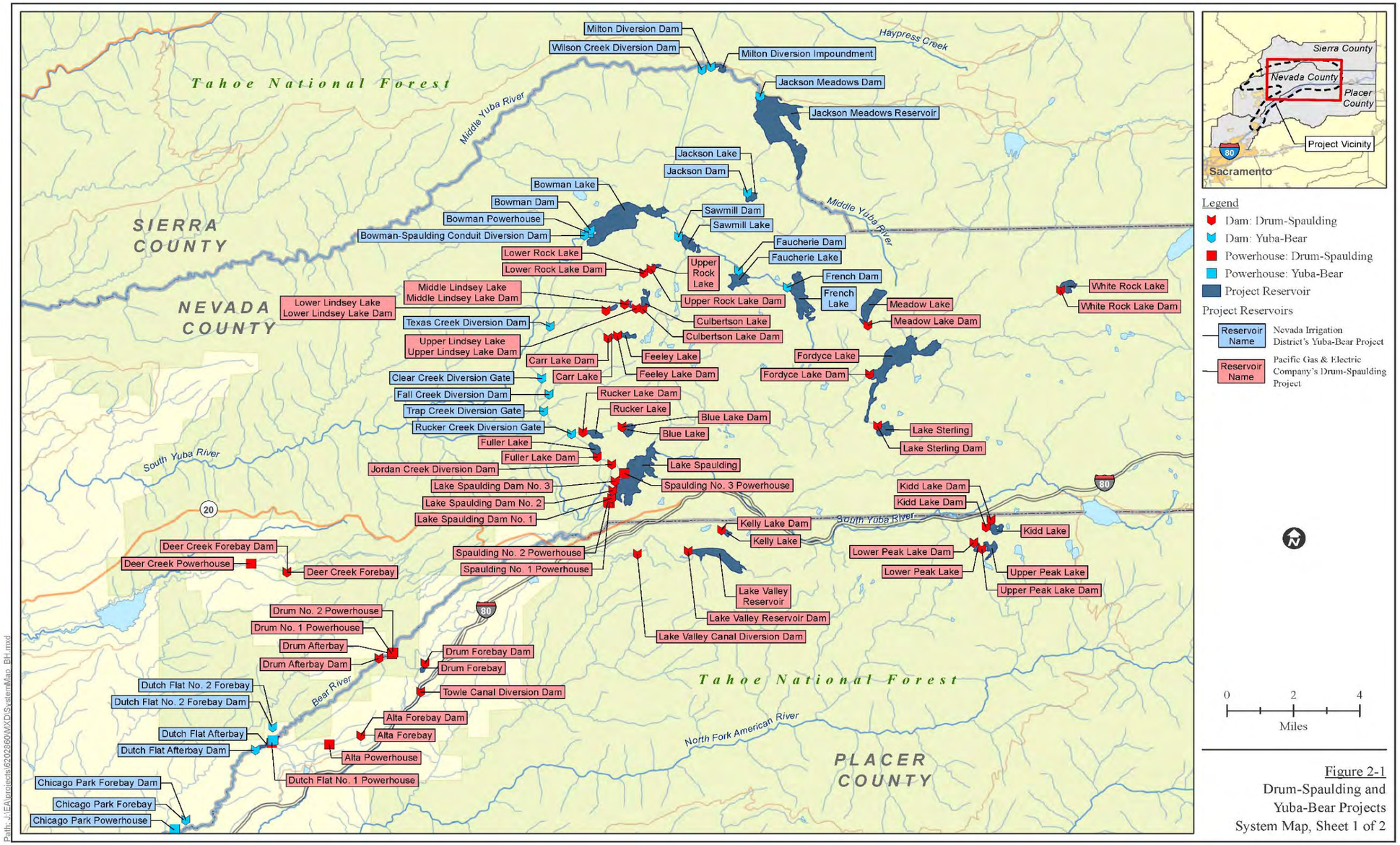


Figure 2-1
Drum-Spaulding and Yuba-Bear Projects System Map, Sheet 1 of 2

Figure 2-1. Drum-Spaulding and Yuba-Bear Projects system map. (Source: ESRI and Tele Atlas North America, Inc., 2006a and 2006b; ESRI and Bureau of Transportation Statistics, 2006; PG&E, 2011a; and NID, 2011a)

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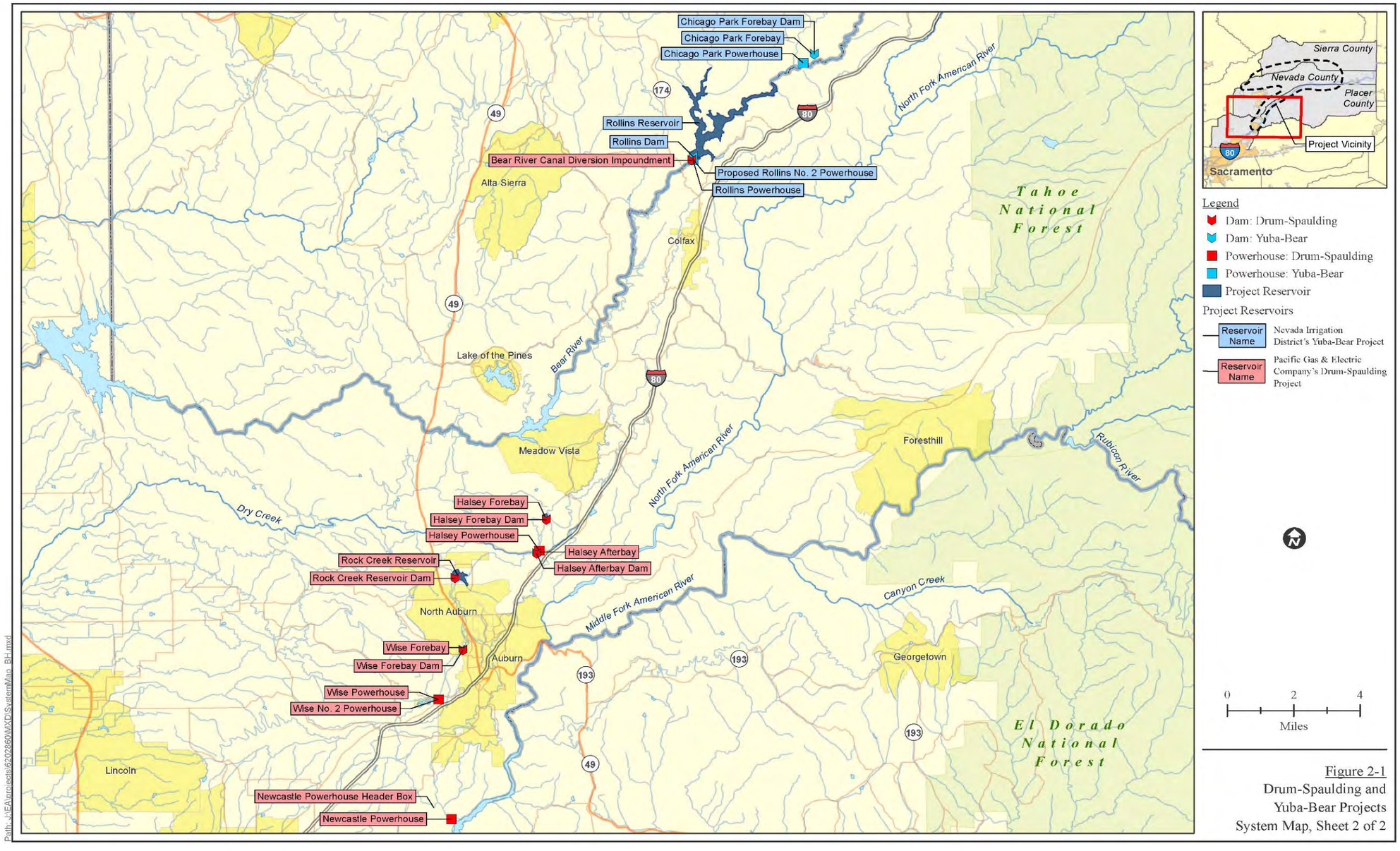


Figure 2-1
Drum-Spaulding and Yuba-Bear Projects System Map, Sheet 2 of 2

Figure 2-1 (continued). Drum-Spaulding and Yuba-Bear Projects system map. (Source: ESRI and Tele Atlas North America, Inc., 2006a and 2006b; ESRI and Bureau of Transportation Statistics, 2006; PG&E, 2011a; and NID, 2011a)

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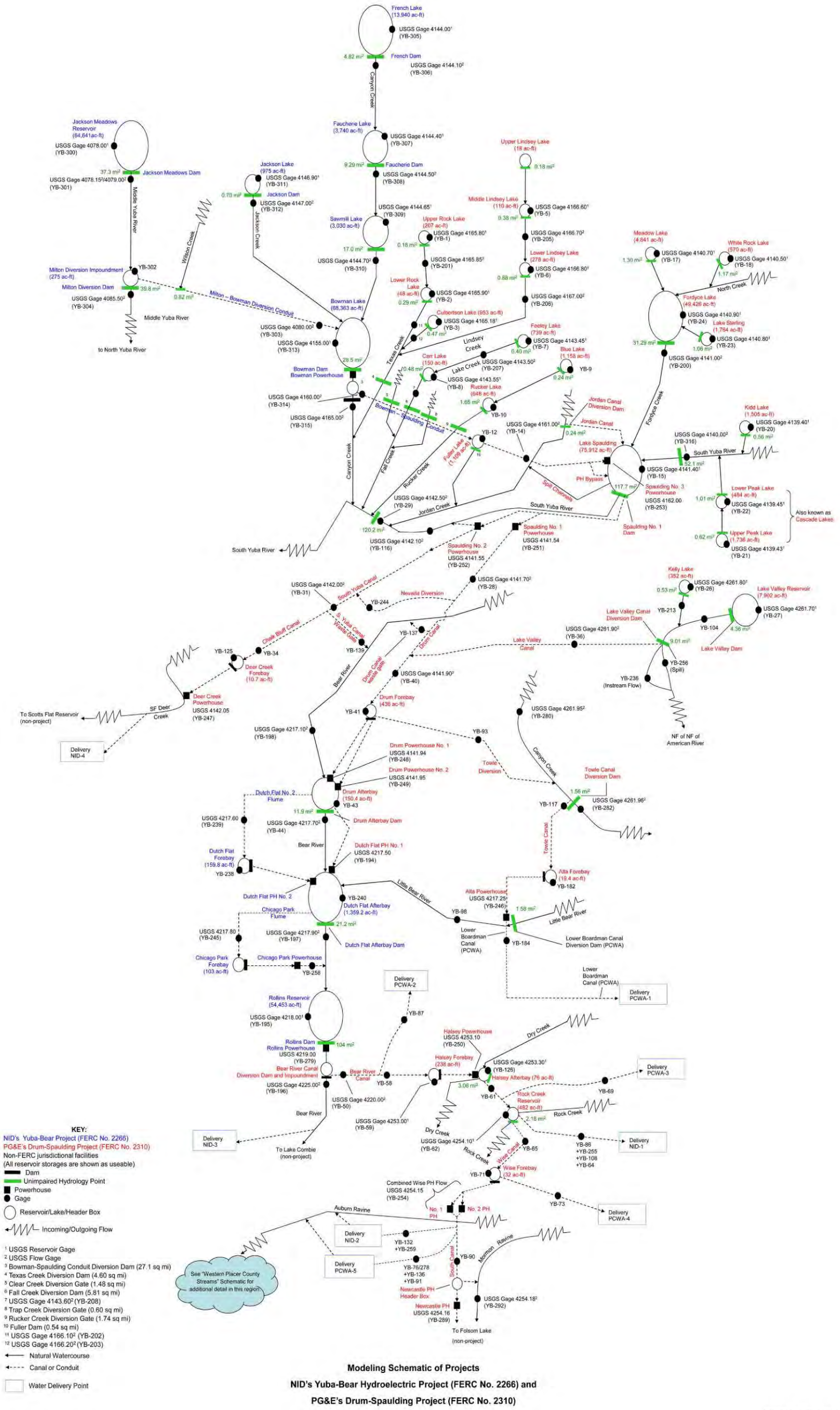


Figure 2-2. Schematic of the Drum-Spaulding and Yuba-Bear Projects. (Source: PG&E and NID, 2012)

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Upper Rock Lake dam is a 16.8-foot-high, 214-foot-long earth-fill dam that impounds Texas Creek to form Upper Rock Lake. The dam has a crest elevation of 6,717.1 feet above mean sea level (msl). Upper Rock Lake has a gross storage capacity of 275 acre-feet and a surface area of 19.8 acres. Normal maximum water surface elevation within the reservoir is 6.714.5 feet msl. The dam has a 17-foot-long uncontrolled overflow spillway. The dam is also equipped with an 18-inch by 24-inch rock truck tunnel that serves as the low-level outlet. The low-level outlet has a maximum capacity of 8.4 cfs. Releases from Upper Rock Lake dam flow into Lower Rock Lake via Texas Creek.

Lower Rock Lake dam is a 10.5-foot-high, 110-foot-long earth- and rock-fill dam that impounds Texas Creek to form Lower Rock Lake. The dam has a crest elevation of 6,627.8 feet msl. Lower Rock Lake has a usable storage capacity of 48 acre-feet and a surface area of 7.6 acres. Normal maximum water surface elevation within the reservoir is 6,625.8 feet msl. The dam has a 30-foot-long uncontrolled overflow spillway. An 8-inch-diameter pipe serves as the low-level outlet for the dam and has a maximum flow capacity of 7.3 cfs. Releases from Lower Rock Lake dam flow into Texas Creek.

Culbertson Lake dam is a 20-foot-high, 255-foot-long earth- and rock-fill dam that impounds an unnamed tributary of Texas Creek to form Culbertson Lake. The dam has a crest elevation of 6,440.2 feet msl. Culbertson Lake has a usable storage capacity of 953 acre-feet and a surface area of 70.5 acres. Normal maximum water surface elevation within the reservoir is 6,436.4 feet msl. The dam has a 23-foot-long overflow spillway. A 12- to 24-inch-diameter pipe serves as the low-level outlet and has a flow capacity of 23.1 cfs. Releases from Culbertson Lake dam flow into Texas Creek downstream of the discharges from Lower Rock Lake via an unnamed tributary.

Upper Lindsey Lake dam is an 8-foot-high, 90-foot-long earth-fill dam that impounds Lindsey Creek to form Upper Lindsey Lake. The dam has a crest elevation of 6,485.4 feet msl. Upper Lindsey Lake has a usable storage capacity of 18 acre-feet and a surface area of 3.9 acres. Normal maximum water surface elevation within the reservoir is 6,482.6 feet msl. The dam has a 5-foot-long overflow spillway. An 8-inch-diameter pipe serves as the low-level outlet and has a maximum flow capacity of 6.5 cfs. Releases from Upper Lindsey Lake dam flow into Middle Lindsey Lake via Lindsey Creek.

Middle Lindsey Lake dam is a 9.5-foot-high, 335-foot-long earth-fill dam that impounds Lindsey Creek to form Middle Lindsey Lake. The dam has a crest elevation of 6,438.2 feet msl. Middle Lindsey Lake has a usable storage capacity of 110 acre-feet and a surface area of 21.5 acres. Normal maximum water surface elevation within the reservoir is 6,435.7 feet msl. The dam has a 37-foot-long overflow spillway. A 10-inch-diameter pipe serves as the low-level outlet and has a maximum flow capacity of 11.3 cfs. Releases from Middle Lindsey dam flow into Lower Lindsey Lake via Lindsey Creek.

Lower Lindsey Lake dam is a 16.6-foot-high, 335-foot-long earth- and rock-fill dam that impounds Lindsey Creek to form Lower Lindsey Lake. The dam has a crest elevation of 6,239.1 feet msl. Lower Lindsey Lake has a usable storage capacity of 278 acre-feet and a surface area of 29.4 acres. Normal maximum water surface elevation within the reservoir is 6,235.6 feet msl. The dam has a 42-foot-long overflow spillway. A 14-inch-diameter steel pipe serves as the low-level outlet and has a maximum flow capacity of 28.1 cfs. Releases from Lower Lindsey dam flow into Texas Creek downstream of the discharges from Lower Rock dam and Culbertson Lake dam.

Flows from the facilities described above are diverted from Texas Creek to NID's Bowman-Spaulding conduit by Texas Creek diversion dam (Yuba-Bear Project, Dutch Flat Development). Undiverted flows continue downstream to Canyon Creek and eventually the South Yuba River at RM 32.4.

Feeley Lake dam is a 22.6-foot-high, 210-foot-long earth- and rock-fill dam that impounds Lake Creek to form Feeley Lake. The dam has a crest elevation of 6,727.6 feet msl. Feeley Lake has a usable

storage capacity of 739 acre-feet and a surface area of 52 acres. Normal maximum water surface elevation within the reservoir is 6,723.6 feet msl. The dam has a 32-foot-long overflow spillway. A 10- to 24-inch-diameter pipe serves as the low-level outlet and has a maximum flow capacity of 16.8 cfs. Releases from Feely Lake dam flow into Carr Lake via Lake Creek.

Carr Lake dam is an 8-foot-high, 185-foot-long earth- and rock-fill dam that impounds Lake Creek to form Carr Lake. The dam has a crest elevation of 6,667.7 feet msl. Carr Lake has a usable storage capacity of 150 acre-feet and a surface area of 15.8 acres. Normal maximum water surface elevation within the reservoir is 6,663.7 feet msl. The dam has a 40-foot-long overflow spillway. A 24-inch-diameter concrete-encased pipe serves as the low-level outlet and has a maximum flow capacity of 82.7 cfs. Releases from Carr Lake dam continue down Lake Creek into Fall Creek and are diverted into NID's Bowman-Spaulding conduit by the Fall Creek diversion dam (Yuba-Bear Project, Dutch Flat Development). Undiverted flows continue downstream via Fall Creek, which also receives flows from Clear and Trap Creeks not diverted into NID's Bowman-Spaulding conduit by Clear and Trap Creek diversion gates (Yuba-Bear Project, Dutch Flat Development), before entering the South Yuba River at RM 35.6.

Blue Lake dam is a 25-foot-high, 296-foot-long earth- and rock-fill dam that impounds Rucker Creek to form Blue Lake. The dam has a crest elevation of 5,935.6 feet msl. Blue Lake has a usable storage capacity of 1,158 acre-feet and a surface area of 59.7 acres. Normal maximum water surface elevation within the reservoir is 5,931.6 feet msl. The dam has a 12-foot-long overflow spillway. An 18-inch-diameter steel pipe serves as the low-level outlet and has a maximum flow capacity of 18 cfs. Releases from Blue Lake dam flow into Rucker Lake via Rucker Creek.

Rucker Lake dam is a 22-foot-high, 620-foot-long earth- and rock-fill dam that impounds Rucker Creek to form Rucker Lake. The dam has a crest elevation of 5,468.2 feet msl. Rucker Lake has a usable storage capacity of 648 acre-feet and a surface area of 78.6 acres. Normal maximum water surface elevation within the reservoir is 5,464.2 feet msl. The dam has a 60-foot-long overflow spillway. A 15- to 24-inch-diameter steel pipe serves as the low-level outlet and has a maximum flow capacity of 15 cfs. Releases from Rucker Lake dam continue downstream via Rucker Creek and are diverted into NID's Bowman-Spaulding conduit by the Rucker Creek diversion gate (Yuba-Bear Project, Dutch Flat Development) before entering the South Yuba River at RM 37.0.

Fuller Lake dam is a 39-foot-high, 410-foot-long earth- and rock-fill dam that impounds an unnamed tributary of Jordan Creek to form Fuller Lake. The dam has a crest elevation of 5,343.5 feet msl. Fuller Lake receives water diverted by NID's Bowman-Spaulding conduit (Yuba-Bear Project, Dutch Flat Development) and is used as a re-regulating pool to control the rate at which water enters Spaulding no. 3 powerhouse for hydropower generation shaping. The reservoir has a usable storage capacity of 1,109 acre-feet and a surface area of 70.2 acres. Normal maximum water surface elevation within the reservoir is 5,341.8 feet msl. The dam has 15-foot-long siphonic spillway and a 15-foot-long auxiliary spillway. A 14- to 24-inch outside diameter steel pipe serves as the low-level outlet and has a maximum flow capacity of 25 cfs. Releases from Fuller Lake dam flow from an unnamed tributary into Jordan Creek, which enters the South Yuba River at RM 40.2.

The 1,614.5-foot-long, 66-inch-diameter Spaulding no. 3 powerhouse steel penstock releases water from NID's Bowman-Spaulding conduit to the Spaulding no. 3 powerhouse. The penstock has a maximum flow capacity of 334 cfs. Spaulding no. 3 powerhouse is located on the northwest side of Lake Spaulding. PG&E operates this powerhouse semi-automatically in a base-loaded fashion, generating based on flows that are scheduled for consumptive water and power demands. Spaulding no. 3 powerhouse has an installed capacity of 5.8 MW with a synchronous generator, four Francis turbines with

a rated nameplate hydraulic capacity of 270 cfs, and a dependable capacity of 4.3 MW.[2] The Spaulding no. 3–Spaulding no. 1 transmission line is a 60-kilovolt (kV), 1.1-mile-long line that connects Spaulding no. 3 powerhouse to Spaulding no. 1 powerhouse switchyard. The Spaulding no. 3 powerhouse discharges into Lake Spaulding.

Recreational facilities in Spaulding No. 3 Development include: Upper Rock Lake primitive campsites (3 sites); Lower Rock Lake primitive campsites (3 sites); Culbertson Lake primitive campsites (3 sites); Middle Lindsey Lake primitive campsites (3 sites); Lower Lindsey Lake campground (12 sites); Lower Lindsey Lake trailhead (20 parking spaces); Carr Lake walk-in campground (11 sites); Carr-Feeley trailhead (30 parking spaces); Rucker Lake walk-in campground (7 sites); Fuller Lake day-use and boat launch (8 picnic sites, 14 parking spaces, and a 1-lane concrete ramp); Fuller Lake angler access (6 parking spaces); Blue Lake primitive campsites (10 sites); Bear Valley group campground (1 site); and Sierra discovery trail (1 mile interpretive trail and 4 picnic sites).

**Spaulding No. 1 and No. 2 Development**

The Spaulding No. 1 and No. 2 Development is composed of the following reservoirs and associated dams and spillways: White Rock Lake, Meadow Lake, Lake Sterling, Fordyce Lake, Kidd Lake, Upper Peak Lake, Lower Peak Lake, and Lake Spaulding. PG&E operates these reservoirs to fill with spring and summer runoff that accumulates during the snowmelt season, to provide water for consumptive downstream demand, hydroelectric generation, environmental water releases, and recreational benefits. The Spaulding No. 1 and No. 2 Development also contains Spaulding no. 1 powerhouse and tunnel, Spaulding no. 2 powerhouse and penstock, Spaulding no. 1 and no. 2 powerhouse switchyard, Spaulding no. 2–Spaulding no. 1 transmission line, and the South Yuba canal.

White Rock Lake dam is a 10-foot-high, 331-foot-long earth-fill and rock-wall dam that impounds White Rock Creek to form White Rock Lake. The dam has a crest elevation of 7,824.0 feet msl. White Rock Lake has a usable storage capacity of 570 acre-feet and a surface area of 88.9 acres. Normal maximum water surface elevation within the reservoir is 7,820.0 feet msl. The dam has a 40-foot-long overflow spillway. A 12-inch-diameter pipe serves as the low-level outlet and has a maximum flow capacity of 18.6 cfs. Releases from White Rock dam flow down White Rock Creek into North Creek and enter Fordyce Lake.

Meadow Lake dam is a 38-foot-high, 940-foot-long earth-fill and rock wall dam that impounds an unnamed tributary to form the Meadow Lake reservoir. The dam has a crest elevation of 7,286.2 feet. Meadow Lake has a usable storage capacity of 4.841 acre-feet and a surface area of 240 acres. Normal maximum water surface elevation within the reservoir is 7,281.8 feet msl. The dam has a 65-foot-long overflow spillway. A 26-inch-diameter steel pipe serves as the low-level outlet and has a maximum flow capacity of 50 cfs. Releases from Meadow Lake dam flow into Fordyce Lake via an unnamed tributary.

Lake Sterling dam is a 25-foot-high, 228-foot-long rock-fill dam that impounds Bloody Creek to form Lake Sterling. The dam has a crest elevation of 6,988.7 feet msl. Lake Sterling has a usable storage capacity of 1,764 acre-feet and a surface area of 104.7 acres. Normal maximum water surface elevation within the reservoir is 6,987.9 feet msl. The dam has an overflow spillway controlled with flashboards during the summer months. A 20-inch-diameter pipe serves as the low-level outlet and has a maximum flow capacity of 31.9 cfs. Releases from Lake Sterling dam flow into Fordyce Lake via Bloody Creek.

[2] Dependable capacities are based on average daily power generation data as estimated in the applicants' No-Action Alternative Operations Model run over the period of July-August 1977, which represents a period of adverse (i.e., low) water conditions coupled with high demand for electricity.

Fordyce Lake dam is a 156-foot-high, 1,220-foot-long rock-fill dam that impounds Fordyce Creek to form Fordyce Lake. The dam has a crest elevation of 6,406.6 feet msl. Fordyce Lake has a usable storage capacity of 49,426 acre-feet and a surface area of 716.2 acres. Normal maximum water surface elevation within the reservoir is 6,405.1 feet msl. The dam has a 120-foot-long lateral overflow spillway controlled with two 15-foot-by-14-foot radial gates and flashboards during the summer months. A 47-inch steel pipe serves as the low-level outlet and has a maximum flow capacity of 590 cfs. Releases from Fordyce Lake dam flow into Lake Spaulding via Fordyce Creek.

Kidd Lake dam is a 35-foot-high, 449-foot-long earth- and rock-fill dam that impounds an unnamed tributary to form Kidd Lake. The dam has a crest elevation of 6,631.4 feet msl. Kidd Lake has a usable storage capacity of 1,505 acre-feet and a surface area of 86.7 acres. Normal maximum water surface elevation within the reservoir is 6,627.6 feet msl. The dam has a 37-foot-long uncontrolled overflow spillway. A 20- to 24-inch-diameter steel pipe serves as the low-level outlet and has a maximum flow capacity of 25 cfs. Releases from Kidd Lake dam flow down an unnamed tributary into the South Yuba River at RM 0.0 and enter Lake Spaulding.

Upper Peak Lake dam is a 39-foot-high, 316-foot-long earth- and rock-fill dam that impounds Cascade Creek to form Upper Peak Lake. The dam has a crest elevation of 6,611.4 feet msl. Upper Peak Lake has a usable storage capacity of 1,736 acre-feet and a surface area of 83.8 acres. Normal maximum water surface elevation within the reservoir is 6,607.4 feet msl. The dam has a 30-foot-long overflow spillway. A 20-inch-diameter steel conduit serves as the low-level outlet and has a maximum discharge of 100 cfs. Releases from Upper Peak Lake dam flow into Lower Peak Lake via Cascade Creek.

Lower Peak Lake dam is a 29-foot-high, 200-foot-long earth- and rock-fill dam that impounds Cascade Creek to form Lower Peak Lake. The dam has a crest elevation of 6,583.4 feet msl. Lower Peak Lake has a usable storage capacity of 484 acre-feet and a surface area of 33 acres. Normal maximum water surface elevation within the reservoir is 6,581.9 feet msl. The dam has a 55-foot-long overflow spillway. A 21-inch-diameter steel pipe serves as the low-level outlet and has a maximum discharge of 86.7 cfs. Releases from Lower Peak Lake dam flow down Cascade Creek into the South Yuba River at RM 0.0 and enter Lake Spaulding.

Three dams were required to block all drainages and create Lake Spaulding: Lake Spaulding dams no. 1, 2, and 3. Lake Spaulding dam no. 1 (main dam) is a 276-foot-high, 800-foot-long concrete-arch dam that impounds the South Yuba River to form Lake Spaulding. The dam has a crest elevation of 5,016.1 feet msl. A 30-inch-diameter pipe serves as the low-level outlet and has a maximum flow capacity of 16 cfs. Lake Spaulding dam no. 2 is a 42-foot-high, 309-foot-long concrete-gravity dam located on an unnamed tributary to Jordan Creek. The dam has a crest elevation of 5,016.1 feet. The dam has a 271.3-foot-long overflow spillway with elevations ranging from 4,994.6 to 5,014.6 feet msl. The spillway is controlled by three 14-foot-by-20-foot radial gates, seven 14-foot-by-15-foot radial gates, and 14 flashboards. Lake Spaulding dam no. 3 is a 91-foot-high, 813-foot-long concrete gravity arch dam on a topographic low point that would otherwise drain to Jordan Creek. The dam has a crest elevation of 5,019.6 feet. The dam has a 21-foot-long overflow spillway controlled by 10 bays with emergency trippable flashboards. Lake Spaulding has a usable storage area of 75,912-acre-feet and a surface area of 682 acres. Normal maximum water surface elevation within the reservoir is 5,014.6 feet. Releases from Lake Spaulding dam no. 1 flow into the Spaulding no. 1 powerhouse tunnel and Spaulding no. 2 penstock, and releases from Lake Spaulding dam no. 2 flow into a spill channel discharging to an unnamed tributary to Jordan Creek. Releases into the spill channel flow into Jordan Creek and then into the South Yuba River at RM 0.0.

Spaulding no. 1 powerhouse tunnel is a 963-foot-long, 104-inch-diameter rock tunnel that diverts up to 600 cfs of water from Lake Spaulding to Spaulding no.1 powerhouse. Spaulding no. 1 powerhouse

is located downstream of Lake Spaulding and discharges, along with the Spaulding no. 1 powerhouse bypass, up to 840 cfs into Drum canal (part of the Drum No. 1 and No. 2 Development). This powerhouse features semi-automatic operation and is scheduled as base-loaded for downstream water demand. Spaulding no. 1 powerhouse has an installed capacity of 7.0 MW with a synchronous generator and one Francis turbine with a nameplate hydraulic capacity of 600 cfs.

Spaulding no. 2 penstock diverts up to 200 cfs of water from Lake Spaulding to the Spaulding no. 2 powerhouse. Spaulding no. 2 powerhouse is located downstream of Lake Spaulding, adjacent to Spaulding no. 1 powerhouse. This powerhouse features semi-automatic operation and PG&E schedules it as base-loaded for downstream water demand. Spaulding no. 2 powerhouse has an installed capacity of 4.4 MW with a synchronous generator and one Francis turbine with a rated nameplate hydraulic capacity of 200 cfs. Spaulding no. 2 powerhouse discharges into the South Yuba canal. The Spaulding No. 1 and No. 2 Development has a combined dependable capacity of 5.5 MW. The Spaulding no. 2–Spaulding no. 1 transmission line is a 2.3-kV single-circuit, 0.04-mile-long line that connects Spaulding no. 2 powerhouse to Spaulding no. 1 powerhouse transformer.

Recreational facilities in Spaulding No. 1 and No. 2 Development include: White Rock Lake primitive campsites (6 sites); Meadow Lake campground (15 sites); Meadow Lake shoreline campsites (10 sites); Meadow Knoll group campground (2 sites); Lake Sterling walk-in campground (6 sites); Kidd Lake group campground (3 sites); Lake Spaulding campground (25 sites); Lake Spaulding overflow campground (10 sites); and Lake Spaulding boat launch (67 parking spaces, 2-lane concrete ramp, and 3 picnic sites).

**Alta Development**

The Alta Development consists of Towle diversion, Towle canal diversion dam, Towle canal, Alta forebay and dam, and Alta powerhouse and switchyard. Towle canal diversion dam is a 5.5-foot-high wooden diversion dam with steel vertical slide gates. Towle canal diverts water (up to 42 cfs) from Canyon Creek (primarily consisting of deliveries from Drum forebay into Canyon Creek upstream via Towle diversion) to Alta forebay. Towle canal consists of open ditch (6.5 feet wide by 4.5 feet deep) and flume (96-inch and 108-inch Lennon flume) sections and has a total length of 3.9 miles.

Alta forebay dam is a 13-foot-high, 1,500-foot-long earth-fill dam. The dam has a crest elevation of 4,243.0 feet msl. Alta forebay has a usable storage capacity of 19.4 acre-feet and a surface area of 5 acres. Normal maximum water surface elevation within the reservoir is 4,240.0 feet. Alta forebay dam has an 8.5-foot-long overflow spillway. PG&E operates Alta forebay as a re-regulating reservoir, regulating flow into Alta powerhouse.

Alta powerhouse is located below Alta forebay, northeast of Alta, California. PG&E operates this powerhouse semi-automatically based on PCWA's downstream water demands. Alta powerhouse has an installed capacity of 2.0 MW with a synchronous generator, two overhung impulse turbines with a combined rated nameplate hydraulic capacity of 56 cfs, and a dependable capacity of 0.8 MW. The water that discharges from Alta powerhouse enters into the Alta powerhouse tailrace area where most of it is immediately re-diverted into PCWA's Lower Boardman canal for downstream consumptive water demands. Undiverted flows are released to Dutch Flat afterbay via the Little Bear River.

**Drum No. 1 and No. 2 Development**

The Drum No. 1 and No. 2 Development consists of Lake Valley reservoir, dam, and spillway; Kelly Lake reservoir, dam, and spillway; Lake Valley canal diversion dam; Lake Valley canal, Drum canal; Drum forebay dam and reservoir; Drum no. 1 powerhouse penstocks no. 1 and no. 2; Drum

powerhouse tunnels; Drum no. 2 powerhouse penstock no. 3; Drum no. 1 powerhouse; and Drum no. 2 powerhouse.

Lake Valley reservoir dam is a 75-foot-high, 1,035-foot-long earth- and rock-fill dam that impounds the North Fork of the North Fork American River to form Lake Valley reservoir. The dam has a crest elevation of 5,789.9 feet msl. The reservoir has a usable storage capacity of 7.902 acre-feet and a surface area of 303.9 acres. Normal maximum water surface elevation within the reservoir is 5,784.9 feet msl. The dam has a 525-foot-long overflow spillway controlled with manually hoisted flashboards from April to September. A 30-inch pipe serves as the low-level outlet and has a maximum flow capacity of 50 cfs. Releases from Lake Valley dam flow into the North Fork of the North Fork American River.

Kelly Lake dam is a 10.5- to 23.5-foot-high, 448-foot-long earth and rock-fill dam that impounds Sixmile Creek to form Kelly Lake. The dam has a crest elevation of 5,911.3 feet msl. The reservoir has a usable storage capacity of 352 acre-feet and a surface area of 28 acres. Normal maximum water surface elevation within the reservoir is 5,908.8 feet msl. The dam has an 18-foot-long overflow spillway controlled with manually hoisted flashboards and a maximum discharge of 490 cfs. A 20-inch-diameter pipe with a flow capacity of 25 cfs serves as the low-level outlet. Releases from Kelly Lake dam flow into the North Fork of the North Fork American River via Sixmile Creek.

Lake Valley canal diversion dam on the North Fork of the North Fork American River diverts water released upstream from Lake Valley reservoir and Kelly Lake to Lake Valley canal, which delivers up to 36 cfs of water to Drum canal. Drum canal delivers up to 840 cfs to Drum forebay. Drum forebay dam is a 65-foot-high, 4,107-foot-long earth-fill dam. PG&E operates the dam for re-regulating purposes, regulating flow into the Drum no. 1 and no. 2 powerhouse penstocks. Drum forebay dam has a crest elevation of 4,766.5 feet msl. Drum forebay has a usable storage capacity of 436 acre-feet and a surface area of 20 acres. Normal maximum water surface elevation within the reservoir is 4,756.0 feet msl. Drum forebay dam has an 800-foot-long overflow spillway, which is not in use. A 2-foot-diameter pipe with a flow capacity of 80 cfs serves as the low-level outlet.

Drum no. 1 powerhouse penstock and Drum no. 2 powerhouse penstock pass flows up to 643 cfs and 505 cfs from Drum forebay to Drum no. 1 powerhouse and Drum no. 2 powerhouse, respectively. Both powerhouses are located on Drum afterbay (part of the Dutch Flat No. 1 Development). PG&E operates the Drum no. 1 and no. 2 powerhouses semi-automatically as peaking plants generating for daily power demands. Drum no. 1 powerhouse has an installed capacity of 56.4 MW (normal operating capacity is 54.0 MW) with a synchronous generator, three double overhung impulse turbines, and one single overhung impulse turbine with a rated nameplate hydraulic capacity of 643 cfs. Drum no. 2 powerhouse has an installed capacity of 49.5 MW with a synchronous generator, with one vertical impulse turbine with a rated nameplate hydraulic capacity of 505 cfs. The Drum No. 1 and No. 2 Development has a combined dependable capacity of 79.5 MW. Flows through Drum no. 1 and no. 2 powerhouses are discharged into Drum afterbay.

Recreational facilities in Drum No. 1 and No. 2 Development include: Lodgepole campground (35 sites) and Silvertip picnic area and boat launch (10 picnic sites, 20 parking spaces, and a 1-lane concrete ramp), located at Lake Valley reservoir, and Kelly Lake picnic area (5 picnic sites), located at Kelly Lake.

**Dutch Flat No.1 Development**

The Dutch Flat No. 1 Development includes Drum afterbay and dam, Dutch Flat tunnel and penstock, Dutch Flat no. 1 powerhouse and switchyard, Dutch Flat no.1 transmission line, and Dutch Flat no. 2 tie.

Drum afterbay dam is a 102-foot-high, 356-foot-long concrete arch dam located on the Bear River. The dam has a crest elevation of 3,385.0 feet msl. PG&E operates Drum afterbay dam for reregulating purposes, regulating flow from the Bear River into Dutch Flat no. 1 tunnel and penstock. Drum afterbay has a usable storage capacity of 150.4 acre-feet and a surface area of 10 acres. Normal maximum water surface elevation within the afterbay is 3,383.3 feet msl. The dam has an 88.6-foot-long gated spillway controlled with one 20-foot-by-5.5-foot skimmer gate and four 13-foot-by-6-foot radial gates. A 60-inch-diameter sluice pipe and a 10-inch-diameter release with a combined flow capacity of 1,120 cfs serve as low-level outlets. Releases from Drum afterbay dam flow into Dutch Flat afterbay via the Bear River, Dutch Flat no. 1 powerhouse tunnel and penstock, and Dutch Flat forebay (Yuba-Bear Project, Dutch Flat Development) via the Dutch Flat no. 2 flume (Yuba-Bear Project, Dutch Flat Development).

The 12-foot-by-12-foot, 4.1-mile-long Dutch Flat tunnel has a maximum capacity of 475 cfs. The 78- to 96-inch-diameter Dutch Flat no. 1 penstock diverts up to 490 cfs from Drum afterbay to Dutch Flat no. 1 powerhouse. Dutch Flat no. 1 powerhouse is located on Dutch Flat afterbay. PG&E operates this powerhouse as a semi-automatic plant for limited peaking power demands. The powerhouse has an installed capacity of 22 MW with a synchronous generator, one vertical Francis unit with a rated nameplate hydraulic capacity of 490 cfs, and a dependable capacity of 22 MW. The Dutch Flat no. 1 powerhouse discharges into Dutch Flat afterbay. The Dutch Flat no. 1 transmission line is a 115-kV single-circuit line that extends 0.12 mile from Dutch Flat no. 1 powerhouse to the Drum-Higgins 115-kV transmission line. The Dutch Flat no. 2 tie is a 115-kV single-circuit line that extends 0.41 mile from Dutch Flat no. 2 powerhouse, part of NID's Yuba-Bear Project's Dutch Flat Development, to the 115-kV Drum-Rio Oso no. 1 transmission line.

**Halsey Development**

The Halsey Development includes the Bear River canal diversion dam, Bear River canal, Halsey forebay and dam, Halsey powerhouse penstock and tunnels, and Halsey powerhouse.

Bear River canal diversion dam is a concrete-fill dam with an unlimited spillway capacity located on the Bear River. Bear River canal diverts up to 490 cfs from the Bear River to Halsey forebay. The canal has open ditch (10 feet wide by 9 feet deep), flume (10 feet wide by 7.8 feet deep), and tunnel (8 feet wide by 11 feet high) sections and a total length of 22.7 miles. Releases from the Bear River canal diversion dam flow into Lake Combie (non-project facility) via the Bear River.

Halsey forebay dam is a 42-foot-high, 850-foot-long earth-fill dam at the downstream end of the Bear River canal that forms Halsey forebay. The dam has a crest elevation of 1,821.4 feet. PG&E operates Halsey forebay for re-regulating purposes, regulating flow into Halsey powerhouse. Halsey afterbay has a usable storage capacity of 238 acre-feet and a surface area of 18 acres. Normal maximum water surface elevation within the afterbay is 1,816.7 feet msl. The dam has an overflow spillway controlled with flashboards. A 2-foot-diameter steel pipe serves as the low-level outlet and has a maximum capacity of 30 cfs. Releases from Halsey forebay dam flow into the Halsey powerhouse penstock.

Halsey powerhouse penstock is a72-inch-diameter, 1,205-foot-long steel penstock that diverts a maximum of 490 cfs from Halsey forebay to Halsey powerhouse. The Halsey powerhouse tunnels consist of two concrete-lined tunnels with a combined flow capacity of 490 cfs. Halsey powerhouse is located adjacent to Halsey afterbay. PG&E operates Halsey powerhouse semi-automatically based on downstream water demands. Halsey powerhouse has an installed capacity of 11 MW with a synchronous generator, one Francis double-overhung turbine with a rated nameplate hydraulic capacity of 495 cfs, and a dependable capacity of 11 MW. Halsey powerhouse discharges into Halsey afterbay.

The Halsey forebay picnic area (9 picnic sites and 12 parking spaces) is the only recreational facility associated with the Halsey Development.

**Wise Development**

The Wise Development includes Halsey afterbay dam and afterbay, Upper Wise canal, Rock Creek dam and reservoir, Lower Wise canal, Wise dam and forebay, Wise powerhouse penstock, Wise powerhouses, and one distribution line.

Halsey afterbay dam is a 38-foot-high, 222-foot-long rock-fill dam located on Dry Creek. The dam has a crest elevation of 1,499 feet msl. PG&E operates Halsey afterbay dam for re-regulating purposes diverting flows in Dry Creek and from Halsey powerhouse into Upper Wise canal. During periods of high inflow from Dry Creek into Halsey afterbay, water is occasionally spilled at Halsey afterbay dam into the downstream reach of Dry Creek. Halsey afterbay has a usable storage capacity of 76 acre-feet and a surface area of 10.3 acres. Normal maximum water surface elevation within the afterbay is 1,494.0 feet msl. The dam has an overflow spillway, and a controlled 2-foot-diameter pipe serves as the low-level outlet.[3] Releases from Halsey afterbay flow into Rock Creek reservoir via Upper Wise canal; however, some of this flow discharges downstream as spillage or leakage into Dry Creek or is diverted to meet downstream non-project consumptive water demands by NID and PCWA.

Upper Wise canal is comprised of open ditch (12 feet wide by 8 feet deep), concrete flume, and natural waterway sections and has a total length 2.18 miles. The canal diverts up to 488 cfs to Rock Creek reservoir, also operated as a re-regulating reservoir. As mentioned above, Upper Wise canal delivers water to both Rock Creek reservoir and to downstream areas for consumptive water demands.

Rock Creek reservoir dam is a 36-foot-high, 1,020-foot-long earth-fill and multiple-concrete-arch dam that forms Rock Creek reservoir. The dam has a crest elevation of 1,445.1 feet msl. Rock Creek reservoir has a usable storage capacity of 482 acre-feet and a surface area of 58 acres. Normal maximum water surface elevation within the reservoir is 1,439.6 feet msl. Rock Creek reservoir dam has a 60-foot-long passive overflow spillway. A 2-foot pipe with a maximum capacity of 80 cfs serves as the low-level outlet. PG&E operates the dam for re-regulating purposes. Releases from Rock Creek dam flow into Wise forebay via Lower Wise canal; however, some of this flow is diverted for NID's water delivery point NID-1 or released downstream in Rock Creek.

Wise Forebay dam is a 20-foot-high, 1,741-foot-long earth-fill dam that forms Wise forebay. The dam has a crest elevation of 1,422.0 feet. Wise Forebay has a usable storage capacity of 32 acre-feet and a surface area of 4.5 acres. Normal maximum water surface elevation within the forebay is 1,418.0 feet msl. The dam has a 130-foot-long uncontrolled overflow spillway, which is not currently in use. A 60-inch pipe with a flow capacity of 32 cfs serves as the low-level outlet. PG&E operates Wise forebay for re-regulating purposes for flows into Wise powerhouse penstock.

Wise powerhouse penstock is a 93- to 96-inch-diameter steel pipe with a total length of 8,580 feet. Wise penstock bifurcates into two separate penstocks about 1,000 feet above the Wise powerhouses, allowing up to 393 cfs to Wise powerhouse and 80 cfs to Wise no. 2 powerhouse. Wise powerhouse is located 1.8 miles downstream of Wise forebay. PG&E operates Wise powerhouse semi-automatically based on downstream consumptive water demand. Wise powerhouse has an installed capacity of 14 MW with a synchronous generator, one Francis turbine with a rated nameplate hydraulic capacity of 393 cfs, and a dependable capacity of 9.0 MW. Wise powerhouse discharges into South canal, where the flow is either diverted to Auburn Ravine for downstream consumptive water demands or continues to the Newcastle powerhouse header box at the terminus of South canal. The Wise powerhouse distribution line

[3] The low-level outlet pipe is currently blocked by sediment and is not operational.

is a 12-kV single-circuit line extending 5 feet from Wise powerhouse to a connection with PG&E's interconnected system adjacent to the powerhouse yard.

**Wise No. 2 Development**

The Wise No. 2 Development consists of Wise no. 2 powerhouse penstock and Wise no. 2 powerhouse. Wise no. 2 powerhouse penstock is a 1,362-foot-long 30- to 60-inch-diameter steel pipe that delivers up to 80 cfs to Wise no. 2 powerhouse. PG&E operates Wise no. 2 powerhouse semi-automatically as a base-loaded plant for downstream water demand. Wise no. 2 powerhouse has an installed capacity of 3.2 MW (normal operating capacity is 3.1 MW) with a synchronous generator, one Francis turbine with a rated nameplate hydraulic capacity of 80 cfs, and a dependable capacity of 3.0 MW. Wise no. 2 powerhouse discharges into South Canal, where the flow is either diverted to Auburn Ravine for consumptive water demands, or continues to the Newcastle powerhouse header box at the terminus of South canal.

**Newcastle Development**

The Newcastle Development consists of South canal, Newcastle powerhouse header box, Newcastle penstock, Newcastle powerhouse, and one transmission line. South canal is comprised of open ditch (6.7 to 10 feet wide by 6 feet deep), flume (9 feet wide by 6 feet deep), and tunnel (6.5 feet wide by 8 feet high) sections with a total length of 5.4 miles. As noted above, South canal currently diverts up to 375 cfs from the two Wise powerhouses to Newcastle powerhouse.[4] South canal traverses over (or under in the event of a tunnel crossing) the Dutch, Secret, and Miners ravine watersheds, respectively. No water (outside of minimal leakage) is released or spilled from South canal into these drainages. South canal flows are delivered to the Newcastle penstock, a pipe with steel and concrete sections, and a capacity of 392 cfs, via the Newcastle powerhouse header box. The header box delivers a minimum instream flow, as well as periodic spills, from the South canal into Mormon ravine.

Newcastle powerhouse is located 6.0 miles downstream of Wise powerhouse and Wise no. 2 powerhouse. PG&E operates the Newcastle powerhouse automatically from the Wise switching center as a base-loaded plant. Newcastle powerhouse has an installed capacity of 11.5 MW with a synchronous generator, one Francis turbine with a rated nameplate hydraulic capacity of 392 cfs, and a dependable capacity of zero MW. The water discharged from Newcastle powerhouse flows into Folsom Lake (non-project facility operated by Reclamation) via a 0.3-mile reach of Mormon Ravine. The Newcastle powerhouse tap is a 500-foot-long underground 115-kV transmission line that connects Newcastle powerhouse to the Newcastle switchyard for the non-project Placer-Gold Hill no. 1 and no. 2 115-kV transmission lines.

**Deer Creek Development**

The Deer Creek Development consists of the South Yuba canal, Chalk Bluff canal, Deer Creek forebay, Deer Creek powerhouse penstock, Deer Creek powerhouse, and the Deer Creek–Drum transmission line.

South Yuba canal diverts up to 126 cfs from Spaulding no. 2 powerhouse to its confluence with Chalk Bluff canal, where the South Yuba canal terminates. South Yuba canal is composed of open ditch (5 feet deep by 7 feet wide), flume (6.5 feet wide by 7 feet high), and pipe sections (156-inch-diameter) and has total length of 14.0 miles. Spills from the South Yuba canal enter the Bear River via the South Yuba canal waste gate.

[4] In 1987, South canal lost capacity due to concrete work on the bottom of South canal downstream of gage YB-132.

Chalk Bluff canal has a capacity of 107 cfs and diverts water from its confluence with the South Yuba canal to Deer Creek forebay. The canal is composed of open ditch (5 feet deep by 6 feet wide), Lennon flume (156-inch), and pipe sections (52-inch-diameter) and has total length of 3.2 miles.

Deer Creek forebay dam is a 14-foot-high, 1,175-foot-long earth-fill dam located at the downstream end of the Chalk Bluff canal. The dam has a crest elevation of 4,470.0 feet msl. Deer Creek forebay has a usable storage capacity of 10.7 acre-feet and a surface area of 3.3 acres. Normal maximum water surface elevation in the reservoir is 4,473.0 feet. PG&E operates the Deer Creek forebay as a re-regulating reservoir, regulating flow into Deer Creek powerhouse. The dam has a 400-foot-long overflow spillway controlled by manually hoisted flashboards. A 10-inch drain valve serves as the low-level outlet and has a maximum capacity of 80 cfs. Releases from Deer Creek forebay dam flow into the Deer Creek powerhouse via the Deer Creek penstock.

The Deer Creek steel penstock is 42 to 48 inches in diameter, 5,589 feet long, has a capacity of 110 cfs. Deer Creek powerhouse is located 1.05 miles from Deer Creek forebay. Deer Creek powerhouse is a semiautomatic plant. PG&E operates this powerhouse as a diversion plant generating for daily downstream water demands of NID. The powerhouse has an installed capacity of 5.7 MW with a synchronous generator, one double overhung impulse turbine with a rated nameplate hydraulic capacity of 110 cfs, and a dependable capacity of 4.7 MW. The Deer Creek powerhouse discharges into the South Fork of Deer Creek, which leads to the Scotts Flat reservoir (non-project facility). The Deer Creek-Drum transmission line is a 60-kV single-circuit line that extends 6.25 miles from Deer Creek powerhouse to Drum powerhouse switchyard.

The Deer Creek forebay angler access (5 parking spaces) is the only recreational facility in Deer Creek Development.

**Existing Project Boundary**

The existing project boundary for the Drum-Spaulding Project consists of lands necessary for the safe operation and maintenance of the project and other purposes, such as recreation, shoreline control, and protection of environmental resources. The existing Drum-Spaulding Project boundary encompasses 5,520.2 acres of land in Nevada and Placer Counties, California.

The majority of land in the Drum-Spaulding Project boundary is owned by PG&E (3,443.9 acres). There are 994.0 acres of federal land, of which 978.3 acres are managed by the Forest Service, 5.1 acres are managed by Reclamation, and 10.6 acres are managed by the BLM. The project is also located on 20.4 acres that are administered by California Fish and Wildlife and 1,061.9 acres of privately owned land.

#### 2.1.1.2 Yuba-Bear Project

NID's Yuba-Bear Project is located in the South Yuba River, Middle Yuba River, and Bear River Basins. All project facilities in the Yuba River basin are located in the headwaters of the Middle and South Yuba Rivers and are upstream of the U.S. Army Corps of Engineers Englebright Lake and dam (a non-project facility). The project consists of four developments: Bowman, Dutch Flat, Chicago Park, and Rollins. Among these four developments, there are 13 main dams; 11 reservoirs or impoundments; 4 major water conduits; 4 powerhouses with associated switchyards with a combined authorized installed capacity of 79.32 MW; 1 transmission line; and appurtenant facilities and structures, including recreation facilities. NID not only operates the Yuba-Bear Project for power generation but, in some cases, to meet the downstream consumptive water demands of both NID and PCWA. Each of the developments is described below.

**Bowman Development**

The Bowman Development is composed of Jackson Meadows reservoir, dam, and spillway; Milton Main dam and spillway, Milton South dam, and Milton reservoir; Milton-Bowman diversion conduit; Wilson Creek diversion dam; Jackson Lake, dam and spillway; French Lake, and French dam and spillway; Faucherie Lake, dam, and spillway; Sawmill Lake, dam, and spillway; Bowman Lake; Bowman North dam; Bowman South dam and spillway; Bowman penstock; Bowman powerhouse; and Bowman transmission line.

Jackson Meadows dam is a 195-foot-high, 1,530-foot-long zoned embankment structure that impounds the Middle Yuba River to form Jackson Meadows reservoir. The dam has a crest elevation of 6,044.5 feet msl. Jackson Meadows reservoir has an estimated usable storage capacity of 64,641 acre-feet and a surface area of about 1,008 acres. The normal maximum water surface elevation of the reservoir is 6,036.0 feet msl. The dam includes two low-level outlets with an elevation of 5,933.0 feet msl and a combined maximum design capacity of about 760.1 cfs at full pool. Jackson Meadows dam spillway is a three-bay, gated spillway composed of reinforced concrete. A reinforced concrete chute carries spillway flow about 200 feet past the gates and discharges into a rock-lined channel. Releases from Jackson Meadows dam flow into Milton diversion impoundment via the Middle Yuba River at RM 47.1.

Milton Main dam and Milton South dam impound the Middle Yuba River to form Milton reservoir. Milton main dam is a 37-foot-high, 286-foot-long, concrete arch dam with a crest elevation of 5,690.0 feet msl. The dam includes one low-level outlet with a maximum design capacity of 113 cfs at full pool and one 8-inch valve with a capacity of 5 cfs for minimum instream releases. Milton Main dam spillway acts as an ungated, uncontrolled spillway. Milton South dam is a 30-foot-high, 140-foot-long, concrete arch dam with a crest elevation of 5,696.0 feet msl. Milton reservoir has a gross storage capacity of 275 acre-feet with a surface area of 100 acres. The normal maximum water surface elevation of the reservoir is 5,690.0 feet msl. Milton-Bowman diversion conduit is composed of both pipeline (3,315 feet long, 84-inch-diameter) and tunnel (22,623 feet long, 7.5 feet by 9.5) sections carrying water from Milton reservoir to Bowman reservoir. The majority of flow released from Milton diversion dam flows into Bowman Lake via the Milton-Bowman diversion conduit, and the remaining flow is released to the Middle Yuba River at RM 44.8.

Wilson Creek diversion dam is a grouted rubble matrix dam located on Wilson Creek, 0.4 mile upstream of its confluence with the Middle Yuba River, between Milton reservoir and Bowman Lake. The dam is 3 feet high with a crest elevation of 5,690 feet msl. Releases from Wilson Creek diversion dam continue downstream to the Middle Yuba River.

Jackson dam is a 28-foot-high, 772-foot-long dam, homogenous, compacted, earth-fill dam that impounds Jackson Creek to form Jackson Lake. The dam has a crest elevation of 6,596.0 feet msl. Jackson Lake has a gross storage capacity of 1,330 acre-feet and a surface area of 52 acres. Normal maximum water surface elevation within the reservoir is 6,592.7 feet msl. Jackson dam spillway is a 50-foot-long, uncontrolled, sharp-crested weir with rubble masonry training walls. The dam includes one low-level outlet, with a maximum design capacity of 60 cfs at full pool. Releases from Jackson dam flow into Bowman Lake via Jackson Creek.

French dam is a 70-foot-high, 200-foot-long rock-fill dam with reinforced gunite and shotcrete that impounds Canyon Creek to form French Lake. The dam has a crest elevation of 6,665.0 feet msl. French Lake is a storage reservoir, with a usable storage capacity of 13,940 acre-feet and a surface area of 356 acres. Normal maximum water surface elevation within the reservoir is 6,660.3 feet msl. French dam spillway is an uncontrolled 100-foot-long weir wall constructed of reinforced concrete. The dam

includes one low-level outlet, with a maximum design capacity of 650 cfs at full pool. Releases from French dam flow into Faucherie Lake via Canyon Creek.

Faucherie dam is a 65-foot-high, 665-foot-long zoned embankment dam that impounds Canyon Creek to form Faucherie Lake. The dam has a crest elevation of 6,131.0 feet msl. Faucherie Lake is a storage reservoir with a usable storage capacity of 3,740 acre-feet and a surface area of 150 acres. Normal maximum water surface elevation within the reservoir is 6,123.0 feet msl. Faucherie dam spillway is a 150-foot-long, uncontrolled, 3-foot-high, sharp-crested concrete weir directing spillway discharge into an unlined rock channel that returns discharge to the creek downstream. The dam includes two low-level outlets, with a combined maximum design capacity of 288.5 cfs at full pool. Releases from Faucherie dam flow into Sawmill Lake via Canyon Creek.

Sawmill dam is a 60-foot-high, 384-foot-long rock-fill dam that impounds Canyon Creek to form Sawmill Lake. The dam has a crest elevation of 5,865.0 feet msl. Sawmill Lake is a man-made storage reservoir with a usable storage capacity of 3,030 acre-feet and a surface area of 113 acres. Normal maximum water surface elevation within the reservoir is 5,860.0 feet msl. Sawmill dam spillway is a 230-foot-long, uncontrolled, flat slab and buttress structure and directs spillway discharge into an unlined rock channel that returns discharge to the creek downstream. The dam includes one low-level outlet with a maximum design capacity of 160 cfs at full pool. Releases from Sawmill dam flow into Bowman Lake via Canyon Creek.

Bowman North dam and Bowman South dam impound Canyon Creek to form Bowman Lake. Bowman North dam is a 175-foot-high, 700-foot-long rock-fill dam, with a crest elevation of 5,567.0 feet msl. The dam includes three low-level outlets with a combined maximum design capacity of 400 cfs at full pool. Bowman South dam is a 135-foot-high, 400-foot-long constant radius arch dam constructed in nine monoliths. The dam has a crest elevation of 5,563.6 feet msl. Bowman South dam spillway is a reinforced concrete flat slab and buttress structure with 12 bays, 5 of which permit uncontrolled overflow and 7 of which are fitted with radial gates. The spillway is 175 feet long and is controlled by radial gates. In addition, the Bowman South dam acts as an ungated, uncontrolled spillway with a maximum design capacity of 25,000 cfs. Bowman Lake is a storage reservoir with a usable storage capacity of 68,363 acre-feet and a surface area of 827 acres. Normal maximum water surface elevation within the reservoir is 5,562.0 feet msl. Releases from Bowman Lake flow into Bowman powerhouse penstock.

Bowman penstock is a submerged, concrete-encased, 62-inch-diameter penstock that diverts a maximum of 375 cfs to Bowman powerhouse. Bowman powerhouse is located immediately downstream of Bowman North dam. Bowman powerhouse is located near the base of Bowman North dam, adjacent to Canyon Creek. The powerhouse consists of one horizontal Francis turbine with a nameplate rated capacity of 3.6 MW at a head of 135 feet and a flow of 313 cfs. The flow through Bowman powerhouse discharges into Canyon Creek, where the majority of water is diverted to Fuller Lake via the Bowman-Spaulding conduit (Dutch Flat Development); undiverted flow continues downstream in Canyon Creek and enters the South Yuba River at RM 32.4. Bowman switchyard is adjacent to Bowman powerhouse. Bowman transmission line is an aboveground, 9.0-mile-long, 60-kV line that connects the Bowman powerhouse switchyard to the Drum-Spaulding 60-kV line 1.5 miles west of Spaulding no. 1 powerhouse, part of PG&E's Drum-Spaulding Project.

Recreational facilities associated with the Bowman Development include: Jackson Meadows reservoir recreation area, which consists of Findley campground (14 campsites), East Meadows campground (46 campsites), Fir Top campground (12 campsites), Pass Creek campground (30 campsites), Woodcamp campground (20 campsites), Aspen Group campground (capacity for 100 people-at-one-time [PAOT]), Silvertip group campground (capacity for 50 PAOT), and Jackson Point boat-in campground (10 campsites); Bowman Lake recreation area, which consists of Bowman Lake campground (11 sites),

primitive campsites (14 sites), and informal boat launches (2 ramps); Faucherie Lake recreation area, which consists of Faucherie group campground and a day-use area; and Canyon Creek campground, which includes 16 developed sites.

**Dutch Flat Development**

The Dutch Flat Development is composed of Bowman-Spaulding conduit diversion dam; Bowman-Spaulding conduit; Texas Creek diversion dam; Fall Creek diversion dam and flume; Clear Creek, Trap Creek, and Rucker Creek diversions; Dutch Flat no. 2 conduit; Dutch Flat dam, spillway, and forebay; and Dutch Flat no. 2 powerhouse and penstock.

Bowman-Spaulding conduit diversion dam is a 21-foot-high, 150-foot-long concrete structure, with a crest elevation of 5,400 feet msl. The dam has a 30-inch-diameter low-level outlet with a capacity of 80 cfs used to release instream flows and a canal inlet section used to divert flows directly into the head of the Bowman-Spaulding conduit. The Bowman-Spaulding conduit diverts flows from Canyon Creek below Bowman Lake to Fuller Lake and Lake Spaulding (part of PG&E's Drum-Spaulding Project's Spaulding No. 3 and Spaulding No. 1 Developments, respectively) via 7.7 miles of canals and flumes and 3.1 miles of tunnels. Flow is diverted by the Bowman-Spaulding diversion dam through a 12-foot-wide radial head gate into the conduit. The maximum design capacity of the conduit at the head gate is 300 cfs but increases to 325 cfs at its terminus into Lake Spaulding. Releases from Bowman-Spaulding conduit diversion dam flow into the South Yuba River at RM 32.4 via Canyon Creek.

Texas Creek diversion dam is a 21-foot-high, 50-foot-long, concrete-reinforced diversion dam on Texas Creek, which diverts a portion of flow into the Bowman-Spaulding conduit. The dam has a crest elevation of 5,385.8 feet msl and a low-level outlet with a capacity of 80 cfs. Releases from Texas Creek diversion dam flow into Canyon Creek via Texas Creek.

Fall Creek diversion dam is a 5.5-foot-high, 74.5-foot-long, concrete-reinforced diversion dam on Fall Creek, which diverts a portion of flow into the Bowman-Spaulding conduit. The dam has a crest elevation of 5,368.7 feet msl and a low-level outlet with a capacity of 80 cfs. Fall Creek diversion flume is a 204-foot-long, 6-foot-4-inch-diameter steel flume that diverts water from Fall Creek diversion dam to the Bowman-Spaulding conduit. The maximum design capacity of the flume is 100 cfs. Releases from Fall Creek diversion dam flow into the South Yuba River at RM 35.6 via Fall Creek.

Other Bowman-Spaulding conduit diversions include Clear Creek, Trap Creek, and Rucker Creek diversions, each of which diverts the entire streamflow. These diversions occur as each creek flows over the upstream wall or section into the Bowman-Spaulding conduit. Dump gates are located in the downstream side of the conduit and make releases into the respective drainages.

Dutch Flat no. 2 flume is a 24,728-foot-long combination of tunnel, flume, siphon, and canal that diverts water from Drum afterbay, part of PG&E's Drum-Spaulding Project's Dutch Flat No. 1 Development, to Dutch Flat no. 2 forebay at a maximum design capacity of 610 cfs. Dutch Flat no. 2 forebay dam is a 77-foot-high, 440-foot-long, zoned, earth-fill embankment dam adjacent to the Bear River that forms Dutch Flat no. 2 forebay. The dam has a crest elevation of 3,336.0 feet msl. Dutch Flat no. 2 forebay is an off-stream, re-regulating reservoir with a usable storage capacity of 159.8 acre-feet and a surface area of 8 acres. Normal maximum water surface elevation within the forebay is 3,330.0 feet msl. Dutch Flat no. 2 forebay dam does not include a low-level outlet because it is an off-stream facility connected to the Dutch Flat no. 2 powerhouse penstock. Dutch Flat no. 2 forebay has an uncontrolled, 250-foot-long concrete spillway. Discharge from the spillway is routed through two 60-inch-diameter metal pipes down to a spillway channel to the Bear River.

Dutch Flat no.2 powerhouse penstock is a 1,370.2-foot-long, 8-foot-diameter steel penstock that releases water, at a maximum design capacity of 610 cfs, from Dutch Flat no. 2 forebay to Dutch Flat no. 2 powerhouse. Dutch Flat no. 2 powerhouse is located adjacent to Dutch Flat afterbay, on the Bear River. Dutch Flat no.2 powerhouse is an aboveground, outdoor powerhouse constructed of reinforced concrete. The powerhouse consists of one vertical axis Francis turbine with a nameplate rated capacity of 24.6 MW and a flow capacity of 600 cfs. Dutch Flat no. 2 powerhouse discharges into Dutch Flat afterbay.

**Chicago Park Development**

The Chicago Park Development is composed of Dutch Flat afterbay dam, spillway, and afterbay and Chicago Park conduit, forebay dam, spillway, forebay, penstock, and powerhouse.

Dutch Flat afterbay dam is a 165-foot-high, 495-foot-long zoned embankment dam with rock-fill shells that impounds the Bear River to form Dutch Flat afterbay. The dam has a crest elevation of 2,755.0 feet msl. Dutch Flat afterbay is a re-regulating reservoir with a usable storage capacity of 1,359.2 acre-feet and a surface area of 38 acres. Normal maximum water surface elevation within the afterbay is 2,741.0 feet msl. Dutch Flat afterbay spillway is an uncontrolled, 100-foot-wide, concrete-lined spillway with a crest elevation of 2,741.0 feet msl. Discharge goes over an ogee crest and down a 405-foot-long concrete chute that discharges into the Bear River. Dutch Flat afterbay dam includes two low-level outlets with a combined maximum design capacity of 150 cfs at full pool. Releases from Dutch Flat afterbay dam flow into Rollins reservoir via the Bear River.

Chicago Park flume diverts water from Dutch Flat afterbay dam to Chicago Park forebay via 16,225 feet of concrete flume (18 feet wide by 10 feet deep) and gunite-lined ditch (14 feet wide and 10 feet deep). Maximum design capacity of the conduit is 1,100 cfs. Chicago Park forebay dam is a 35-foot-high, 200-foot-long earth-fill dam with gunite face located off-stream, adjacent to the Bear River, and forms Chicago Park forebay. The dam has a crest elevation of 2,720.0 feet msl. Chicago Park forebay is a re-regulating reservoir, with a usable storage capacity of 103 acre-feet and a surface area of 7 acres. Normal maximum water surface elevation in the forebay is 2,716 feet msl. Chicago Park forebay dam spillway is an uncontrolled side-channel spillway 40 feet in length and is located on the Chicago Park conduit, 0.5 mile above the Chicago Park powerhouse penstock intake structure. Chicago Park forebay dam includes one low-level outlet with a maximum design capacity of 75 cfs. Releases from Chicago Park forebay dam flow into the Chicago Park powerhouse penstock.

Chicago Park powerhouse penstock is a 2,200-foot-long, 9.25- to-10.0-foot-diameter steel penstock that diverts water, at a maximum design capacity of 1,167 cfs, from Chicago Park forebay to Chicago Park powerhouse. Chicago Park powerhouse is located adjacent to the Bear River, 800 feet southeast of the confluence of the Bear River and Steephollow Creek. The powerhouse consists of one vertical axis Francis turbine with a nameplate rated capacity of 39 MW at a head of 480 feet and a maximum flow of 1,100 cfs. Chicago Park powerhouse discharges into the Bear River upstream of Rollins reservoir.

**Rollins Development**

The Rollins Development is composed of Rollins dam, spillway, reservoir, penstock, and powerhouse. Rollins dam is a 252.5-foot-high, 1,260-foot-long, zoned embankment dam that impounds the Bear River to form Rollins reservoir. Rollins dam has a crest elevation of 2,187.5 feet msl. Rollins reservoir is a storage reservoir, with a usable storage capacity of 54,453 acre-feet and a surface area of 788 acres. Normal maximum water surface elevation within the reservoir is 2,171.0 feet msl. Rollins dam spillway is an uncontrolled concrete ogee crest spillway 620 feet in length, with a crest elevation of 2,171.0 feet msl and a maximum design capacity of 70,000 cfs. Rollins dam includes one low-level with

a maximum design capacity of 2,000 cfs at full pool. Releases from Rollins dam flow into the Rollins powerhouse penstock.

Rollins powerhouse penstock is a 524-foot-long, 8.5-foot-diameter, steel penstock partially encased in concrete that diverts water, at a maximum design capacity of 840 cfs, from Rollins dam to Rollins powerhouse. Rollins powerhouse is located at the toe of Rollins dam. Rollins powerhouse is an aboveground, outdoor powerhouse constructed of reinforced concrete. The powerhouse consists of one vertical axis Francis turbine with a nameplate rated capacity of 12.2 MW at a head of 208 feet and a maximum flow of 840 cfs. Rollins powerhouse discharges into the Bear River and enters Bear River canal diversion impoundment at RM 10.4. Releases from Bear River canal diversion dam continue downstream in the Bear River to Lake Combie at RM 0.0.

Recreational facilities in Rollins Development are located at Rollins reservoir recreation area, which consists of four project recreation facilities at Rollins reservoir: Peninsula campground (67 campsites); Greenhorn campground (79 campsites); Long Ravine campground (85 campsites); and Orchard Springs campground (101 campsites). Each facility includes a boat launch.

**Existing Project Boundary**

The existing project boundary, consisting of lands necessary for the safe operation and maintenance of the project and other purposes, such as recreation, shoreline control, and protection of environmental resources, encompasses 6,252.6 acres of land in Nevada, Placer, and Sierra Counties, California.

The majority of land in the boundary is owned by NID (4,056.3 acres). There are 1,749.3 acres of federal land, of which 1,540.8 acres are managed by the Forest Service as part of the Tahoe National Forest and 208.5 acres are managed by BLM as part of the Sierra Resource Management Area, and 447.0 acres of privately owned land.

### 2.1.2 Project Safety

The Drum-Spaulding and Yuba-Bear Projects have been operating under the existing licenses for more than 49 years, and during this time Commission staff have conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operation, compliance with the terms of the licenses, and proper maintenance. In addition, each project has been inspected and evaluated every 5 years by an independent consultant, and a consultant's safety report for each project has been filed for Commission review. As part of the relicensing process, the Commission staff would evaluate the continued adequacy of the proposed project facilities under new licenses. Special articles would be included in any licenses issued, as appropriate. Commission staff would continue to inspect the projects during the new license terms to assure continued adherence to Commission-approved plans and specifications; special license articles relating to construction (if any), operation, and maintenance; and accepted engineering practices and procedures.

### 2.1.3 Existing Project Operation

The Drum-Spaulding and Yuba-Bear Projects are multi-use systems that provide both power and non-power benefits to PG&E's and NID's electricity customers, local water customers, and California residents. The projects' power benefits include low-cost, base-load Renewables Portfolio Standard electricity, load-following energy, and dependable capacity. As described above, the two projects are interconnected at both upstream and downstream reaches, and they are operated largely in tandem.

#### 2.1.3.1 Drum-Spaulding Project

The Drum-Spaulding Project has a usable storage of about 151,355 acre-feet of water, generated an annual average of 794 GWh from 1972 (the first full year of generation) to 2007, and has a historical dependable capacity of 142 MW. With the conditions of the applicants' No-action Alternative Operations Model, the project's average annual energy is 750 GWh with a total dependable capacity of 139.8MW.[5]

The project's larger reservoirs (Fordyce Lake, Lake Spaulding, and Lake Valley reservoir) operate as storage reservoirs to capture rain and snowmelt during the spring and summer months and are slowly drawn down through summer and fall months, releasing water for power generation, irrigation, and domestic consumption purposes. These reservoir dams have spill gates or flashboard structures, which are used to optimize the storage in the reservoirs during the snowmelt period. In particular, Lake Spaulding is a "hub" for conveyance of upstream regulated releases (primarily Fordyce Lake) along with water transfers into (via NID's Yuba-Bear Project Bowman-Spaulding conduit) and out of (via South Yuba canal and Drum canal) the reservoir. Combined with the large, high-elevation, unimpaired watershed above Lake Spaulding and subsequent snowmelt runoff forecasting, reservoir operations at Lake Spaulding are the most complex of any in the project. Using its SOCRATES forecasting model, PG&E develops a water management plan in order to achieve end-of-the-month storage targets for the three major project storage reservoirs.

Meadow Lake, White Rock Lake, and Lake Sterling are examples of other reservoirs in the system that are operated as fill and spill reservoirs; the dams have passive spillways that overtop when the water level exceeds the storage capacity of the dam but do not have spill gate structures. The forebays and afterbays, including Deer Creek, Drum, Halsey, Dutch Flat, Alta, and Wise, have minimal usable storage capacities and are operated as regulating reservoirs, reshaping and diverting flows from upstream storage reservoirs for power generation, irrigation, and consumption purposes.

Nine powerhouses (Spaulding no. 1, no. 2, and no. 3; Deer Creek, Alta, Halsey, Wise, Wise no. 2, and Newcastle) are operated as base-loaded plants. Dutch Flat no. 1 powerhouse is operated for intermediate amounts of peaking (limited by diurnal storage availability in the forebay and afterbay of the powerhouse), and the Drum no. 1 and no. 2 powerhouses are operated as peaking plants.

PG&E implements hydrologic and hydraulic operation planning for the project to manage basin runoff throughout the annual hydrologic cycle for irrigation, municipal water supply, recreation, and power generation. The project utilizes storage capacity within its reservoirs to store spring runoff that occurs during the snowmelt season. Stored water is gradually released during summer and fall to augment streamflows, provide hydroelectric generation, and meet consumptive water demands. The storage reservoirs are generally operated in accordance with target storage curves to achieve reservoir levels and storage capacity that manages the available water effectively.

[5] The difference in generation and dependable capacity between historical operations and the no-action alternative is due in large part to the following operational project differences incorporated in the No-action Alternative Operations Model: (1) retirement of PG&E's Alta powerhouse unit 2, which ceased operations in 2007; (2) decommissioning of the Jordan Creek diversion and associated conveyance system in the Spaulding No. 3 Development; (3) re-operation between PG&E's Dutch Flat no. 1 powerhouse and NID's Dutch Flat no. 2 powerhouse based on water rights rather than operational or efficiency considerations; (4) modified winter/spring operations in both projects implemented since 1997 and applied to the model beginning in 1976; (5) use of usable storage estimates generated by updated bathymetric surveys in several project reservoirs of both projects; and (6) the use of average water delivery demand from 2001 to 2009 rather than historical water delivery demand for both projects.

PG&E conducts operation planning forecasting for the project in cooperation with NID. Together, the two entities perform monthly snow surveys in the project watershed during the winter and, combined with snow course data from the California Department of Water Resources (California DWR), provide this information to PG&E's hydrologists who use these data to develop runoff forecast models. In addition, PG&E uses larger scale snowmelt runoff forecasts generated by the California DWR in the form of Bulletin 120 water year forecasts (provided as "South Yuba River at Lang's Crossing," which is just downstream of Lake Spaulding dam). These data are shared with NID to determine best operational practices.

In general, weekly and daily operation of the Drum-Spaulding Project is prioritized for facility and public safety, regulatory compliance, and to balance irrigation and domestic consumptive water demands with power generation. The project is also operated to comply with PG&E's existing water rights licenses and permits.

#### 2.1.3.2 Yuba-Bear Project

The Yuba-Bear Project has a usable storage of about 212,847 acre-feet of water, generated an annual average of 354.3 GWh from 1972 through 2007 (periods for Rollins and Bowman powerhouses are shorter as they came online in 1981 and 1986, respectively), and has a historical dependable capacity of 44.2 MW. With the conditions of the applicants' No-action Alternative Operations Model, the project's average annual energy is 266 GWh with a total dependable capacity of 47 MW.[6]

In general, the Yuba-Bear Project is characterized by high-elevation storage and lower-elevation power generation via a network of natural and constructed conveyances. Water is stored and released from the upper reservoirs of the project (also known as the "Mountain Division") based on NID's consumptive needs and combined reservoir storage targets developed with PG&E. Discretionary releases are made from Jackson Meadows reservoir and Jackson, French, Faucherie, and Sawmill Lakes during the spring runoff season through late fall. These releases are conveyed to Bowman Lake via the Milton-Bowman tunnel (releases from Jackson Meadows reservoir), Jackson Creek (releases from Jackson Lake), and Canyon Creek (releases from French, Faucherie, and Sawmill Lakes). This water is then stored and released by Bowman dam through Bowman powerhouse into the Bowman-Spaulding conduit diversion impoundment.

While the majority of the Bowman-Spaulding conduit flow is provided by releases at Bowman Lake, five small diversion structures (known as "feeders") on creeks that run perpendicular to the alignment of the Bowman-Spaulding conduit also provide water to the conduit some of which is used by NID for consumptive deliveries after passing through PG&E's Drum-Spaulding Project generating facilities. These feeders augment flows in the conduit up to its capacity, and spill the remainder into their respective natural drainages downstream of the conduit.

Flows upstream of the Bowman-Spaulding conduit in Texas, Fall, Lake, and Rucker Creeks are regulated by upstream reservoirs owned and operated by PG&E as part of the Drum-Spaulding Project

[6] The difference in generation and dependable capacity between historical operations and the no-action alternative is due in large part to the following operational project differences incorporated in the No-action Alternative Operations Model: (1) re-operation between PG&E's Dutch Flat no. 1 and NID's Dutch Flat no. 2 powerhouses based on water rights rather than operational or efficiency considerations; (3) modified winter/spring operations in both projects implemented since 1997 and applied to the model beginning from 1976; (4) use of usable storage estimates generated by updated bathymetric surveys in several project reservoirs of both projects; and (5) the use of average water delivery demand from 2001 to 2009 rather than historical water delivery demand for both projects.

(Spaulding No. 3 Development). These are Culbertson, Upper Rock, Lower Rock, Upper Lindsey, Middle Lindsey, and Lower Lindsey Lakes in the Texas Creek watershed; Carr and Feeley Lakes in the Fall Creek watershed; and Blue and Rucker Lakes in the Rucker Creek watershed. Bowman-Spaulding conduit discharges into PG&E's Fuller Lake (Drum-Spaulding Project, Spaulding No. 3 Development), where it then is diverted to a second section of the Bowman-Spaulding conduit before it is utilized by PG&E for power generation at Spaulding no. 3 powerhouse (Drum-Spaulding Project, Spaulding No. 3 Development). PG&E then passes this water through Lake Spaulding into the South Yuba River, Spaulding no. 1 and no. 2 powerhouses, the Drum canal (Drum-Spaulding Project, Drum Development), and the South Yuba canal (Drum-Spaulding Project, Deer Creek Development). Water transported into Drum canal is passed through PG&E's Drum forebay, used by PG&E for power generation at Drum no. 1 and no. 2 powerhouses, and then diverted from PG&E's Drum afterbay, located on the Bear River, into the Dutch Flat no. 2 flume, forebay, and powerhouse (Yuba-Bear Project, Dutch Flat No. 2 Development). Water transported by PG&E into the South Yuba canal is passed through PG&E's Deer Creek forebay and Deer Creek powerhouse (Drum-Spaulding Project, Deer Creek Development) prior to being released into South Fork Deer Creek. NID re-diverts most of this water out of South Fork Deer Creek, 0.1 mile downstream, to meet consumptive demand. Daily volumes into each canal are scheduled by PG&E and NID for downstream consumptive demand and discretionary hydropower generation.

Water from the project's Dutch Flat no. 2 powerhouse and PG&E's Dutch Flat no. 1 powerhouse (Drum-Spaulding Project, Dutch Flat No. 1 Development) discharges into the project's Dutch Flat afterbay located on the Bear River, where the water is then delivered via the Chicago Park flume to the project's Chicago Park powerhouse by way of the project's Chicago Park forebay. Daily volumes are scheduled for downstream consumptive demand and discretionary hydroelectric power generation. These waters are discharged into the Bear River roughly 1.5 miles upstream of the high water line of the project's Rollins reservoir.

Rollins reservoir is the project's major low-elevation storage reservoir and serves as a multipurpose facility that meets municipal, irrigation, domestic water supply, recreation, and power generation needs. Rollins reservoir is generally kept as high as possible through the recreation season of Memorial Day through Labor Day. This is accomplished through upstream deliveries into the Bear River watershed by PG&E's Drum and Lake Valley canals (Drum-Spaulding Project, Drum No. 1 and No. 2 Development). Drum canal is supplied by a combination of NID's water transfers out of the Middle Yuba River (via the Milton-Bowman tunnel) and Canyon Creek (via the Bowman-Spaulding conduit) watersheds, along with PG&E reservoirs and natural runoff in the South Yuba and North Fork of the North Fork American River watersheds.

A significant decrease in reservoir storage is generally experienced during the outage period of Drum canal, which occurs in the last 2 weeks of September each year. Rollins reservoir storage is generally recovered through natural runoff and canal flows in the fall and early winter months. Drum and Dutch Flat afterbays are negligibly affected due to their relatively low minimum instream flow requirements, but Rollins reservoir is significantly affected due to the relatively high level of instream flow and water delivery demands from the reservoir in this time period.

Bowman powerhouse is operated as a base-loaded plant to meet daily downstream water demands. Dutch Flat no. 2 and Chicago Park powerhouses are operated to meet intermediate loads with some peaking operation. Rollins powerhouse is operated as a base-loaded plant generating power according to irrigation water demand and water conditions.

### 2.1.4 Existing Environmental Measures

#### 2.1.4.1 Drum-Spaulding Project

The current license for the Drum-Spaulding Project includes environmental measures and requirements. Existing environmental measures for the Drum-Spaulding Project are discussed below.

The license for the Drum-Spaulding Project (article 39) includes the minimum flow requirements shown in tables 2-1 and 2-2.

Table 2-1. Current minimum flow requirements for the Drum-Spaulding Project in Upper Rock Lake, Lower Rock Lake, Middle Lindsey Lake, Lower Lindsey Lake, Feeley Lake, Carr Lake, Blue Lake, Rucker Lake, and Culbertson Lake.[a] (Source: PG&E, 2011a)

| Release Location | Period | Target Flow (cfs) | Allowable Minimum Flow (cfs) |
|---|---|---|---|
| Upper Rock Lake | 7/1-9/30 | 0.25 | 0.1 |
| Lower Rock Lake | 7/1-9/30 | 0.25 | 0.1 |
| Middle Lindsey Lake | 7/1-9/30 | 0.25 | 0.1 |
| Lower Lindsey Lake | Year-long | 0.5 | 0.2 |
| Feeley Lake (Upper) | Year-long | 0.5 | 0.2 |
| Carr Lake (Lower Feeley) | Year-long | 0.5 | 0.2 |
| Blue Lake | Year-long | 0.5 | 0.2 |
| Rucker Lake | Year-long | 0.5 | 0.2 |
| Culbertson Lake | Year-long | 0.75 | 0.3 |

[a] During dry years, these flows shall be adjusted according to the following formula: $(0.8*[storage^{July\ 1}]*0.504)/123$, where 0.8 is used to account for evaporation in the lake; 0.504 is the conversion from acre-feet to cfs; and 123 is the number of days from July 1 to October 31.

Table 2-2. Existing minimum flow requirements for the Drum-Spaulding Project in Fordyce Creek below Fordyce Lake, South Yuba River below Lake Spaulding, South Yuba River below Langs Crossing, Bear River in Bear Valley above Drum afterbay, Bear River below Drum afterbay, Canyon Creek below Towle diversion, and Bear River below Upper Boardman canal. (Source: PG&E, 2011a)

| Stream | Period | Minimum Flow (cfs) | Qualifications |
|---|---|---|---|
| Fordyce Creek below Fordyce Lake | Year-long provided that sufficient lake storage shall be reserved at the time of outlet adjustment for unattended winter operation to ensure an initial flow of 5 cfs and not less than 3 cfs at lake level of maximum winter drawdown | 5.0 | Lake storage in excess of these releases to be prorated over the period July 1 to the date of winter operational adjustment without causing Spaulding reservoir to spill; Fordyce Lake not to be drawn down below 3,000 acre-feet of storage |
| South Yuba River below Lake Spaulding | Year-long | 1.0 | None |
| South Yuba River Langs Crossing | Year-long | 5.0 | To be released from Lake Spaulding |
| Bear River (0.1 mile below the site of the California Fish and Wildlife's Bear River fish planting base in Bear Valley)[a] | Year-long | 5.0 | None |
| Bear River below Drum afterbay | 3/1-9/30 | Normal year 10.0<br>Dry year 5.0 | Dry year conditions are deemed to exist in the month following whenever the accumulated seasonal precipitation at Lake Spaulding commencing with Oct. 1 is equal to or less than: 29 inches as of Jan. 31, 35 inches as of Feb. 28-29, 40 inches as of March 31, 45 inches *[as of April 30; provided that if total precipitation by April 30 is 45 inches or less, dry year conditions are deemed to exist for the remainder of the year.] (Note: The latter part of the above text in italics was omitted in the August 14, 1980 order).* |
| | 10/1-2/28-29 | Normal year 10.0<br>Dry year 5.0 | |
| Canyon Creek below Towle diversion | Year-long | 1.0 | Or natural streamflow, whichever is less |
| Bear River below Upper Boardman canal | Year-long | 1.0 | Or natural streamflow, whichever is less |

Table 2-2. Existing minimum flow requirements for the Drum-Spaulding Project in Fordyce Creek below Fordyce Lake, South Yuba River below Lake Spaulding, South Yuba River below Langs Crossing, Bear River in Bear Valley above Drum afterbay, Bear River below Drum afterbay, Canyon Creek below Towle diversion, and Bear River below Upper Boardman canal. (Source: PG&E, 2011a)

| Stream | Period | Minimum Flow (cfs) | Qualifications |
|---|---|---|---|
| Mormon Ravine above Newcastle powerhouse[b] | Year-long | 5.0 | No minimum flow required during South Canal outage. |

[a] The proposed California Fish and Wildlife Bear River Fish Planting Base in Bear Valley was never constructed; the minimum flow requirement is currently measured at PG&E's Gage YB-198.

[b.] With the separation of the Drum-Spaulding Project into three projects, Mormon Ravine above Newcastle powerhouse is located in the Lower Drum Project.

The license provides that PG&E regulate downstream releases in as near uniform flow as possible, and provides further that PG&E conduct the normal operations of the Bear River waste gate so as to provide gradual changes in rates of releases from the Drum canal into the Bear River as possible excepting emergencies and allowances for the safety of the Drum canal.

The license also requires that the project maintain water levels in project reservoirs as shown in table 2-3 (article 40).

Table 2-3. Current water level requirements for the Drum-Spaulding Project (Source: PG&E, 2011a)

| Reservoir | Water Level Schedule |
|---|---|
| Meadow Lake | Maximum level consistent with project operation June 1 to August 1 |
| Rucker Lake<br>Sterling Lake<br>Lower Rock Lake<br>Lower Feeley Lake | Maximum level consistent with project operation June 1 to September 1 |
| Fuller Lake | Maximum level consistent with project operations year round; any necessary drawdowns not to decrease the level below the bottom elevation of NID's outlet ditch |
| Upper Lindsey Lake | Level as permitted with no drawdown for irrigation or power purposes |
| Upper Cascade (Peak) Lake<br>Lower Cascade (Peak) Lake | Maximum level consistent with project operations and with use of the storage to maximize recreational use of the lakes and to augment the flow of the South Yuba River during the fall months |
| Rock Creek Reservoir<br>Halsey forebay<br>Halsey afterbay[b] | Maximum level consistent with project operation June 1 to September 1 |

| Reservoir | Water Level Schedule |
|---|---|
| White Rock Lake | Consistent with project operations; storage level used to augment flows into North Creek during summer and fall months. |

[b.] With the separation of the Drum-Spaulding Project into three projects, Rock Creek reservoir, Halsey forebay, and Halsey afterbay are located in the Lower Drum Project.

PG&E is required to operate project reservoirs during flood conditions so that releases are no more than would have occurred under natural stream conditions (article 38).

PG&E is required to, in consultation with the U.S. Geological Survey (USGS), install and maintain recorders for determining the stage and flows in streams from which water is diverted or released, and the amount of water held in storage (article 6).

The license provides that PG&E construct and maintain deer-proof fences, crosswalks, escape ramps, and such other reasonable structures necessary to protect deer as may be prescribed by the Forest Service, California Fish and Wildlife, and FWS (article 42).

The license requires that, prior to any ground-disturbing activity, PG&E consult with the SHPO and the Forest Service, if the work is on National Forest System (NFS) land, about the need for a cultural resources survey and salvage work (article 65).

In addition to the FERC license requirements, PG&E entered into three agreements with resource agencies that included various streamflow-related requirements, which are summarized below.

In an April 11, 1963, agreement between PG&E, the Forest Service, and California Fish and Wildlife, which expires April 30, 2013, PGE& agreed to release 1 cfs in the North Fork of the North Fork American River below Lake Valley reservoir and 1 cfs below Lake Valley canal diversion dam (although 3 cfs is the current minimum flow per a water rights permit-related "agreement" in the mid-1980s with California Fish and Wildlife). PG&E also agreed to drawdown provisions for Kelly Lake and Kidd Lake (modified in the June 22, 1979, agreement below) and provisions to use storage in White Rock Lake to augment flow of North Creek in summer and fall months.

A June 22, 1979, letter agreement between PG&E, California Fish and Wildlife, and the Forest Service acted as an interim modification to the 1963 agreement. In this agreement, PG&E agreed to make releases from Kidd Lake and Upper and Lower Peak (Cascade) Lakes to maintain a minimum flow of 5 cfs and a maximum water temperature of 70 degrees Fahrenheit (°F) in the South Yuba River, as measured at Cisco Grove, consistent with the primary purposes of the project and as water conditions permit, although releases from these reservoirs prior to September 1 should be controlled to keep the lake water surfaces as high as reasonably possible during the recreation season.

Finally, in an April 21, 1987, "letter agreement" between PG&E and California Fish and Wildlife, PG&E agreed to bypass 0.25 cfs year-round in Little Bear River below Alta powerhouse.

#### 2.1.4.2 Yuba-Bear Project

The current FERC license (article 69) for the Yuba-Bear Project requires NID to consult annually with the Forest Service, FWS, and other resource agencies with regard to measures needed to ensure protection and development of the natural resource values of the project area, and to file with the Commission within 2 months of the consultation a report that includes any recommendations made by the agencies.

The current FERC license (articles 32 and 33) includes the minimum flow requirements shown in table 2-4.

Table 2-4. Existing minimum flow requirements for the Yuba-Bear Project. (Source: NID, 2011a)

| From | To | Release (cfs) | Period | Applicable Water Year Type |
|---|---|---|---|---|
| Jackson Meadows dam | Middle Yuba River | 5 | Continuous | All |
| Milton diversion dam | Middle Yuba River | 3 | Continuous | All |
| Jackson Lake dam | Jackson Creek | 0.75 | Continuous | All |
| French Lake dam | Canyon Creek to Bowman Reservoir | 2.5 | Continuous | All |
| Bowman-Spaulding diversion dam | Canyon Creek | 3 | 4/1-10/31 | All |
| | | 2 | 11/1-3/31 | |
| Dutch Flat afterbay dam | Bear River | 10 | 5/1-10/31 | All |
| | | 5 | 11/1-4/30 | |
| Rollins dam[a] | Bear River | 75 | 5/1-10/31 | Normal[b] |
| | | 20 | 11/1-4/30 | |
| | | 40 | 5/1-10/31 | Less than Normal[b] |
| | | 15 | 11/1-4/30 | |

[a] As measured at the Colfax-Grass Valley streamflow gage (Bear River at Highway 174 crossing).

[b] Normal and less than normal are based on monthly precipitation at Lake Spaulding.

The license (article 34) also requires the project to adhere to the following ramping rates:

- Jackson Meadows Dam: no more than releases of 15 cfs over 30 minutes when releases are in the range of 5 to 125 cfs, or greater than 15 cfs over 15 minutes when releases are at a level of 125 cfs or greater. In addition, the flow changes in the Middle Yuba River below Jackson Meadows dam are limited to four changes (i.e., two increases and two decreases) per year, except in cases of emergency and/or uncontrolled spills.

- Rollins Dam: 1 foot in 6 hours or 3 inches during any 1 hour as measured at the Colfax-Grass Valley streamflow gage.

The license (articles 29, 30, and 31) for the project includes the following reservoir pool limitations:

- Jackson Meadows Reservoir: in normal and wet water years, not less than 10,000 acre-feet from October 1 through May 31 and not less than 21,000 acre-feet from June 1 through September 30; and in dry water years, not less than 3,000 acre-feet from October 1 through May 31 and not less than 21,000 acre-feet from June 1 through September 30. For the purpose of this measure, a dry

year is one in which the April-July runoff forecast made by the California DWR on May 1 for the Bowman area-Middle Yuba River and Canyon Creek is for less than 70,000 acre-feet.

- Milton Diversion Dam Impoundment: an elevation of 5,686 feet msl year-round except when repair to the Milton-Bowman tunnel is necessary, at which time the normal pool may be drawn to a minimum elevation of 5,678 feet msl.

- Rollins Reservoir: a minimum pool year-round of not less than 5,000 acre-feet.

NID is required to, in consultation with USGS, install and maintain recorders for determining the stage and flows in streams from which water is diverted or released, and the amount of water retained in storage (article 6).

The license (article 35) provides that NID cooperate with the Forest Service, FWS, and California Fish and Wildlife in planning the location of deer-proof fences, crosswalks, escape ramps, and such other reasonable structures necessary to protect deer and to maintain these facilities.

The license (article 77) prohibits the use of pesticides or herbicides on NFS lands for any purpose without the prior written approval of the Forest Service.

The license (article 78) requires that prior to any ground-disturbing activity, NID consult with the California SHPO and the Forest Service, if the work is on NFS land, about the need for a cultural resources survey and salvage work.

## 2.2 APPLICANTS' PROPOSALS

### 2.2.1 Proposed Project Facilities

PG&E proposes to separate the Drum-Spaulding Project into three projects: the 147.4-MW Upper Drum-Spaulding Project, the 39.7-MW Lower Drum Project, and the 5.7-MW Deer Creek Project. The proposed projects are described in section 2.2.1.1, 2.2.1.2, and 2.2.1.3. The proposed Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project facilities are shown in figure 2-3.

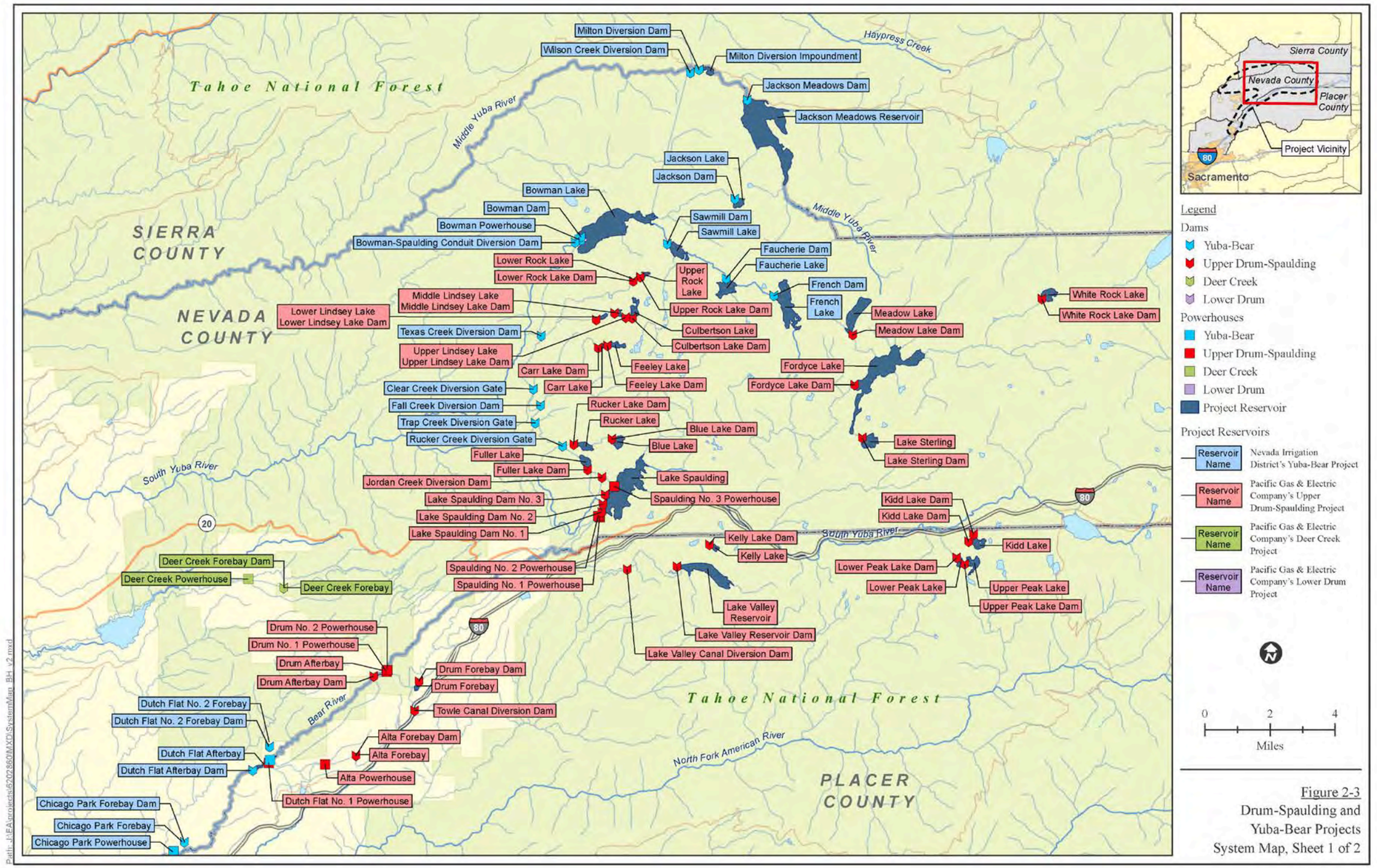


Figure 2-3. Upper Drum-Spaulding (pink), Lower Drum (purple), Deer Creek (green), and Yuba-Bear (blue) Projects system map. (Source: ESRI and Tele Atlas North America, Inc., 2006a and 2006b; ESRI and Bureau of Transportation Statistics, 2006; PG&E, 2011a; and NID, 2011a)

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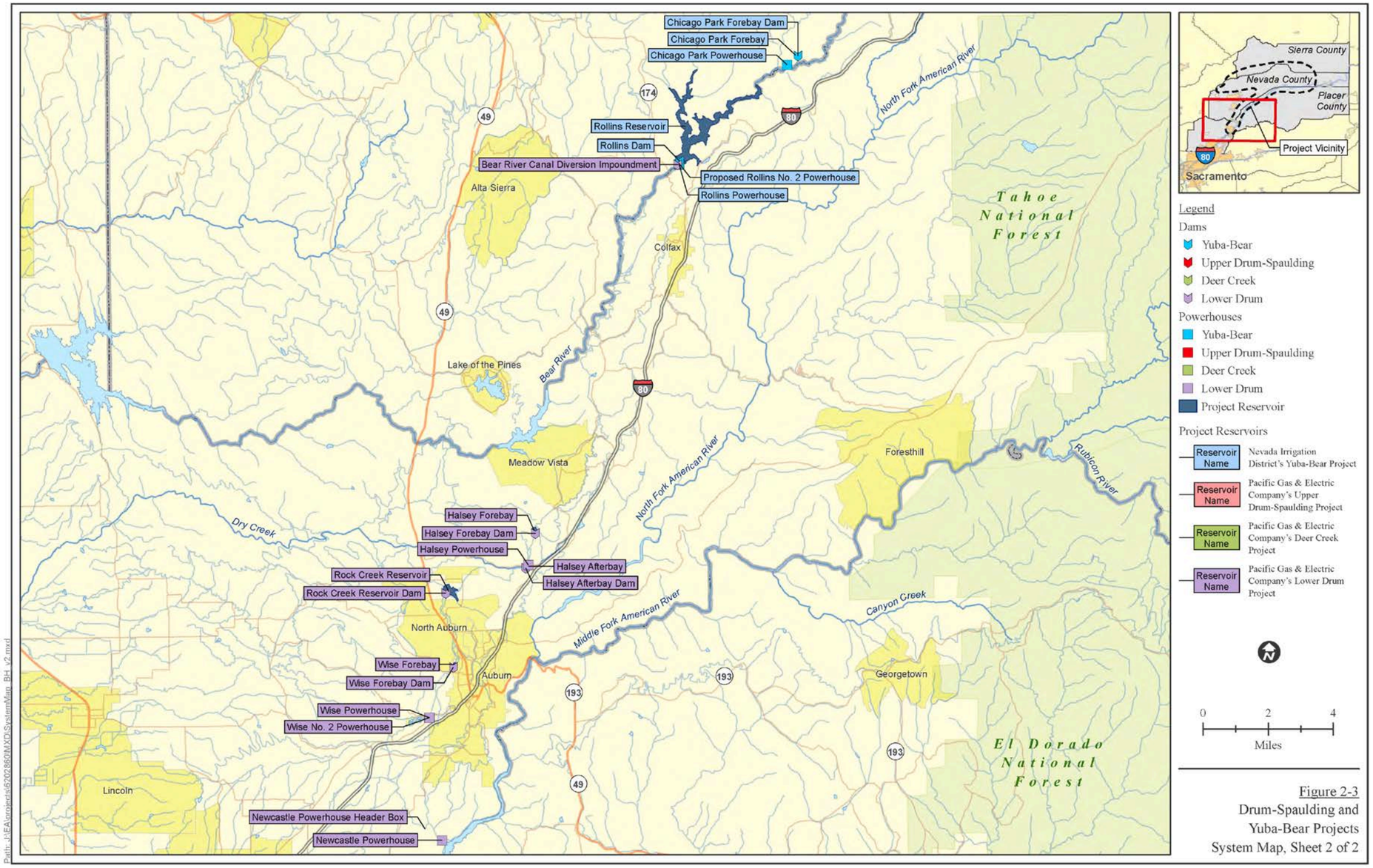


Figure 2-3
Drum-Spaulding and
Yuba-Bear Projects
System Map, Sheet 2 of 2

Figure 2-3 (continued). Upper Drum-Spaulding (pink), Lower Drum (purple), Deer Creek (green), and Yuba-Bear (blue) Projects system map. (Source: ESRI and Tele Atlas North America, Inc., 2006a and 2006b; ESRI and Bureau of Transportation Statistics, 2006; PG&E, 2011a; and NID, 2011a)

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#### 2.2.1.1 Upper Drum-Spaulding Project

The proposed 147.4-MW Upper Drum-Spaulding Project would include the existing Spaulding No. 3, Spaulding No. 1, Spaulding No. 2, Drum No. 1, Drum No. 2, Alta, and Dutch Flat No.1 Developments, as described above.

PG&E proposes to retire Alta powerhouse unit 2; modify flow-release facilities; decommission and remove the Jordan Creek diversion; build new recreation facilities; and rehabilitate existing recreation facilities. In addition, PG&E proposes to add some existing roads to the project.

**Generation Facilities**

Generating facilities included in the seven developments that comprise the proposed Upper Drum-Spaulding Project are described in detail in section 2.1.1.1. PG&E does not propose to add any new generation facilities to the project. However, PG&E proposes to retire Alta powerhouse unit 2, which has not operated since 2007. In 2007, PG&E removed the lower 100 feet of the original 48-inch-diameter penstock to the Alta powerhouse and installed about 40 feet of new 36-inch-diameter penstock and manifold connection to unit 1. PG&E did not connect unit 2 because the powerhouse is operated primarily for PCWA water demand, and PG&E determined that demand can be met through the operation of a single unit. PG&E decommissioned unit 2 at that time and left the unit intact but hydraulically disconnected from the penstock.[7]

**Proposed Recreation Facilities**

PG&E also proposes to build new recreation facilities and rehabilitate existing recreation facilities at the proposed Upper Drum-Spaulding Project. A brief summary of the proposed new facilities is provided below.

- Meadow Lake: develop a small day-use area including three-unit picnic tables, parking area with up to eight parking spaces; provide pedestrian trail from Meadow Knoll group campground to Meadow Lake; develop a potable water source at the existing Meadow Lake campground; and install a one-unit vault toilets at the existing Meadow Lake shoreline campsites.

- Lake Sterling: install three primitive campsites each with a steel fire ring, animal-resistant food locker, and information signs on the east side of the reservoir; install a host site near the reservoir; and convert existing Lake Sterling walk-in campground to a day-use area with 4-5 picnic sites and a 1-unit toilet.

[7] Each of the two units in Alta powerhouse, located on the Little Bear River, consists of a Pelton single overhung impulse turbine. Water supply for Alta powerhouse originates from Drum forebay, where it is released through the low-level outlet through the Towle diversion into Canyon Creek and then diverted downstream at Towle canal diversion dam into Towle canal, which conveys the water 3.9 miles before discharging into Alta forebay. Alta powerhouse discharges into the tailrace where it is diverted into PCWA's Lower Boardman canal (a non-project facility) for domestic and irrigation use. Historically, PCWA's water demand in the Lower Boardman canal has ranged from a low of 2 cfs to a maximum of 22 cfs. A fixed orifice at the diversion gate releases a minimum constant flow of 0.25 cfs in the Little Bear River below the powerhouse. With the exception of a few weeks during the spring runoff period, Alta powerhouse is operated to meet PCWA's demand downstream. With unit 2 retired, the maximum capacity of the remaining unit would be 28 cfs.

- Fordyce Lake: develop a primitive campground with 7 to10 campsites along Fordyce Lake Road. Each campsite would include a fire ring, animal-resistant food locker, and a site marker. The facility would also include a one-unit vault toilet, facility identification sign, and improved information signs at the information board.

- Lake Spaulding: construct a 12-unit boat-in shoreline campground with boat mooring system, steel fire rings, vault toilet, animal-resistant food lockers, and picnic tables on the northeast end of the reservoir. Establish and maintain appropriate fire safe vegetation clearances at each boat-in campsite.

- Lower Lindsey Lake: construct a new 20 to 25 unit drive-in family campground on south side of Lindsey Creek that provides potable water, 2 vault toilet, and a food locker, picnic table, and fire ring at each campsite; reconstruct the existing rustic Lower Lindsey Lake campground to a Development Scale 2 campground including gravel roads and spurs, and installation of vehicle barriers.

- Fuller Lake: at Fuller Lake day-use and boat launch, expand the parking area by lengthening the parking spaces to 40 feet for vehicles and trailers, install a courtesy dock beside the boat ramp, expand and improve turn-around at top of boat launch ramp, and install an accessible[8] fishing pier, restrooms, and parking space at the boat launch.

- Lower Peak Lake: install up to five primitive campsites, each with a steel fire ring and an animal-resistant food locker along the shoreline.

- Rucker Lake: provide 6 additional walk-in campsites; define and further develop the trail between the parking area and the walk-in camping area; convert Rucker Lake campground to a 20-unit drive-in Development Scale 3 campground with picnic tables, fire rings, 2 vault toilets, food lockers, potable water; develop the existing informal boat launch into a formal car-top boat launch.

- Carr Lake: reconstruct campground as Development Scale 2; develop 5 to 6 new, walk-in campsites on west side of lake near the dam; convert campsite on northern tip of the lake into an informal boat launch; construct a trail from existing campsites to non-project toilet (to be constructed) at Carr-Feel trailhead and construct trail from new campsites near the dam to non-project toilet (to be constructed).

- Lake Valley Reservoir: develop a new group campground for 50 to 100 people; install an animal-resistant food locker at each campsite (35 total) at the existing Lodgepole campground.

**Flow-Release Facilities**

As part of proposed aquatic measures (see section 2.2.3, *Proposed Environmental Measures*), PG&E proposes new or modified flow-release facilities, as described below.

- South Yuba below Spaulding Dam: modify Lake Spaulding dam low-level outlet to provide capacity to comply with proposed peak minimum streamflow of 90 cfs, add control valves, improve gage YB-29, and modify and improve control systems.

[8] PG&E and NID use the term "accessible" in reference to Americans with Disabilities Act Accessibility Guidelines, Forest Service Outdoor Recreation Accessibility Guidelines, and/or Architectural Barriers Act Accessibility Standards.

- Lake Valley Reservoir Dam Reach near YB 104: modify gage YB-104 for full flow, add energy dissipater, and modify downstream channel.

- Towle Canal Diversion Dam Reach: modify existing gates to release increased minimum streamflow of 3 cfs and modify existing weir.

- Bear River below Drum Canal at YB-137: design and install two fixed plate orifice outlet pipes for a capacity of 1 cfs each.

**Jordan Creek Diversion**

PG&E proposes to remove the Jordan Creek diversion and associated conveyance system in the Spaulding No. 1 and No. 2 Development. PG&E explains that the diversion dam and conveyance system are not needed for project operations and have not been used for many years.

**Project Boundary**

The project boundary for the proposed Upper Drum-Spaulding Project would include lands currently included in the existing Drum-Spaulding Project FERC license for the Spaulding No. 3, Spaulding No. 1, Spaulding No. 2, Drum No. 1, Drum No. 2, Alta, and Dutch Flat No.1 developments. These lands consist of lands necessary for the safe operation and maintenance of the project and other purposes, such as recreation, shoreline control, and protection of environmental resources. The proposed project boundary for the Upper Drum-Spaulding Project would include 4,219.8 acres of land, including 949.3 acres of federal lands administered by the Forest Service.

In June 2010, PG&E submitted mapping corrections related to a transmission line separation, adjustments to canal widths to reflect operational needs, a boundary adjustment to accommodate a recent condemnation proceeding from PCWA, and other former actions requiring map updates. Additional changes submitted as part of PG&E's proposed project include changes to the project boundary consistent with the Commission-approved Roads and Trails Study Plan and the correction of boundary discrepancies identified through the use of aerial maps and field observations.

PG&E met with resource agencies and others to develop a comprehensive list of primary project roads. PG&E defines primary project roads as non-general-use roads used primarily for the project and are located within the project boundary. PG&E proposes modifications to the project boundary to include portions (or the whole) of the following primary project roads:

- Carr-Lindsey Road, located partially on PG&E land, partially on Forest Service land, and partially on private land.

- Upper Lindsey Lake Road, located entirely on PG&E land.

- Lower Peak Road, located partially on PG&E land and partially on Forest Service land.

- Langs Crossing Spillway Road, located partially on private land and partially on PG&E land.

- Drum Canal/YB-28 Access Road, located entirely on PG&E land.

- Chicken Ladder Road, located partially on private land and partially on PG&E land.

- Burnt Point Road, located entirely on PG&E land.

- Drum Canal Access Road, located entirely on PG&E land.
- Pittman Spill Channel North Road, located partially on private land and partially on PG&E land.
- Pittman Spill Channel South Road, located entirely on PG&E land.
- Drum #3 Penstock Access Road, located entirely on PG&E land.
- Wheel House Road, located entirely on PG&E land.
- Access Road, located entirely on PG&E land.
- South Yuba Canal Access Road (project road identification number DS038), located entirely on private land.
- East Excelsior Point Road, located partially on Forest Service land and partially on private land.
- South Yuba Canal Access Road (project road identification number DS039), located entirely on Forest Service land.
- Dutch Flat Surge Tank Road, located partially on PG&E land, partially on Forest Service land, and partially on private land.
- Feeley Lake Road, located entirely on Forest Service land.
- Drum Butterfly Valve House Road, located entirely on PG&E land.
- Boot Road, located entirely on Forest Service land.
- Spaulding No. 3 Header Box Road, located entirely on PG&E land.
- Upper Access to YB-34 Road, located partially on PG&E land and partially on Forest Service land.
- Spillway Access Road, located entirely on Forest Service land.
- South Yuba Canal Access Road (project road identification number DS083), located partially on PG&E land and partially on Forest Service land.
- Bear Valley Spill Road, (South Yuba Canal Access), located partially on PG&E land and partially on Forest Service land.

#### 2.2.1.2 Lower Drum Project

The proposed 39.7-MW Lower Drum Project would include the existing Halsey, Wise, Wise no.2, and Newcastle Developments, as described above.

**Generation Facilities**

Generating facilities included in the Halsey, Wise, Wise no.2, and Newcastle Developments are described in detail in section 2.1.1.1. PG&E does not propose to add any new generation facilities to the Lower Drum Project.

**Streamflow Gages**

PG&E proposes to add one new gage in Auburn Ravine upstream of their release point from South canal. This gage would measure nature inflow upstream of PG&E's release point for determination of compliance with minimum streamflows during canal outages.

**Recreation Facilities**

PG&E proposes to rehabilitate existing recreation facilities at the Lower Drum Project, specifically at Halsey forebay, and develop a new facility at the Lower Drum Project, specifically at Wise forebay. A brief summary of the proposed new facilities is provided below.

- Wise Forebay: install an asphalt parking area for up to five vehicles on PG&E property on the southwest corner of the forebay.

- Halsey Forebay: at the forebay picnic area, upgrade one picnic site to accessible standards with parking and develop accessible fishing station.

**Flow-Release Facilities**

PG&E does not propose new or modified flow-release facilities for the Lower Drum Project.

**Project Boundary**

The project boundary for the proposed Lower Drum Project would include lands currently included in the existing Drum-Spaulding Project FERC license for the Halsey, Wise, Wise No. 2, and Newcastle developments. These lands consist of lands necessary for the safe operation and maintenance of the project and other purposes, such as recreation, shoreline control, and protection of environmental resources. The proposed project boundary for the Lower Drum Project would include 696.8 acres of land, including 5.3 acres of federal Reclamation lands.

### 2.2.1.3 Deer Creek Project

The proposed 5.7-MW Deer Creek Project would include the existing Deer Creek development with the exception of the upper 1.57 miles of the South Yuba Canal, which would be part of the Upper Drum-Spaulding Project. The Deer Creek Development is described above.

**Generation Facilities**

Generating facilities that comprise the Deer Creek Development are described in detail in section 2.1.1.1. PG&E does not propose to add any new generation facilities to the Deer Creek Project.

**Flow-Release Facilities**

PG&E does not propose new or modified flow-release facilities for the Deer Creek Project.

**Recreation Facilities**

PG&E does not propose to build new recreation facilities or rehabilitate existing recreation facilities as part of the Deer Creek Project.

**Project Boundary**

The project boundary for the Deer Creek Project would include lands currently included in the existing Drum-Spaulding Project FERC license for the Deer Creek development, with the exception of lands that encompass the upper 1.57 miles of the South Yuba canal. These lands consist of lands necessary for the safe operation and maintenance of the project and other purposes, such as recreation, shoreline control, and protection of environmental resources. The proposed project boundary for the proposed Deer Creek Project would include 334.9 acres of land, including 185.2 acres of federal lands (179.6 acres of Forest Service land and 5.6 acres of BLM lands).

#### 2.2.1.4 Yuba-Bear Project

NID proposes to expand the existing Rollins Development through the addition of Rollins no. 2 powerhouse; add five new streamflow gages; and replace, upgrade, or install new recreation facilities. NID also proposes to adjust the project boundary.

**Generation Facilities**

NID's only proposed generation expansion to the Yuba-Bear Project is to construct a new powerhouse associated with the Rollins Development. NID explains that the new generating facility (Rollins no. 2 powerhouse) would more effectively capture the combined releases from Rollins reservoir. The existing powerhouse consists of one vertical axis, Francis turbine with a rated capacity of 12.15 MW at a head of 208 feet and maximum flow of 840 cfs. NID anticipates that the new powerhouse would be constructed entirely on NID-owned land adjacent to the existing powerhouse location in a laydown area just below the existing parking lot on the right bank of the river.[9] NID indicates that the existing powerhouse would be unaltered and remain in full operation.

**Streamflow Gages**

NID proposes to add to the project five new streamflow gages for monitoring compliance with minimum flow releases. The new gages would be located on the downstream face of the diversion facilities at Texas, Clear, Fall, Trap, and Rucker Creeks. The gages would be named YB-317, YB-318, YB-319, YB-320, and YB-321, respectively. In addition, existing USGS gages 11414410 (Canyon Creek below French Lake), 11414500 (Canton Creek below Faucherie Lake), and 11414470 (Canyon Creek

[9] The current design concept for the new powerhouse includes a 58-foot-by-40-foot concrete building that would house a single Francis turbine with a maximum flow of 600 cfs and synchronous generator combination yielding a maximum capacity of 11.4 MW. The average annual plant factor for the powerhouse, based on a model of plant operations from water year 1995 through 2008, is expected to be 0.55 (dependable capacity of 6.27 MW). The plant is expected to generate 18.4 GWh per year and to operate at 64 percent of capacity during dry years, at 83 percent of capacity during normal years, and at 96 percent of capacity during wet years. This new facility would be an automatic, remotely operable, unmanned installation. The upgrade would require modifications to the existing penstock to allow a new bifurcation to route flow to the new generation facility, and would include replacing the Rollins powerhouse switchyard with a new switchyard that will service both the existing and proposed powerhouses. The upgrade would occur entirely within the existing project boundary on NID-owned land.

below Sawmill Lake), which are currently rated to measure up to 3 cfs, would be improved to monitor compliance with NID's proposed minimum streamflows. Existing USGS gage 11421790 (Bear River below Dutch Flat afterbay dam) would be improved for rating.

**Primary Project Access Roads**

NID proposes to remove a segment of Chicago Park Forebay Road from the set of primary project access roads. This road segment is presently closed by an active landslide. NID also proposes to remove the unnamed recreation road that provides access to the Jackson Meadows administrative site. NID has never used this site nor has it used the recreation road that provides access to it and does not plan to use it in the future. NID proposes to decommission these roads as they are not necessary for continued project operation and maintenance (O&M).

**Recreation Facilities**

NID's proposed project includes a Recreation Facilities Plan. The plan contains many components, including replacement and upgrade of existing recreation facilities and evaluation for new recreation facilities over the term of the new license. The plan includes the addition of the following specific new facilities:

- Jackson Meadows Reservoir: install animal-resistant food lockers at campsites that do not have such lockers; construct a pedestrian, single-track trail from the first loop of East Meadow campground to Pass Creek; install a one-unit vault restroom at Pass Creek overflow campground; construct an accessible trail on the shoreline from the Pass Creek boat launch parking area to the shoreline at Aspen picnic area; construct a pedestrian, single-track trail from Aspen group campground to the parking area at Aspen picnic area; develop road access and a loading/unloading area at Woodcamp picnic area with accessible parking spaces and access to the shoreline restroom and picnic sites; construct pedestrian, single-track connector trails between the project recreation facilities within the Woodcamp Complex (Fir Top, Findley, Woodcamp and Silvertip group campgrounds and Woodcamp picnic area) and a connector trail from these connector trails to the non-project Woodcamp interpretive trailhead; replace the existing Woodcamp boat launch facility to California Department of Boating and Waterways (California Boating) standards.

- Milton Diversion Impoundment: develop a shoreline day-use area including a gravel parking area for up to five vehicles with barriers and a single-lane hand launch designed to accessible standards; develop up to six primitive campsites, each with a designated parking spur/space setback from the shoreline, steel fire ring, and site marker.

- Bowman Lake: develop a day-use parking area for up to 10 vehicles on NID land with vehicle barriers and an informational board (2-panel) at Jackson Creek inflow along the north shoreline/Bowman Lake Road; designate up to 10 primitive campsites along the shoreline on NID land each with a picnic table, steel fire ring, animal-resistant food locker, parking spur/space with barriers, site marker, and resource protection signage.

- Sawmill Lake: develop a rustic, 10-unit family campground on NID land with a native surface circulation road, two-unit vault restroom, entrance station, and campsites each with a table, fire ring, animal-resistant food locker, site marker, and vehicle spur with barriers; develop a rustic group campground on NFS land to accessible standards, as feasible, consisting of a single group campsite for 25 PAOT, native surface parking area for 10 vehicles with barriers, one-unit vault restroom, and hand launch.

- Canyon Creek: install animal-resistant food lockers at campsites without animal-resistant lockers.

- Dutch Flat no. 2 Forebay: install an information kiosk.

- Dutch Flat Afterbay: make a good faith effort to purchase at fair market value a parcel of land from private landowner or obtain a long-term lease or easement for use of such property or make a good faith effort to work out an agreement with the licensee of the Drum-Spaulding Project (PG&E), to develop a day-use area that will include parking for six vehicles, six picnic tables, restroom, and a kiosk sign.

**Project Boundary**

NID proposes the following changes to the existing project boundary:

- Use of contours derived from the USGS National Elevation Dataset 1/3 arc second digital elevation model as a partial replacement to survey metes and bounds that are used in the existing license to define the project boundary around Jackson Meadows reservoir, Bowman reservoir, French Lake, Jackson Lake, Sawmill Lake, Faucherie Lake, Dutch Flat forebay, and Dutch Flat afterbay. Where the derived contour lines exceeded 200 horizontal feet from a project reservoir's normal maximum water surface, 200-foot horizontal buffers of the reservoir's maximum water surface were used to define the project boundary.

- Removal of the area that incorporates the mineral survey area south of Dutch Flat afterbay.

- Removal of the area that incorporates the administrative site at Jackson Meadows reservoir and the recreation road that provides access to it.

- Modification of the boundary to more accurately contain and encompass the following recreation sites: East Meadow campground, Fir Top campground, Bowman Lake campground, and Canyon Creek area campground.

- Addition of the area that incorporates the primary project portion of the following roads, including a right-of-way of 20 feet on-road centerline: French Lake Dam Road (Forest Service Road 843-20), Milton Pipeline Access Road, Wilson Creek Diversion Access Road, Bunkhouse Road, Texas Creek Diversion Access Road, Bowman-Spaulding Canal Berm Road, Bowman-Spaulding Canal Access Road, Stump Canyon Siphon Intake Access Road, Canyon Siphon Low Level Valve Access Road, "B" Alarm Road, Chicago Park Forebay Road, and Chicago Park Powerhouse Access Road.

All but two of the proposed project recreation facilities would be located within the proposed project boundary. These two facilities include: (1) the primitive campsites at the "Tree Camp" located along the north shoreline of Bowman Lake on Forest Service land; and (2) the walk-in campground at Sawmill Lake on NID land. Given the uncertainty of the final footprint for these two facilities, NID requests that the Commission expand the project boundary to include each facility after the final design of the facility is complete and prior to construction.

### 2.2.2 Proposed Project Operation

#### 2.2.2.1 Upper Drum-Spaulding Project

The proposed Upper Drum-Spaulding Project would consist of the existing Spaulding No. 3, Spaulding No. 1, Spaulding No. 2, Drum No. 1, Drum No. 2, Alta, and Dutch Flat No.1 Developments, which have a usable storage of about 150,516 acre-feet of water, generated an annual average of 575 GWh from 1972 (the first full year of generation) to 2007, and has a historical dependable capacity of 114 MW. With the conditions of the applicants' No-action Alternative Operations Model, the project's average annual energy is 571 GWh with a total dependable capacity of 112.8MW.[10]

The Upper Drum-Spaulding Project's larger reservoirs (Fordyce Lake, Lake Spaulding, and Lake Valley reservoir) operate as storage reservoirs to capture rain and snowmelt during the spring and summer months and are slowly drawn down through summer and fall months, releasing water for power generation, irrigation, and domestic consumption purposes. These reservoir dams have spill gates or flashboard structures, which are used to optimize the storage in the reservoirs during the snowmelt period. In particular, Lake Spaulding is a "hub" for conveyance of upstream regulated releases (primarily Fordyce Lake) along with water transfers into (via NID's Yuba-Bear Project Bowman-Spaulding conduit) and out of (via South Yuba canal and Drum canal) the reservoir. Combined with the large, high-elevation, unimpaired watershed above Lake Spaulding and subsequent snowmelt runoff forecasting, reservoir operations at Lake Spaulding are the most complex of any in the project. Using its SOCRATES forecasting model, PG&E develops a water management plan in order to achieve end-of-the-month storage targets for the three major project storage reservoirs.

Meadow Lake, White Rock Lake, and Lake Sterling are examples of other reservoirs in the system that are operated as fill and spill reservoirs; the dams have passive spillways that overtop when the water level exceeds the storage capacity of the dam but do not have spill gate structures. The forebays and afterbays, including Drum, Dutch Flat, and Alta, have minimal usable storage capacities and are operated as regulating reservoirs, reshaping and diverting flows from upstream storage reservoirs for power generation, irrigation, and consumption purposes.

Four powerhouses (Spaulding no. 1, no. 2, and no. 3; Alta,) are operated as base-loaded plants. Dutch Flat no. 1 powerhouse is operated for intermediate amounts of peaking (limited by diurnal storage availability in the forebay and afterbay of the powerhouse), and the Drum no. 1 and no. 2 powerhouses are operated as peaking plants.

In general, weekly and daily operation of the Upper Drum-Spaulding Project is prioritized for facility and public safety, regulatory compliance, and to balance irrigation and domestic consumptive

[10] The difference in generation and dependable capacity between historical operations and the no-action alternative is due in large part to the separation of the Drum-Spaulding Project into the three projects and the following operational project differences incorporated in the No-action Alternative Operations Model: (1) retirement of PG&E's Alta powerhouse unit 2, which ceased operations in 2007; (2) decommissioning of the Jordan Creek diversion and associated conveyance system in the Spaulding No. 3 Development; (3) re-operation between PG&E's Dutch Flat no. 1 powerhouse and NID's Dutch Flat no. 2 powerhouse based on water rights rather than operational or efficiency considerations; (4) modified winter/spring operations in both projects implemented since 1997 and applied to the model beginning in 1976; (5) use of usable storage estimates generated by updated bathymetric surveys in several project reservoirs of both projects; and (6) the use of average water delivery demand from 2001 to 2009 rather than historical water delivery demand for both projects.

water demands with power generation. The project is also operated to comply with PG&E's existing water rights licenses and permits.

Proposed future operation of existing project structures that comprise the proposed Upper Drum-Spaulding Project would be generally consistent with existing operation. Significant changes in future operation, however, are related to new and increased minimum flow releases, and modified ramping rates, as described in section 2.2.3.1, *Proposed Environmental Measures* (Measure DS-AQR1). PG&E also proposes the following: (1) re-operation between PG&E's Dutch Flat no. 1 and NID's Dutch Flat no. 2 powerhouses based on water rights rather than operational or efficiency considerations; and (2) use of modified winter/spring operations implemented since 1997.

#### 2.2.2.2 Lower Drum Project

The Lower Drum Project would consist of the existing Halsey, Wise, Wise no. 2, and Newcastle Developments, which have a usable storage of about 828 acre-feet of water, generated an annual average of 196 GWh from 1972 through 2007 (periods for Wise no. 2 and Newcastle powerhouses are shorter as they came online in 1987), and has a historical dependable capacity of 23 MW. With the conditions of the applicant's No-action Alternative Operations Model, the project's average annual energy is 156 GWh with a total dependable capacity of 23 MW.

The Lower Drum Project's forebays and afterbays, including Halsey and Wise, have minimal usable storage capacities and are operated as regulating reservoirs, reshaping and diverting flows from upstream storage reservoirs for power generation, irrigation, and consumption purposes. Four powerhouses (Halsey, Wise, Wise no. 2, and Newcastle) are currently operated under the existing Drum-Spaulding Project as base-loaded plants.

In general, weekly and daily operation of the developments that comprise the Lower Drum Project is prioritized for facility and public safety, regulatory compliance, and to balance irrigation and domestic consumptive water demands with power generation. The project would continue to be operated to comply with PG&E's existing water rights licenses and permits.

Proposed operation of the Lower Drum Project would be generally consistent with existing operations. Significant changes in future operation, however, are related to new and increased minimum flow releases, and modified ramping rates, as described in section 2.2.3.2, *Proposed Environmental Measures* (Measure DS-AQR1). PG&E also proposes the use of modified winter/spring operations implemented since 1997.

#### 2.2.2.3 Deer Creek Project

The Deer Creek Project would consist of the existing Deer Creek development, with the exception of the upper 1.57 miles of the South Yuba canal, which would remain as part of the Upper Drum-Spaulding Project.

The Deer Creek Project has a usable storage of about 11 acre-feet of water, generated an annual average of 22 GWh from 1972 through 2007 and has a historical dependable capacity of 3.4 MW. As proposed (under the conditions of the applicant's No-action Alternative Operations Model), the project's average annual energy is 23GWh with a total dependable capacity of 3.4 MW.

The Deer Creek forebay has minimal usable storage capacity and is operated as a regulating reservoir, reshaping and diverting flows from upstream storage reservoirs for power generation, irrigation, and consumption purposes. The Deer Creek powerhouse is operated as a base-loaded plant.

In general, weekly and daily operation of the Deer Creek Project is prioritized for facility and public safety, regulatory compliance, and to balance irrigation and domestic consumptive water demands with power generation. The project is also operated to comply with PG&E's existing water rights licenses and permits.

Proposed operation of the Deer Creek Project would be generally consistent with existing operations. Significant changes in future operation, however, are related to new and increased minimum flow releases, and modified ramping rates, as described in section 2.2.3.3, *Proposed Environmental Measures* (Measure DS-AQR1). PG&E also proposes the use of modified winter/spring operations implemented since 1997.

#### 2.2.2.4 Yuba-Bear Project

Proposed operation of the Yuba-Bear Project would be generally consistent with existing operations. Significant changes in future operation, however, are related to new and increased minimum flow releases and modified ramping rates, as described in section 2.2.3.4, *Proposed Environmental Measures* (Measure YB-AQR1). NID also proposes the following: (1) re-operation between PG&E's Dutch Flat no. 1 and NID's Dutch Flat no. 2 powerhouses based on water rights rather than operational or efficiency considerations; and (2) use of modified winter/spring operations implemented since 1997.

### 2.2.3 Proposed Environmental Measures

#### 2.2.3.1 Upper Drum-Spaulding Project

PG&E proposes the following protection and enhancement measures at the Upper Drum-Spaulding Project:

**General Measures**

- Consult annually with the Forest Service to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize staff with special-status species, noxious weeds, and sensitive areas known to occur within the project boundary on Forest Service land, and the procedures for reporting to the agency.

- Develop and implement a Coordinated Operations Plan for the proposed Upper Drum-Spaulding, Lower Drum, and Deer Creek, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

**Geology and Soils**

- Implement an Erosion and Sediment Control and Management Plan (filed April 11, 2014) and Canal Release Point Plan (filed April 11, 2014) to minimize and control project-related erosion; the plan would provide for project-wide implementation of best management practices (BMPs) to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and implementation of repair and restoration plans, as necessary.

- During winter to minimize potential adverse effects of high flows on channel morphology, bank stability, and aquatic and riparian habitat of the Bear River: limit operational flow releases from the Drum canal; implement ramping rates; and limit water spilled from the Drum canal to the

upper Bear River through Bear Valley Meadow when the Drum afterbay is forecast to spill and the Dutch Flat no. 1 and no. 2 powerhouses are fully loaded.

- During facility outages that last more than 30 days: operate multiple spill gates from the Drum canal to more evenly distribute flows through Bear Valley Meadow; implement a 2-day ramping rate; and notify the appropriate agencies.

**Aquatic Resources**

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98. Implement extreme critically dry water year type flows in South Yuba River below Spaulding dam, North Fork of the North Fork American River below Lake Valley reservoir dam and below the Lake Valley diversion dam, when a critically dry year has been preceded by a critically dry or extreme critically dry year.

- To enhance aquatic habitat and protect resident aquatic species, provide the same or increased minimum streamflows to six project-affected reaches and provide new minimum streamflows to three project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 as listed below.

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Fordyce Creek – below Fordyce Lake dam | 3-115 |
| South Yuba River – below Kidd Lake dam and Lower Peak Lake dam | 3-120 |
| South Yuba River – below Lake Spaulding dam | 3-121 |
| North Fork of the North Fork American River – below Lake Valley Reservoir dam | 3-126 |
| North Fork of the North Fork American River – below Lake Valley canal diversion dam | 3-129 |
| Bear River – at Highway 20 crossing | 3-133 |
| Bear River – below Drum afterbay | 3-140 |
| Canyon Creek – below Towle canal diversion dam | 3-136 |
| Little Bear River – below Alta powerhouse tailrace | 3-139 |

- Periodically set the low-level outlet at 16 remote project dams to provide the same or increased minimum streamflows in nine project reaches and new minimum streamflows in seven project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 as listed below.

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Texas Creek – below Upper Rock Lake dam | 3-102 |

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Texas Creek – below Lower Rock Lake dam | 3-103 |
| Unnamed tributary – below Culbertson Lake dam | 3-104 |
| Lindsey Creek – below Middle Lindsey Lake dam | 3-105 |
| Lindsey Creek – below Lower Lindsey Lake dam | 3-106 |
| Lake Creek – below Feeley Lake dam | 3-107 |
| Lake Creek – below Carr Lake dam | 3-108 |
| Rucker Creek – below Blue Lake dam | 3-109 |
| Rucker Lake – below Rucker Lake dam | 3-110 |
| Unnamed tributary – below Fuller Lake dam | 3-111 |
| Unnamed tributary – below Meadow Lake dam | 3-112 |
| White Rock Creek – below White Rock diversion dam | 3-113 |
| Bloody Creek – below Lake Sterling dam | 3-114 |
| Unnamed tributary – below Kidd Lake dam | 3-118 |
| Cascade Creek – below Lower Peak Lake dam | 3-119 |
| Sixmile Creek – below Kelly Lake dam | 3-128 |

- Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Implement modified minimum streamflows in project canal-affected stream reaches during the first 30 days of canal outages, as shown in appendix A-2, table 3-181. For canal outages anticipated to extend past 30 days, consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage. Drum canal and Lower Drum Project's Bear River canal would not be taken out of service at the same time.

- Construct and operate two 1-cfs flow release devices near the existing spillway at the Drum canal to provide controllable minimum streamflows to the Bear River upstream of the Drum afterbay.

- To reduce the risk of stranding of aquatic resources below Lake Spaulding dam, adhere to Lake Spaulding spill cessation schedules and minimize flow fluctuations in the South Yuba River below Lake Spaulding, as shown in appendix A-2, table 3-182 and table 3-183.

- Provide additional summer flows to the South Yuba River below Lake Spaulding dam (Spaulding No. 1 and No. 2 Development) to manage water temperature for resident aquatic resources by implementing the Supplemental Flow Schedule as specified by Forest Service condition 32.

- Implement Forest Service/BLM Gaging Plan (filed April 11, 2014) to monitor compliance with minimum streamflow and other flow management measures. Design and install new or modify existing streamflow gages to measure new minimum streamflows, as shown in appendix A-2, table 3-188 consistent with Gaging Plan.

- Establish a Consultation Group to support implementation, review, and management of the South Yuba River supplemental flow releases below Lake Spaulding dam.

- Implement the Fish Protection and Management during Canal Outages Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Implement an aquatic monitoring program to assess the effects of the proposed flow modifications on aquatic resources in selected project-affected stream reaches, as described in the Fish Population Monitoring Plan (filed November 21, 2013), Foothill Yellow-legged Frog Monitoring Plan (filed November 21, 2013), Channel Morphology Monitoring Plan (filed November 21, 2013), Forest Service/BLM Water Temperature and Stage Monitoring Plan (filed April 11, 2014), and Forest Service/BLM Riparian Vegetation Monitoring Plan (filed April 11, 2014). Also, monitor incidental occurrence of western pond turtle.

**Terrestrial Resources**

- Implement the March 2013 Integrated Vegetation Management Plan (filed November 21, 2013) on federal lands that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites on all project lands and includes control of non-native invasive species, provisions for special-status species, guidelines for pesticide use, and annual training, consultation, and reporting.

- Monitor animal losses from drowning in project canals.

- Consult with California Fish and Wildlife and the Forest Service when replacing wildlife escape and crossing facilities.

- Retrofit existing footbridges or construct new wildlife crossings on Drum and South Yuba canals, at specified locations, to minimize wildlife injury and mortality associated with movement across these project canals.

- Record annually all incidental observations of bird collision/electrocutions along project powerlines and replace or retrofit problem power poles as appropriate. Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality.

- Implement bat management measures, including provisions for monitoring and installing exclusion devices to minimize disturbance during project operation and maintenance.

- Implement a Bald Eagle Management Plan (filed November 21, 2013) to protect eagle nesting from disturbance during project operations and maintenance, and project-related recreation activities.

**Threatened and Endangered Species**

- Implement the VELB provisions of the March 2013 Integrated Vegetation Management Plan, consistent with VELB conservation measures to avoid or minimize the loss of elderberry shrubs.

**Recreation Resources**

- Implement the September 2013 Recreation Plan (filed November 18, 2013) for upgrades, maintenance, and development of new project recreation facilities.

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet for Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam (at Cisco Grove), South Yuba River below Lake Spaulding (at Lang's Crossing), and the Bear River at Highway 20, within one year of license issuance. Implement Water Temperature and Stage Monitoring Plan (filed April 11, 2014 and discussed under Aquatic Resources) that includes installing a monitoring station in the South Yuba River upstream of but as close as possible to Canyon Creek within three years that would monitor river stage hourly (15-minute interval readings that would be transmitted hourly) and would be available in real-time (hourly) to the public via the internet.

- To expand recreational whitewater boating opportunities and support Supplemental Flow releases downstream from Lake Spaulding to the South Yuba River, draw down Fordyce Lake beginning in late spring with an initially high target flow (250 to 450 cfs) until the lake reaches 29,000 acre-feet of remaining storage and then make equally apportioned releases throughout the rest of the year to reach an end-of-year storage of 7,500 to 10,000 acre-feet. Measure also supports coldwater pool management in Lake Spaulding for Supplemental Flow releases downstream from Lake Spaulding to the South Yuba River,

- Maintain flows in Fordyce Creek at 50 cfs for 10-day period beginning about the third week of August to enhance stream crossing for OHV event.

- Pay up to a maximum of $15,000 per year to the California Department of Fish and Wildlife (California Fish and Wildlife) for fish stocking in Lake Spaulding to support recreational angling, provided such stocking is performed (Measure DS-AQR3).

- Provide a one-time payment of $95,000 to BLM for BLM recreation improvements on the South Yuba River downstream of Lake Spaulding and provide $30,000 annually to BLM to partially fund the annual operation, maintenance, and administrative costs for BLM's management of public river access, lands, and river-related recreation in the Upper Drum-Spaulding Project along the South Yuba River downstream of Lake Spaulding and BLM's management of BLM lands within the project boundary.

**Cultural Resources**

- Implement the HPMP (filed September 23, 2013) upon license issuance to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register.

**Land Use and Aesthetic Resources**

- Revise project boundaries to reflect separation of proposed Upper Drum-Spaulding Project from the existing Drum-Spaulding Project.

- Revise the project boundary to remove the Jordan Creek diversion and conveyance system and to include certain primary project roads, and new and rehabilitated recreation facilities after the facilities are decommissioned at the proposed Drum-Spaulding Project.

- Implement the Transportation Management Plan (filed August 29, 2012) to ensure that project roads are adequately maintained.

- Implement the Fire Prevention and Response Plan (filed November 21, 2013) on federal project lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project.

- Implement the Visual Resource Management Plan (filed June 18, 2012) on federal lands to protect visual and aesthetic resources on and adjacent to project lands.

- Develop and implement a Hazardous Substances Plan for oil and hazardous substances storage and spill prevention and cleanup.

#### 2.2.3.2 Lower Drum Project

PG&E proposes the following protection and enhancement measures at the Lower Drum Project:

**General Measures**

- Consult annually with Reclamation to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize staff with special-status species, noxious weeds, and sensitive areas known to occur within the project boundary on Reclamation land, and the procedures for reporting to Reclamation.

- Develop and implement a Coordinated Operations Plan for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

**Geology and Soils**

- Implement an Erosion and Sediment Control and Management and Canal Release Point Plans (filed April 11, 2014) to minimize and control project-related erosion; the plan would provide for project-wide implementation of best management practices (BMPs) to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and implementation of repair and restoration plans, as necessary.

**Aquatic Resources**

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98.

- To enhance aquatic habitat and protect resident aquatic species, provide the same or increased minimum streamflows to one project-affected reach and provide new minimum streamflows to two project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 as listed below. During canal outages, minimum streamflows in Auburn Ravine would equal natural inflow from upstream of the PG&E's point from South canal.

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Dry Creek – below Halsey afterbay dam | 3-142 |
| Rock creek – below Rock Creek diversion dam | 3-143 |
| Mormon Ravine | 3-146 |

- Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Implement modified minimum streamflows in project canal-affected stream reaches during the first 30 days of canal outages, as shown in appendix A-2, table 3-181. For canal outages anticipated to extend past 30 days, consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage. Bear River canal would not be taken out of service at the same time as the Upper Drum-Spaulding Project's Drum canal.

- Coordinate operations with the Yuba-Bear Project at Rollins dam and Bear River canal diversion dam to ensure maintenance of minimum streamflows at downstream compliance point in the lower Bear River. Consistent with Forest Service 10(a) recommendation 4 and California Fish and Wildlife recommendation 2 (Part 3) water would not be diverted by PG&E to Bear River canal (Lower Drum Project), if minimum streamflows are not being met at the compliance point, YB-196, below the Bear River diversion dam.

- Implement Forest Service/BLM Gaging Plan (filed April 11, 2014) to demonstrate compliance with minimum streamflow conditions in new license including modification or installation of gages, as necessary.

- Implement the Fish Protection and Management during Canal Outages Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Implement Fish Population Monitoring Plan (filed November 21, 2013) to assess the effects of flow modifications on fish populations in project-affected reaches.

- Implement procedures to document and report incidental observation of the western pond turtle in conjunction with other monitoring and operations.

- Develop and implement an Aquatic Invasive Species Management and Monitoring Plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

**Terrestrial Resources**

- Implement the March 2013 Integrated Vegetation Management Plan (filed November 21, 2013) on federal lands that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and includes control of non-native invasive species, provisions for special-status species, provisions for pesticide use, and annual review and training, consultation, and reporting.

- Monitor animal losses from drowning in project canals.

- Consult with California Fish and Wildlife and appropriate federal agencies when replacing wildlife escape and crossing facilities.

- Retrofit existing structures or construct new wildlife crossings at the Bear and South canals to minimize wildlife injury and mortality associated with movement across these project canals.

- Record annually all incidental observations of bird collision/electrocutions along the Bowman-Spaulding transmission line and replace or retrofit problem power poles as appropriate. Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality.

- Implement the November 2013 bat management measures, including provisions for monitoring and installing exclusion devices to minimize disturbance during project operation and maintenance.

- Implement a Bald Eagle Management Plan (filed November 21, 2013) to protect eagle nesting from disturbance during project operations and maintenance, and project-related recreation activities.

**Threatened and Endangered Species**

- Implement the VELB provisions of the March 2013 Integrated Vegetation Management Plan, consistent with VELB conservation measures to avoid or minimize the loss of elderberry shrubs.

**Recreation Resources**

- Implement the September 2013 Recreation Plan (filed November 18, 2013) to develop and maintain parking area at Wise forebay and improve and maintain Halsey forebay picnic area.

**Cultural Resources**

- Implement the HPMP (filed September 23, 2013) upon license issuance to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register.

**Land Use and Aesthetic Resources**

- Revise project boundaries to reflect separation of proposed Lower Drum Project from the existing Drum-Spaulding Project.

- Implement the Transportation Management Plan (filed August 29, 2012) to ensure that project roads are adequately maintained.

- Implement the Fire Prevention and Response Plan (filed November 21, 2013) on federal project lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project.

- Develop and implement a Hazardous Substances Plan for oil and hazardous substances storage and spill prevention and cleanup.

- Implement a Visual Resource Management Plan (filed June 18, 2012) on federal land to protect visual and aesthetic resources on and adjacent to project lands.

#### 2.2.3.3 Deer Creek Project

PG&E proposes the following protection and enhancement measures at the proposed Deer Creek Project:

**General Measures**

- Consult annually with the Forest Service and BLM to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize staff with special-status species, noxious weeds, and sensitive areas known to occur within the project boundary on Forest Service and BLM land, and the procedures for reporting to each agency.

- Develop and implement a Coordinated Operations Plan for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

**Geology and Soils**

- Implement an Erosion and Sediment Control and Management Plan and Canal Release Point Plan (filed April 11, 2014) to minimize and control project-related erosion; the plan would provide for project-wide implementation of best management practices (BMPs) to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and implementation of repair and restoration plans, as necessary.

**Aquatic Resources**

- To enhance aquatic habitat and protect resident aquatic species, provide new minimum streamflows to one project-affected reach, as described in section 3.3.2.2.2, Instream Flows, and shown in the tables of appendix A-2 as listed below (Measure DC-AQR1, Part 1).

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| South Fork Deer Creek – below Deer Creek powerhouse | 3-125 |

- Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Notify agencies within one business day in event of emergency outage.

- Implement the Fish Protection and Management during Canal Outages Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Develop and implement an Aquatic Invasive Species Management and Monitoring Plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

**Terrestrial Resources**

- Implement the March 2013 Integrated Vegetation Management Plan (filed November 21, 2013) that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and includes control of non-native invasive species, provisions for special-status species, provisions for pesticide use, and annual training, consultation and reporting.

- Retrofit existing footbridges or construct new wildlife crossings on the South Yuba canal, at specified locations, to minimize wildlife injury and mortality associated with the movement across project canals.

- Consult with California Fish and Wildlife, the Forest Service, and BLM when replacing wildlife escape and crossing facilities.

- Record annually all incidental observations of bird collision/electrocutions along project powerlines and replace or retrofit problem power poles as appropriate. Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality.

- Monitor activities associated with annual planned outages and non-routine planned outages along the South Yuba canal. Record activities that may generate noise disturbances that occur between February 15 through September 15 within 0.25 mile of California spotted owl and northern goshawk Protected Activity Centers.

- Implement bat management measures, including installing exclusion devices to minimize disturbance during project operation and maintenance.

- Implement the July 2013 Bald Eagle Management Plan (filed November 21, 2013) to protect nesting bald eagles from disturbance during project operations and maintenance and project-related recreational activities.

**Threatened and Endangered Species**

- Implement the VELB provisions of the March 2013 Integrated Vegetation Management Plan, consistent with conservation measures to avoid or minimize the loss of elderberry shrubs.

**Recreation Resources**

- Implement the September 2013 Recreation Plan (filed November 18, 2013) to improve and maintain Deer Creek forebay access and parking area, and install directional signs to and from the Highway 20 junction to the Deer Creek forebay.

- Provide a contact for BLM whenever planning or constructing recreation facilities and routine maintenance activities are taking place on BLM lands.

- Provide $30,000 annually to BLM to partially fund the annual operation, maintenance, and administrative costs for BLM's management of BLM lands within the project boundary and BLM's management of public river access, lands, and river-related recreation in the Upper Drum-Spaulding Project along the South Yuba River downstream of Lake Spaulding.

**Cultural Resources**

- Implement the HPMP (filed September 23, 2013) upon license issuance to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register.

**Land Use and Aesthetic Resources**

- Revise project boundaries to reflect separation of proposed Deer Creek Project from the existing Drum-Spaulding Project.

- Implement the Transportation Management Plan (filed August 29, 2012) to ensure that project roads are adequately maintained.

- Implement the Fire Prevention and Response Plan (filed November 21, 2013) on federal lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project.

- Implement the Visual Resource Management Plan (filed June 18, 2012) on federal lands to protect visual and aesthetic resources on and adjacent to project lands.

- Develop and implement a Hazardous Substances Plan for oil and hazardous substances storage and spill prevention and cleanup.

#### 2.2.3.4 Yuba-Bear Project

NID proposes the following protection and enhancement measures:

**General Measures**

- Consult annually with the Forest Service and BLM to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize project staff with special-status species, non-native invasive plants, and sensitive areas known to occur within the project boundary on Forest Service or BLM land, and the procedures for reporting to each agency.

- Annually review special-status species lists and assess new species on federal project lands.

- Consult with the Forest Service, BLM, or, as appropriate, California Fish and Wildlife, to determine potential project-related effects of any proposed future ground-disturbing activity on federal project land.

- Develop and implement a Coordinated Operations Plan for Yuba-Bear Project, Upper Drum-Spaulding Project, and Lower Drum Project regarding implementation of flow-related measures in each project's license.

- Obtain prior written approval of the Forest Service or BLM, as appropriate, for the use of pesticides or herbicides on or affecting public land.

**Geology and Soils**

- Develop and implement an erosion control and restoration plan to prevent adverse effects on environmental resources associated with erosion during the Rollins upgrade construction.

- Implement Erosion and Sediment Control and Management Plan (filed April 11, 2014) to prevent adverse effects on environmental resources associated with erosion during recreation facility construction.

- Implement Clear and Trap Creeks Channel Stabilization Plan (filed June 18, 2012) to stabilize and restore existing erosion effects from spills downstream of the Bowman-Spaulding canal, including at a minimum, Clear and Trap Creeks and Christmas Tree waterway.

- Implement Canal Release Point Plan (filed April 11, 2014) to inventory, record, treat, and monitor potentially significant project-related erosion and sedimentation impacts on federal project lands and minimize future erosion and sedimentation.

**Aquatic Resources**

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98. Implement extreme critically dry water year type flows below Rollins dam, Milton diversion dam, and Bowman-Spaulding diversion dam in a critically dry year that follows a critically dry or extreme critically dry year.

- To enhance aquatic habitat and support and protect resident aquatic species, provide the same or increased minimum streamflows to six project-affected reaches and provide new minimum streamflows to nine project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 as listed below.

| **Project-affected Reach** | **Table No. in Appendix A-2** |
|---|---|
| Middle Yuba River – below Jackson Meadows dam | 3-149 |
| Middle Yuba River – below Milton diversion dam | 3-151 |
| Wilson Creek – below Wilson Creek diversion dam | 3-155 |
| Jackson Creek – below Jackson dam | 3-156 |
| Canyon Creek – below French dam | 3-157 |
| Canyon Creek – below Faucherie dam | 3-159 |
| Canyon Creek - below Sawmill dam | 3-161 |
| Canyon Creek – below Bowman-Spaulding diversion dam | 3-163 |
| Texas Creek – below Texas Creek diversion dam | 3-167 |
| Clear Creek – below Bowman-Spaulding diversion conduit | 3-168 |
| Fall Creek below Bowman-Spaulding diversion dam | 3-170 |

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Trap Creek – below Bowman-Spaulding diversion conduit | 3-173 |
| Rucker Creek – below Bowman-Spaulding diversion conduit | 3-174 |
| Bear River – below Dutch Flat afterbay dam | 3-175 |
| Bear River – below Rollins dam | 3-178 |

- Notify licensing stakeholders at the annual consultation meeting of all annual planned and non-routine planned canal outages in the Bowman-Spaulding diversion conduit. Provide minimum streamflow or inflow, whichever is less during canal outages in Bowman-Spaulding conduit and Upper Drum-Spaulding Project's Drum canal. Consult with licensing stakeholders if the outage is anticipated to extend past 30 days and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage.

- Implement overwintering minimum streamflow adjustments below Milton diversion dam and Bowman-Spaulding diversion dam in response to extended periods of low regional precipitation, as described in section 3.3.2.2.2, *Instream Flows*.

- Implement Forest Service/BLM Gaging Plan (filed April 11, 2014) to measure streamflows at specified locations for documenting compliance with the proposed minimum streamflow requirements listed above and described in section 3.3.2.2.2, *Instream Flows*, as shown in appendix A-2, table 3-189.

- Implement the periodic minimum streamflow settings due to remote location and access difficulties at Wilson Creek diversion dam, as described in section 3.3.2.2.2, *Instream Flows*.

- From May 1 through September 15, avoid non-routine planned outages and operate the turbine/generator unit in Chicago Park powerhouse in a synchronous condense mode when the unit is not generating electricity. During non-routine planned outages that would cause Dutch Flat afterbay dam to spill to the downstream Bear River, make a good faith effort to motor the Chicago Park powerhouse until the increased flows from the Dutch Flat afterbay dam reach the tailrace of Chicago Park powerhouse to prevent a sharp decrease in flows in the Bear River downstream of the Chicago Park powerhouse.

- To reduce the risk of stranding of aquatic resources, implement spill cessation schedules and minimize flow fluctuations at Milton and Bowman-Spaulding diversion dams and Dutch Flat afterbay dam, as described in section 3.3.2.2.1, *Water Quantity*, as shown in appendix A-2, tables 3-184, 3-185, 3-186, and 3-187.

- To prevent rapid flow fluctuations in the lower Bear River below Rollins dam, balance inflow from upstream with outflows when the Rollins reservoir water surface elevation is within the top 2 to 3 feet of the reservoir.

- Implement Canal Outage Fish Rescue Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Develop and implement a Fish Entrainment Protection Plan for the Milton-Bowman conduit, including design, installation, and seasonal operation of fish screens to minimize entrainment of juvenile fish into the conduit.

- Ensure mobile instream LWD continues downstream beyond Jackson Meadows dam, Milton Diversion dam, Sawmill dam, French dam, Faucherie dam, and Bowman dam. Annually in October, relocate LWD that has accumulated on the upstream side of Rollins dam spillway log boom to the downstream side of the log boom. Allow the LWD between the log boom and spillway to pass over the spillway when the reservoir spills to enhance aquatic habitat in the Bear River below Rollins dam.

- Develop and implement a LWD management plan for Yuba-Bear Project affected waters.to identify dams where active management of LWD is necessary to ensure passage downstream of the dam. Specific plans would also be developed for management of LWD at Dutch Flat afterbay dam and Rollins dam.

- Implement an aquatic monitoring program to assess the effects of the proposed flow modifications on aquatic resources in selected project-affected stream reaches, as described in the Fish Population Monitoring Plan (filed November 21, 2013), Foothill Yellow-legged Frog Monitoring Plan (filed November 21, 2013), Channel Morphology Monitoring Plan (filed November 21, 2013), Forest Service/BLM Water Temperature and Stage Monitoring Plan (filed April 11, 2014), and Forest Service/BLM Riparian Vegetation Monitoring Plan (filed April 11, 2014). Also, monitor incidental occurrence of western pond turtle.

- Implement aquatic invasive species management measures included in Aquatic Invasive Species Prevention Guidelines of Non-Native Invasive Plant Management Plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

**Terrestrial Resources**

- Implement March 2013 Integrated Vegetation Management Plan (filed November 21, 2013) on federal lands that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and includes control of non-native invasive species, provisions for special-status species, provisions for pesticide use, and annual training, management, and reporting.

- Record annually all incidental observations of bird collisions/electrocutions at the Bowman-Spaulding transmission line. Consult with the Forest Service, U.S. Fish and Wildlife Service, and California Fish and Wildlife concerning measures needed to ensure the protection of birds where incidental observations of bird collisions/electrocutions illustrate a problem pole or transmission structure. Replace or retrofit poles with substantial raptor-project interaction issues as appropriate.

- Record animal losses from drowning in all project canals. Provide this information to California Fish and Wildlife, the Forest Service, or BLM, as appropriate, as well as to the Commission. After consultation with the appropriate resource agencies, develop additional measures to address

suspected project-related causes of mortality if there is an increasing trend in wildlife mortalities in a canal.

- Consult with the Forest Service or BLM, as appropriate, prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings along project canals, and consult with California Fish and Wildlife regarding specifications and design. Assess existing wildlife escape facilities annually to ensure they are functional and in proper working order.

- Maintain wildlife crossings on Bowman-Spaulding canal consistent with proposed wildlife crossing plan.

- Implement proposed bat management measures. Document all known bat roosts within project buildings, dams, or other structures. Provide inspection results to California Fish and Wildlife, the Forest Service, and BLM, as appropriate. If bats or signs of roosting are present where project personnel routinely work, place humane exclusion devices to prevent occupation of the structure by bats.

- Implement the July 2013 Bald Eagle Management Plan (filed November 21, 2013) to protect nesting bald eagles from disturbance during project operations and recreational activities.

- Monitor the foothill yellow-legged frog population in Steephollow Creek from the confluence with the Bear River for a distance of 1,000 meters (1,094 yards) upstream, to assess if spills from the Chicago Park conduit result in adverse effects on the foothill yellow-legged frog population in Steephollow Creek and, if necessary, to facilitate the development of mitigation measures.

- Conduct event-based monitoring of the foothill yellow-legged frog populations in Steephollow Creek beginning the second full calendar year after a spill event and repeat in the third year following that spill event, and submit a monitoring report to BLM, California Fish and Wildlife, and the California Water Board.

**Recreation Resources**

- Implement a Recreation Plan (filed August 29, 2012) for upgrades, maintenance, and development of new project recreation facilities on federal project lands.

- Develop a rehabilitation plan with BLM to block, gate, and rehabilitate roads and trails at Chicago Park powerhouse and to annually meet with BLM to discuss the following year's projects.

- Provide reservoir storage information via the internet *year-round* for the following locations: Jackson Meadows reservoir; French Lake; Faucherie Lake; Sawmill Lake; Jackson Lake; Bowman Lake; and Rollins Lake.

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet for the Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam, within one year of license issuance.

- Provide increased flows (target streamflow of between 120 and 150 cfs over a continuous 24-hour period as measured at gage YB-306) in Canyon Creek below French dam for whitewater boating

starting between September 1 and September 30 of each year, until the date that French Lake elevation reaches 6,638 feet msl.

- Provide recreational streamflow events (continuous mean daily target streamflow of 300 cfs for at least 6 continuous days as measured at USGS gage 11408550 [Middle Yuba River below Milton diversion dam]) in any years in which spill at Milton diversion dam is 300 cfs or greater after May 1.

- Provide recreational streamflow events (continuous mean daily target streamflow of 275 cfs for at least 5 continuous days as measured at gage 11416500 [Canyon Creek downstream of the Bowman-Spaulding diversion dam] after April 1) in any years in which flow as measured at USGS gage 11416500 is 275 cfs or greater.

- Provide funding to California Fish and Wildlife for the stocking of up to 20,000 trout fry and 25,000 kokanee fry in Bowman Lake and the stocking of up to 10,000 catchable rainbow trout, 10,000 catchable brown trout, and 25,000 kokanee fry in Rollins reservoir.

- Enter into a Recreation Operation and Maintenance Agreement with BLM to provide BLM $30,000 annually for operation, maintenance, law enforcement patrolling, and administration.

**Cultural Resources**

- Implement the HPMP (filed October 15, 2012) upon license issuance to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register.

**Land Use and Aesthetic Resources**

- Implement the Transportation Management Plan (filed August 29, 2012) to rehabilitate and maintain primary project roads to ensure that project roads are adequately maintained.

- Implement the Fire Prevention and Response Plan (filed November 21, 2013) to provide fire prevention procedures, reporting, and safe fire practices for NID personnel and contractors responsible for operating and maintaining the project.

- Revise the project boundary to remove the mineral survey area south of the Dutch Flat afterbay and the administrative site at Jackson Meadows reservoir and the recreation road that provides access to it and to include certain primary project roads, and new and rehabilitated recreation facilities.

- Develop and implement a hazardous materials spill prevention, control, and countermeasure plan for the Rollins upgrade construction.

- Develop and implement a recreation facilities construction hazardous materials spill prevention, control, and countermeasure plan.

- Implement a Visual Resource Management Plan (filed June 18, 2012) on federal lands to improve the visual quality of the project by reducing the visual contrast of existing and proposed project facilities.

### 2.2.4 Modifications to Applicants' Proposals—Mandatory Conditions

The following mandatory conditions have been provided by the Forest Service, BLM, and Reclamation under section 4(e) and are evaluated in this EIS. The federal agencies did not specify which of the Drum-Spaulding Project 4(e) conditions apply to each of the three proposed projects. For this reason, we applied the 4(e) conditions to the projects by assuming the following: (1) Forest Service 4(e) conditions would only apply to the projects that include Forest Service lands (Upper Drum-Spaulding and Deer Creek Projects); (2) BLM 4(e) conditions only apply to projects that include BLM lands (Deer Creek); and (3) Reclamation 4(e) conditions only apply to projects that include Reclamation lands (Lower Drum Project). In addition, 4(e) conditions were assumed to apply at all the projects where that federal agency has some jurisdiction unless the specifications of the condition made it clear that the condition applied to only one or two of the projects. For Forest Service or BLM conditions that specifically apply to non-federal lands associated with the Lower Drum Project (e.g., wildlife crossings for the Bear River and South canals) or where it may be unclear whether a measure would apply to non-federal lands (e.g., measures included in resource plans prepared by PG&E and required by the Forest Service or BLM that apply to both federal and non-federal lands), we intend for those conditions to be evaluated under section 10(a) of the FPA.

#### 2.2.4.1 Upper Drum-Spaulding Project

**Forest Service**

The Forest Service filed terms and conditions pursuant to section 4(e) of the FPA on July 31, 2012, revised conditions on August 23, 2012, and modified conditions on November 21, 2013. On April 14, 2014, the Forest Service filed revised modified conditions ("final conditions") that included 24 standard Forest Service conditions and 35 project-specific resource protection conditions (appendix H-1).

Of the Forest Service's 59 final conditions, we consider the 24 standard conditions (conditions 1 through 24) and conditions 35, 36 and 59 to be administrative or legal in nature and not specific environmental measures. We do not analyze these administrative or legal conditions in this EIS with the exception of condition 1, *Consultation;* condition 2, *Consultation Group Specific to the Drum-Spaulding Project;* condition 21, *Hazardous Substances Plan*; and condition 22, *Pesticide Use Restrictions on NFS Lands*. We analyze conditions that we consider to be environmental measures in section 3, and we summarize our analysis of these measures in section 5.1.4.2, *Land Management 4(e) Conditions*. The Forest Service conditions that we analyze in this document include:

- Forest Service condition 1: Consult with the Forest Service annually on measures needed to ensure protection and utilization of the National Forest resources affected by the project.

- Forest Service condition 2: Establish a consultation group to provide a forum for PG&E to consult with the Forest Service on the annual meeting, review and evaluate monitoring data related to the South Yuba River supplemental flows, consult with the Forest Service on the plans that are developed as required by the new license, and discuss proposed temporary or permanent modifications to license conditions.

- Forest Service condition 21: File with the Commission a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup.

- Forest Service condition 22: Obtain prior written approval from the Forest Service for use of pesticides on NFS lands or in areas affecting NFS lands. Pesticide use would be excluded from NFS lands within 500 feet of known locations of western pond turtles, Sierra Nevada yellow-

legged frog, foothill yellow-legged frog, or known locations of Forest Service special-status or culturally significant plant populations.

- Forest Service condition 25, part 1: Annually perform employee awareness training and perform such training when a staff member is first assigned to the project.

- Forest Service condition 25, part 2: Within 90 days after issuance of new licenses for the Yuba-Bear Project or Upper Drum-Spaulding Project, whichever is later, file with the Commission for approval a Coordinated Operations Plan developed in consultation with the licensee for the Yuba-Bear Project, which shall provide coordination between the Yuba-Bear Project and Upper Drum-Spaulding Project regarding implementation of flow-related measures in each project's license.

- Forest Service condition 26, Water Year Type: Determine the water type year for minimum streamflow compliance based on the California DWR (Bulletin 120) Forecast of Total Unimpaired Runoff in the Yuba River at Smartville or California DWR Full Natural Flow Near Smartville for the Water Year, as shown in appendix H-1, table 1.

- Forest Service condition 27, Minimum Streamflows: Meet the minimum streamflows in specified reaches by month and water year type, as shown in appendix H-1, table 2. Minimum streamflow means the instantaneous flow except as otherwise provided. Record instantaneous streamflow as required by USGS standards at all gages.

- Forest Service condition 28, Flow Setting: By November 1 of each year, set the low-level outlet opening to set the flow release at the winter setting for each remote location, as shown in appendix H-1, table 3.

- Forest Service condition 29, Canal Outages: Inform annual consultation meeting participants about annual planned outages, non-routine planned outages, and emergency outages, as shown in appendix H-1, table 4.

- Forest Service condition 30, Fordyce Lake Drawdown: Manage flows released from Fordyce dam (measured at YB-200) after spills cease at both Fordyce dam and at Lake Spaulding, and Fordyce dam can be safely accessed.

- Forest Service condition 31, Spill Cessation and Minimization of Flow Fluctuations: Adhere to the Lake Spaulding spill cessation schedules, as shown in appendix H-1, tables 5 and 6. One spill cessation schedule is intended to address recreation interests in the project (including boating) and applies in wet, above normal, and below normal water years only, and does not apply in dry, critically dry, or extreme critically dry water years. The other spill cessation schedule applies in all water year types.

- Forest Service condition 32, South Yuba River Supplemental Flows: Release additional flow into the South Yuba River above the minimum streamflow annually between July 1 and September 15 in critically dry, dry, and below normal water years so that the total minimum streamflow (minimum streamflow plus supplemental flow) is no greater than 30 cfs, as shown in appendix H-1, table 7.

- Forest Service condition 33: Implement the Canal Outages Fish Rescue Plan upon Commission approval.

- Forest Service condition 34: Implement the Gaging Plan upon Commission approval.

- Forest Service condition 37: File with the Commission a plan approved by the Forest Service to address invasive species such as the New Zealand mudsnail, Quagga mussels, and zebra mussels if they are found during any monitoring. Implement aquatic invasive species prevention BMPs within the project boundary at project reservoirs.

- Forest Service condition 38, Vegetation and Non-Native Invasive Plant Management Plan: Implement the Integrated Vegetation Management Plan upon Commission approval.

- Forest Service condition 39, Monitor Animal Losses in Project Canals: Record animal losses in all project canals, and consult with the Forest Service, BLM, and California Fish and Wildlife and other interested parties during the annual meeting regarding the protection and utilization of the wildlife resources affected by the project.

- Forest Service condition 40, Replacement of Wildlife Escape and Wildlife Crossing Facilities: Consult with California Fish and Wildlife regarding specifications and design and with the Forest Service, prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings along project canals. File the design with the Commission after the wildlife escape facility or wildlife crossing facility has been replaced or retrofitted. Assess existing wildlife escape facilities and wildlife crossing facilities annually to ensure they are functional and in proper working order.

- Forest Service condition 41, Wildlife Crossings at Drum and South Yuba Canals: Complete a Wildlife Crossing Plan approved by the Forest Service, BLM, and California Fish and Wildlife for placing wildlife crossings across segments of conduits agreed to by the Forest Service, BLM, and California Fish and Wildlife; crossing structures shall maximize the continuity of native soils adjacent to and on the wildlife crossing.

- Forest Service condition 42, Wildlife Crossings at Bear and South Canals: Complete a Wildlife Crossing Plan approved by the Forest Service, BLM, and California Fish and Wildlife for placing wildlife crossings across segments of conduits agreed to by the Forest Service, BLM, and California Fish and Wildlife; crossing structures shall maximize the continuity of native soils adjacent to and on the wildlife crossing.

- Forest Service condition 43, Bald Eagle Management Plan: Implement the Bald Eagle Management Plan upon Commission approval.

- Forest Service condition 44, Special-status Species: Prepare and submit for Forest Service approval a biological evaluation that evaluates the potential impact of the action on the species or its habitat before taking actions to construct new project features on NFS lands that may affect Forest Service special-status species or their critical habitats on NFS land.

- Forest Service condition 45, Annual Review of Special-status Species Lists: Annually review in consultation with the Forest Service the current lists of special-status species that might occur on NFS lands, as appropriate, in the project area that may be directly affected by project operations.

- Forest Service condition 46, Project Powerlines: Use raptor-safe powerline design configurations described in Avian Protection on Powerline Interaction Committee's (APLIC) "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" (APLIC, 2006), or the most current edition of this APLIC document, for all new powerlines or when replacement of existing poles, phase conductors, and associated equipment is required.

- Forest Service condition 47, Raptor Collisions: Annually record all incidental observations of bird collisions/electrocutions at the Bowman-Spaulding Transmission Line including: date; location (i.e., nearest pole number); species, if identifiable; number of birds; condition of bird(s) (i.e., dead or injured); suspected cause of injury or death (i.e., electrocution or collision); and band number if the bird was banded.

- Forest Service condition 48, Bat Management: Document all known bat roosts within project buildings (e.g., powerhouses, storage buildings, and valve houses), dams, or other structures that may be used as a roosting structure and provided findings to California Fish and Wildlife and the Forest Service if the facility is located on NFS lands.

- Forest Service condition 49: Implement the Canal Release Point Plan upon Commission approval.

- Forest Service condition 50: Implement the Erosion and Sediment Control Management Plan upon Commission approval.

- Forest Service condition 51: Implement a monitoring program in coordination with the Forest Service, BLM, California Fish and Wildlife, and the California Water Board. The monitoring program should include:

    - Fish population monitoring as described in the Fish Populations Monitoring Plan.

    - Foothill yellow-legged frog monitoring as described in the Foothill Yellow-legged Frog Monitoring Plan

    - Perform western pond turtle incidental observations and compile an annual report to be provided at the annual consultation meeting.

    - Monitor channel morphology as described in the Channel Morphology Monitoring Plan.

    - Monitor water temperature and stage as described in the Water Temperature and Stage Monitoring Plan.

    - Within 1 year of license issuance, develop an Aquatic Macroinvertebrate Monitoring Plan that has been approved by the Forest Service, BLM, California Fish and Wildlife, and California Water Board.

    - Monitor riparian vegetation as described in the Riparian Vegetation Monitoring Plan.

    - Record of the licensee's activities that may generate noise disturbances that occur between February 15 through September 15 within 0.25 mile of California spotted owl and northern goshawk protected activity centers, and within suitable habitat for these species.

- Forest Service condition 52: Prepare a LWD management plan in consultation with the Forest Service, BLM, California Fish and Wildlife, and the California Water Board and approved by the Forest Service.

- Forest Service condition 53: Implement the Recreation Plan.

- Forest Service condition 54: Within the first year after license issuance, develop a plan to provide real-time streamflow information, in cfs, for: (1) Fordyce Creek below Fordyce dam; (2) the South Yuba River below Kidd Lake and Lower Peak Lake dam; (3) the South Yuba River below Lake Spaulding (at Lang's Crossing); and (4) the Bear River at Highway 20. Implement Water Temperature and Stage Monitoring Plan (filed April 11, 2014 and discussed under Aquatic Resources) that includes installing a monitoring station in the South Yuba River upstream of but as close as possible to Canyon Creek within three years that would monitor river stage hourly (15-minute interval readings that would be transmitted hourly) and would be available in real-time (hourly) to the public via the internet.

- Forest Service condition 55: Implement the Visual Resource Management Plan.

- Forest Service condition 56: Implement the HPMP.

- Forest Service condition 57: Implement the Transportation System Management Plan.

- Forest Service condition 58: Implement the Fire Management and Response Plan.

The following seven PG&E alternative conditions filed under EPAct are unresolved: 1, Consultation; 6, Existing Claims; 13, Access; 18, Use of National Forest Service Roads for Project Access; 19, Access by the United States; 51, Aquatic Benthic Macroinvertebrate Monitoring Program; and 52, Large Woody Debris.

#### 2.2.4.2 Lower Drum Project

As proposed, the Lower Drum Project would include federal lands owned by Bureau of Reclamation, but no Forest Service or BLM lands. As there are no Forest Service or BLM lands within the project boundary for the proposed Lower Drum Project, only 4(e) conditions filed by Reclamation were assumed to be applicable to the proposed Lower Drum Project (with the exception of Forest Service conditions 39, 40, and 41, related with wildlife crossings for the Bear River and South canals).

**Reclamation**

On July 31, 2012, Reclamation filed terms and conditions pursuant to section 4(e) of the FPA, including 11 standard Reclamation conditions and 4 project-specific resource protection conditions (appendix H-3).

Of Reclamation's 15 conditions, we consider condition A and the 14 standard conditions (conditions b.1 through b.14) to be administrative or legal in nature and not specific environmental measures. Conditions b.1 to b.10 are nearly identical to the Forest Service and BLM administrative conditions. We do not analyze these administrative or legal conditions in this EIS, with the exception of condition b.1, *Consultation;* condition b.9, *Pesticide Use Restrictions on Reclamation Lands;* condition b.10, *Hazardous Materials*; and condition b.11, *Discovery of Cultural Resources*. We analyze conditions that we consider to be environmental measures in section 3, and we summarize our analysis of these measures in section 5.1.4.2, *Land Management 4(e) Conditions*. The Reclamation conditions that we analyze in this document are specific to the O&M of Newcastle Powerhouse and include:

- Reclamation condition b.1: similar to Forest Service condition 1 and BLM condition 23.

- Reclamation condition b.9: similar to Forest Service condition 22 and BLM condition 37.

- Reclamation condition b.10: similar to Forest Service condition 21 and BLM condition 49 for the Upper Drum-Spaulding Project.

- Reclamation condition b.11: Immediately provide notification to the Reclamation authorized official in the event of discovery of any antiquities, paleontological items, or objects of archeological, cultural, historic, or scientific interest on Reclamation lands.

#### 2.2.4.3 Deer Creek Project

**Forest Service**

The Forest Service filed terms and conditions pursuant to section 4(e) of the FPA on July 31, 2012, revised conditions on August 23, 2012, and modified conditions on November 21, 2013. On April 14, 2014, the Forest Service filed revised modified conditions ("final conditions") that included 24 standard Forest Service conditions and 35 project-specific resource protection conditions (appendix H-1).

Of the Forest Service's 59 final conditions, we consider the 24 standard conditions (conditions 1 through 24) and conditions 35, 36 and 59 to be administrative or legal in nature and not specific environmental measures. We do not analyze these administrative or legal conditions in this EIS with the exception of condition 1, *Consultation;* condition 2, *Consultation Group Specific to the Drum-Spaulding Project;* condition 21, *Hazardous Substances Plan*; and condition 22, *Pesticide Use Restrictions on NFS Lands*. We analyze conditions that we consider to be environmental measures in section 3, and we summarize our analysis of these measures in section 5.1.4.2, *Land Management 4(e) Conditions*. The Forest Service conditions that we analyze in this document include:

- Forest Service condition 1: Consult with the Forest Service annually on measures needed to ensure protection and utilization of the National Forest resources affected by the project.

- Forest Service condition 21: File with the Commission a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup.

- Forest Service condition 25, part 1: Annually perform employee awareness training and perform such training when a staff member is first assigned to the project.

- Forest Service condition 25, part 2: Within 90 days after issuance of new licenses for the Yuba-Bear Project or Deer Creek Project, whichever is later, file with the Commission for approval a Coordinated Operations Plan developed in consultation with the licensee for the Yuba-Bear Project, which shall provide coordination between the Yuba-Bear Project and Deer Creek Project regarding implementation of flow-related measures in each project's license.

- Forest Service condition 26, Water Year Type: Determine the water type year for minimum streamflow compliance based on the California DWR (Bulletin 120) Forecast of Total Unimpaired Runoff in the Yuba River at Smartville or California DWR Full Natural Flow Near Smartville for the Water Year, as shown in appendix H-1, table 1.

- Forest Service condition 27, Minimum Streamflows: Meet the minimum streamflows in specified reaches by month and water year type, as shown in appendix H-1, table 2. Minimum streamflow means the instantaneous flow except as otherwise provided. Record instantaneous streamflow as required by USGS standards at all gages.

- Forest Service condition 29, Canal Outages: Inform annual consultation meeting participants about annual planned outages, non-routine planned outages, and emergency outages, as shown in appendix H-1, table 4.

- Forest Service condition 33: Implement the Canal Outages Fish Rescue Plan upon Commission approval.

- Forest Service condition 34: Implement the Gaging Plan upon Commission approval.

- Forest Service condition 37: File with the Commission a plan approved by the Forest Service to address invasive species such as the New Zealand mudsnail, Quagga mussels, and zebra mussels if they are found during any monitoring. Implement aquatic invasive species prevention BMPs within the project boundary at project reservoirs.

- Forest Service condition 38, Vegetation and Non-Native Invasive Plant Management Plan: Implement the Integrated Vegetation Management Plan upon Commission approval.

- Forest Service condition 39, Monitor Animal Losses in Project Canals: Record animal losses in all project canals, and consult with the Forest Service, BLM, and California Fish and Wildlife and other interested parties during the annual meeting regarding the protection and utilization of the wildlife resources affected by the project.

- Forest Service condition 40, Replacement of Wildlife Escape and Wildlife Crossing Facilities: Consult with California Fish and Wildlife regarding specifications and design and with the Forest Service, prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings along project canals. File the design with the Commission after the wildlife escape facility or wildlife crossing facility has been replaced or retrofitted. Assess existing wildlife escape facilities and wildlife crossing facilities annually to ensure they are functional and in proper working order.

- Forest Service condition 41, Wildlife Crossings at Drum and South Yuba Canals: Complete a Wildlife Crossing Plan approved by the Forest Service, BLM, and California Fish and Wildlife for placing wildlife crossings across segments of conduits agreed to by the Forest Service, BLM, and California Fish and Wildlife; crossing structures shall maximize the continuity of native soils adjacent to and on the wildlife crossing.

- Forest Service condition 43, Bald Eagle Management Plan: Implement the Bald Eagle Management Plan upon Commission approval.

- Forest Service condition 44, Special-status Species: Prepare and submit for Forest Service approval a biological evaluation that evaluates the potential impact of the action on the species or its habitat before taking actions to construct new project features on NFS lands that may affect Forest Service special-status species or their critical habitats on NFS land.

- Forest Service condition 45, Annual Review of Special-status Species Lists: Annually review in consultation with the Forest Service the current lists of special-status species that might occur on NFS lands, as appropriate, in the project area that may be directly affected by project operations.

- Forest Service condition 46, Project Powerlines: Use raptor-safe powerline design configurations described in Avian Protection on Powerline Interaction Committee's (APLIC) "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" (APLIC, 2006), or

the most current edition of this APLIC document, for all new powerlines or when replacement of existing poles, phase conductors, and associated equipment is required.

- Forest Service condition 47, Raptor Collisions: Annually record all incidental observations of bird collisions/electrocutions at the Bowman-Spaulding Transmission Line including: date; location (i.e., nearest pole number); species, if identifiable; number of birds; condition of bird(s) (i.e., dead or injured); suspected cause of injury or death (i.e., electrocution or collision); and band number if the bird was banded.

- Forest Service condition 48, Bat Management: Document all known bat roosts within project buildings (e.g., powerhouses, storage buildings, and valve houses), dams, or other structures that may be used as a roosting structure and provided findings to California Fish and Wildlife and the Forest Service if the facility is located on NFS lands.

- Forest Service condition 49: Implement the Canal Release Point Plan upon Commission approval.

- Forest Service condition 50: Implement the Erosion and Sediment Control Management Plan upon Commission approval.

- Forest Service condition 51: Implement a monitoring program in coordination with the Forest Service, BLM, California Fish and Wildlife, and the California Water Board. The monitoring program should include:

    - Record of the licensee's activities that may generate noise disturbances that occur between February 15 through September 15 within 0.25 mile of California spotted owl and northern goshawk protected activity centers, and within suitable habitat for these species.

- Forest Service condition 53: Implement the Recreation Plan

- Forest Service condition 55: Implement the Visual Resource Management Plan.

- Forest Service condition 56, Implement the HPMP.

- Forest Service condition 57: Implement the Transportation System Management Plan.

- Forest Service condition 58: Implement the Fire Management and Response Plan

The following seven PG&E alternative conditions filed under EPAct are still unresolved: 1, Consultation; 6, Existing Claims; 13, Access; 18, Use of National Forest Service Roads for Project Access; 19, Access by the United States; 51, Aquatic Benthic Macroinvertebrate Monitoring Program; and 52, Large Woody Debris.

**BLM**

BLM filed terms and conditions pursuant to section 4(e) of the FPA on July 31, 2012, revised conditions on August 27, 2012, and modified conditions on November 21, 2013. On April 15, 2014, BLM filed revised modified conditions ("final conditions") that included 28 standard BLM conditions and 22 project-specific resource protection conditions (appendix H-2).

Of BLM's 50 final conditions, we consider the 28 standard conditions (conditions 23 through 50) and condition 8 to be administrative or legal in nature and not specific environmental measures. These conditions were nearly identical to the Forest Service administrative conditions with the removal of one Forest Service condition (condition 26, *Slope Assessment and Facility Release Access Plan*) and the addition of two BLM general conditions (condition 46, *Maintenance of Improvements,* and condition 48, *Licensee Contact*). We do not analyze these administrative or legal conditions in this EIS, with the exception of condition 23, *Consultation;* condition 24, *Consultation Group Specific to the Drum-Spaulding Project*; condition 37, *Pesticide Use Restrictions on Bureau of Land Management Lands;* condition 48, *Licensee Contact;* condition 49, *Hazardous Substances Plan*; and condition 50, *Erosion and Sediment Control and Management*. We analyze conditions that we consider to be environmental measures in section 3, and we summarize our analysis of these measures in section 5.1.4.2, *Land Management 4(e) Conditions*. The BLM conditions that we analyze in this document include:

- BLM condition 1: similar to Forest Service condition 25.
- BLM condition 2: similar to Forest Service condition 25.
- BLM condition 4: similar to Forest Service condition 29.
- BLM condition 5: similar to Forest Service condition 33.
- BLM condition 6: Annually pay to BLM $30,000 to partially fund the annual operation, maintenance, and administration costs for BLM's management of BLM lands within the project boundary as well as public river access, lands, and river-related recreation facilities along the South Yuba River downstream of Lake Spaulding.
- BLM condition 9: similar to Forest Service condition 34.
- BLM condition 10: similar to Forest Service condition 42.
- BLM condition 11: similar to Forest Service condition 40.
- BLM condition 12: similar to Forest Service condition 39.
- BLM condition 13: similar to Forest Service condition 44.
- BLM condition 14: similar to Forest Service condition 45.
- BLM condition 15: similar to Forest Service condition 46.
- BLM condition 16: similar to Forest Service condition 43.
- BLM condition 17: similar to Forest Service condition 38.
- BLM condition 18: similar to Forest Service condition 58.
- BLM condition 19: similar to Forest Service condition 49.
- BLM condition 20: similar to Forest Service condition 55.
- BLM condition 21: similar to Forest Service condition 56.

- BLM condition 22: similar to Forest Service condition 57.

- BLM condition 23: similar to Forest Service condition 1.

- BLM condition 24: similar to Forest Service condition 2.

- BLM condition 48: Provide a contact with BLM when planning or constructing recreation facilities or other project improvements and when routine and other maintenance activities are taking place on BLM lands.

- BLM condition 49: similar to Forest Service condition 21.

- BLM condition 50: similar to Forest Service condition 50.

The following five PG&E alternative conditions filed under EPAct are still unresolved: 23, Consultation; 27, Existing Claims; 34, Access; 41, Use of Bureau of Land Management Roads for Project Access; and 42, Access by the United States.

#### 2.2.4.4 Yuba-Bear Project

**Forest Service**

The Forest Service filed terms and conditions pursuant to section 4(e) of the FPA on July 31, 2012, revised conditions on August 23, 2012, and modified conditions on November 21, 2013. On April 14, 2014, the Forest Service filed revised modified conditions ("final conditions") that included 24 standard Forest Service conditions and 39 project-specific resource protection conditions (appendix I-1).

Of the Forest Service's 63 final conditions, we consider the 24 standard conditions (conditions 1 through 24) and conditions 35, 36, and 63 to be administrative or legal in nature and not specific environmental measures. We do not analyze these administrative or legal conditions in this EIS with the exception of condition 1, *Consultation;* condition 2, *Consultation Group Specific to the Yuba-Bear Project*; condition 21, *Hazardous Substances Plan*; and condition 22, *Pesticide Use Restrictions on NFS Lands*. We analyze conditions that we consider to be environmental measures in section 3, and we summarize our analysis of these measures in section 5.2.4.2, *Land Management 4(e) Conditions*. The Forest Service conditions that we analyze in this document include:

- Forest Service condition 1: Consult with the Forest Service annually on measures needed to ensure protection and utilization of the National Forest resources affected by the project.

- Forest Service condition 2: Establish a consultation group to provide a forum for NID to consult with the Forest Service on the annual meeting, review and evaluate monitoring data, consult with the Forest Service on the plans that are developed as required by the new license, and discuss proposed temporary or permanent modifications to license conditions.

- Forest Service condition 21: File with the Commission a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup.

- Forest Service condition 22: Obtain prior written approval from the Forest Service for use of pesticides on NFS lands or in areas affecting NFS lands. Pesticide use would be excluded from NFS lands within 500 feet of known locations of western pond turtles, Sierra Nevada yellow-

legged frog, foothill yellow-legged frog, or known locations of Forest Service special-status or culturally significant plant populations.

- Forest Service condition 25, Annual Employee Training: Annually perform employee awareness training and perform such training when a staff member is first assigned to the project.

- Forest Service condition 25, Coordinated Operations Plan: Within 90 days after issuance of new licenses for the Yuba-Bear Project, Upper Drum-Spaulding, Lower Drum, or Deer Creek Project, whichever is later, file with the Commission for approval a Coordinated Operations Plan developed in consultation with the licensee for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects, which shall provide coordination between the Yuba-Bear Project and Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects regarding implementation of flow-related measures in each project's license.

- Forest Service condition 26, Water Year Type: Determine the water type year for minimum streamflow compliance based on the California DWR (Bulletin 120) Forecast of Total Unimpaired Runoff in the Yuba River at Smartville or California DWR Full Natural Flow Near Smartville for the Water Year, as shown in appendix I-1, table 1.

- Forest Service condition 27: Meet the minimum streamflows in specified reaches by month and water year type, as shown in appendix I-1, table 2. Minimum streamflow means the instantaneous flow except as otherwise provided. Record instantaneous streamflow as required by USGS standards at all gages.

- Forest Service condition 28: Inform annual consultation meeting participants about annual planned outages, non-routine planned outages, and emergency outages, as shown in appendix I-1, table 3.

- Forest Service condition 29: Overwintering minimum streamflow adjustments:

    - Middle Yuba River Below Milton Diversion Dam: generally, minimum streamflow in the Middle Yuba River downstream of Milton diversion dam shall be 15 cfs.

    - Canyon Creek Below Bowman-Spaulding Diversion Dam: generally, minimum streamflow in the Canyon Creek downstream of Bowman-Spaulding diversion dam shall be 20 cfs.

- Forest Service condition 30: compliance with the minimum streamflows described for Wilson Creek diversion dam:

    - Non-Winter Period: Set the outlet works once each week consistent with the minimum streamflow for that month.

    - Winter Period: Set the outlet works at Wilson Creek diversion dam to make the minimum streamflow release for the Wilson Creek diversion dam.

- Forest Service condition 31: Provide target flows, measured as mean daily flow, within 10 percent of the target flows with effort not to make releases from Milton diversion dam and Bowman-Spaulding diversion dam that result in short-term, high flow fluctuations. Adhere to the spill cessation schedule for the Middle Yuba River below Milton diversion dam and the Canyon Creek below Bowman dam, as shown in appendix I-1, tables 4 and 5.

- Forest Service condition 32: Develop in consultation with the Forest Service, California Fish and Wildlife, and the California Water Board, a Fish Entrainment Protection Plan for a fish screen for rainbow trout fry at or near the Milton-Bowman diversion dam on the Middle Yuba River; after approval by the Forest Service, file with Commission for approval a plan that specifies the licensee with construct and maintain a retractable cylindrical fish screen system to be installed in the Milton diversion impoundment in front of the existing Milton-Bowman conduit intake.

- Forest Service condition 33: Implement the Canal Outages Fish Rescue Plan upon Commission approval.

- Forest Service condition 34: Implement the Gaging Plan upon Commission approval.

- Forest Service condition 37: File with the Commission a plan approved by the Forest Service to address invasive species such as the New Zealand mudsnail, Quagga mussels, and zebra mussels if they are found during any monitoring. Implement aquatic invasive species prevention BMPs within the project boundary at project reservoirs.

- Forest Service condition 38: Implement the Integrated Vegetation Management Plan upon Commission approval.

- Forest Service condition 39: Record animal losses in all project canals, and consult with the Forest Service, BLM, and California Fish and Wildlife and other interested parties during the annual meeting regarding the protection and utilization of the wildlife resources affected by the project.

- Forest Service condition 40: Consult with California Fish and Wildlife regarding specifications and design and with the Forest Service, prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings along project canals. File the design with the Commission after the wildlife escape facility or wildlife crossing facility has been replaced or retrofitted. Assess existing wildlife escape facilities and wildlife crossing facilities annually to ensure they are functional and in proper working order.

- Forest Service condition 41: Maintain and construct wildlife crossings at Bowman-Spaulding canal.

- Forest Service condition 42: Implement the Bald Eagle Management Plan upon Commission approval.

- Forest Service condition 43: Prepare and submit for Forest Service approval a biological evaluation that evaluates the potential impact of the action on the species or its habitat before taking actions to construct new project features on NFS lands that may affect Forest Service special-status species or their critical habitats on NFS land.

- Forest Service condition 44: Annually review in consultation with the Forest Service the current lists of special-status species that might occur on NFS lands, as appropriate, in the project area that may be directly affected by project operations.

- Forest Service condition 45: Use raptor-safe powerline design configurations described in Avian Protection on Powerline Interaction Committee's (APLIC) "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" (APLIC, 2006), or the most current

edition of this APLIC document, for all new powerlines or when replacement of existing poles, phase conductors, and associated equipment is required.

- Forest Service condition 46: Annually record all incidental observations of bird collisions/electrocutions at the Bowman-Spaulding Transmission Line including: date; location (i.e., nearest pole number); species, if identifiable; number of birds; condition of bird(s) (i.e., dead or injured); suspected cause of injury or death (i.e., electrocution or collision); and band number if the bird was banded.

- Forest Service condition 47: Document all known bat roosts within project buildings (e.g., powerhouses, storage buildings, and valve houses), dams, or other structures that may be used as a roosting structure and provided findings to California Fish and Wildlife and the Forest Service if the facility is located on NFS lands.

- Forest Service condition 48: Implement the Channel Stabilization Plan upon Commission approval.

- Forest Service condition 49: Implement the Canal Release Point Plan upon Commission approval.

- Forest Service condition 50: Implement the Erosion and Sediment Control and Management Plan upon Commission approval.

- Forest Service condition 51: Implement a monitoring program in coordination with the Forest Service, BLM, California Fish and Wildlife, and the California Water Board. The monitoring program should include:

    - Fish population monitoring as described in the Fish Populations Monitoring Plan.

    - Foothill yellow-legged frog monitoring as described in the Foothill Yellow-legged Frog Monitoring Plan

    - Perform western pond turtle incidental observations and compile an annual report to be provided at the annual consultation meeting.

    - Monitor channel morphology as described in the Channel Morphology Monitoring Plan.

    - Monitor water temperature and stage as described in the Water Temperature and Stage Monitoring Plan.

    - Within 1 year of license issuance, develop an Aquatic Macroinvertebrate Monitoring Plan that has been approved by the Forest Service, BLM, California Fish and Wildlife, and California Water Board.

    - Monitor riparian vegetation as described in the Riparian Vegetation Monitoring Plan.

    - Record of the licensee's activities that may generate noise disturbances that occur between February 15 through September 15 within 0.25 mile of California spotted owl and northern goshawk protected activity centers, and within suitable habitat for these species.

- Forest Service condition 52: Prepare an LWD management plan in consultation with the Forest Service, BLM, California Fish and Wildlife, and the California Water Board and approved by the Forest Service.

- Forest Service condition 53: This condition provides proposed facility indicators and occupancy standards (triggers) at developed project recreation facilities in tables contained within the condition. When the occupancy standard for a grouping (groups of similar types of recreation facilities that are relatively close in proximity) is reached or exceeded, a suitability-feasibility analysis would be conducted to determine if site development is feasible and suitable at one of the reservoirs within a facility monitoring grouping. If site development is not suitable or feasible, agreed upon actions and policies would be implemented to manage recreation use levels.

- Forest Service condition 54: Provide a contact for the Forest Service when planning or constructing recreation facilities, when conducting major maintenance on existing recreation facilities, or other major project improvements are taking place on NFS lands within the project boundary.

- Forest Service condition 55: Meet with Forest Service at least every 6 years to review project recreation facilities on NFS land and agree upon necessary replacement and major maintenance work needed and its timing. Develop a 6-year schedule for replacement and/or reconstruction of project recreation facilities on NFS land for approval by the Forest Service prior to being filed with the Commission.

- Forest Service condition 56: Meet with interested resource agencies for an Annual Recreation Coordination Meeting to discuss recreational use and management, public safety, and recreation related resource protection.

- Forest Service condition 57: Within one year, develop and submit Recreation Plan that includes the elements and facility improvements outlined in the condition for Forest Service approval and implement the Recreation Plan upon approval

- Forest Service condition 58: Within one year after license issuance, provide real-time streamflow information, in cfs, for: (1) the Middle Yuba River at Jackson Meadows reservoir dam; (2) Middle Yuba River below Milton diversion dam; (3) Canyon Creek below French Dam; and (4) Canyon Creek below Bowman reservoir dam.

- Forest Service condition 59: Implement the final Visual Resource Management Plan.

- Forest Service condition 60: Implement the final HPMP.

- Forest Service condition 61: Implement the final Transportation System Management Plan.

- Forest Service condition 62: Implement the final Fire Management and Response Plan.

The following ten NID &E alternative conditions filed under EPAct are unresolved: 1, Consultation; 2, Consultation Group Specific to Yuba-Bear Project; 6, Existing Claims; 13, Access; 18, Use of National Forest System Roads for Project Access; 19, Access by the United States; 26, Water Year Types; 36, Modification of 4(e) Conditions in Event of Anadromous Fish Reintroduction; 37, Aquatic Invasive Species Management Plan; 51, Aquatic Benthic Macroinvertebrate Monitoring Program; and 57, Recreation Plan.

**BLM**

BLM filed terms and conditions pursuant to section 4(e) of the FPA on July 31, 2012, revised conditions on August 27, 2012, and modified conditions on November 21, 2013. On April 15, 2014, BLM filed revised modified conditions ("final conditions") that included 25 standard BLM conditions and 41 project-specific resource protection conditions (appendix I-2).

Of BLM's 66 final conditions, we consider the 25 standard conditions (conditions 42 through 66) and condition 13 to be administrative or legal in nature and not specific environmental measures. These conditions were nearly identical to the Forest Service administrative conditions with the removal of one Forest Service condition (condition 23, *Hazardous* Substance Plan) and the addition of one BLM general condition (condition 65, *Maintenance of Improvements*). We do not analyze these conditions in this EIS with the exception of BLM condition 42, *Consultation;* condition 43, *Consultation Group Specific to the Yuba-Bear Hydroelectric Project*; condition 52, *Risks and Hazards on BLM Lands*; condition 53, *Protect Bureau of Land Management Special-status Species;* and condition 57, *Pesticide Use Restrictions on Bureau of Land Management Lands*. We analyze conditions that we consider to be environmental measures in section 3, and we summarize our analysis of these measures in section 5.4.4.2, *Land Management 4(e) Conditions*. The BLM conditions that we analyze in this document specify that NID:

- BLM condition 1: similar to Forest Service condition 25, Annual Employee Training.
- BLM condition 2: similar to Forest Service condition 25, Coordinated Operations Plan.
- BLM condition 3: provide minimum streamflows based on water year type similar to Forest Service condition 26, Water Year Type (see appendix I-2, table 1).
- BLM condition 4: provide minimum streamflows similar to flows specified in Forest Service condition 27, Minimum Streamflows (see appendix I-2, table 2).
- BLM condition 5: similar to Forest Service condition 28, Canal Outages.
- BLM condition 6: Make an effort to avoid non-routine planned outages and operate the turbine/generator unit in Chicago Park powerhouse in a synchronous condense mode (motoring) when the unit is not generating electricity.
- BLM condition 7: similar to Forest Service condition 31, as applicable only for Bear River below Dutch Flat afterbay dam, as shown in appendix I-2, table 6.
- BLM condition 8: Manage the flows in the Bear River below Rollins dam to balance outflows with inflows when Rollins reservoir elevation is within the top 2 to 3 feet of the reservoir to eliminate rapid fluctuations in the Bear River below Rollins dam.
- BLM condition 9: Relocate the LWD that accumulates on the upstream side of Rollins dam spillway log boom to the downstream side of the log boom; allow the LWD between the log boom and spillway to pass over the spillway when the reservoir spills.
- BLM condition 10: Monitor foothill yellow-legged frog in Steephollow Creek from the confluence with the Bear River for a distance of 1,000 meters upstream to assess if spills from the Chicago Park conduit result in adverse effects on the foothill yellow-legged frog population in Steephollow Creek.

- BLM condition 11: similar to Forest Service condition 33.
- BLM condition 12: similar to Forest Service condition 34.
- BLM condition 14: similar to Forest Service condition 37.
- BLM condition 15: similar to Forest Service condition 38.
- BLM condition 16: similar to Forest Service condition 39.
- BLM condition 17: similar to Forest Service condition 40.
- BLM condition 18: similar to Forest Service condition 42.
- BLM condition 19: similar to Forest Service condition 43.
- BLM condition 20: similar to Forest Service condition 44.
- BLM condition 21: similar to Forest Service condition 47.
- BLM condition 22: similar to Forest Service condition 51.
- BLM condition 23: In consultation with the Forest Service, BLM, California Fish and Wildlife, and the California Water Board, prepare an LWD Management Plan for Dutch Flat afterbay approved by BLM. Upon Commission approval, implement the Plan.
- BLM condition 24: similar to Forest Service condition 49.
- BLM condition 25: similar to Forest Service condition 57, but does not include all of the facility improvements outlined in the Forest Service condition.
- BLM condition 26: similar to Forest Service condition 54, but specifies contact for BLM for BLM lands.
- BLM condition 27: similar to Forest Service condition 56.
- BLM condition 28: similar to Forest Service condition 55, but specifies meeting with BLM and that the review include all project recreation facilities.
- BLM condition 29: similar to Forest Service condition 53, but specifies details related to recreation monitoring, including occupancy surveys on a 6-year cycle for Dutch Flat afterbay and the Chicago Park recreation area near Chicago Park powerhouse and a Recreational User Survey (questionnaire) every 12 years; and preparation of the Recreation Monitoring and Survey Report 6 and 12 years after license issuance.
- BLM condition 30: similar to Forest Service condition 57, General Measures for All Recreation Sites.
- BLM condition 31: similar to Forest Service condition 57, Vegetation Management in Recreation Sites.

- BLM condition 32: Dutch Flat afterbay day-use recreation site: Within 90 days, make a good faith effort to purchase a parcel of land or obtain a long-term lease or easement for use of such property for day-use recreational activities that would include parking for six vehicles, six picnic tables, kiosk sign, and a restroom facility.

- BLM condition 33: Sign an assistance agreement with BLM and develop a rehabilitation plan with the BLM Mother Lode Field Office to block, gate, and rehabilitate roads and trails agreed to by the licensee and BLM that spur off the Haul Road, Chicago Park Powerhouse Road, Chicago Park Conduit Road, and Lowell Hill Road.

- BLM condition 34: Enter into a recreation operation and maintenance agreement to provide $30,000 annually for operation maintenance, law enforcement patrolling, and administration in accordance with the Recreation Plan (see condition 27).

- BLM condition 35: similar to Forest Service condition 57, Recreation Plan Revision.

- BLM condition 36: similar to Forest Service condition 57, Managing Project-Related Recreation Facilities, except specifies BLM and BLM land.

- BLM condition 37: similar to Forest Service condition 58, but specifies the development of a plan for recreation flow information for two stream reaches, Bear River below Dutch Flat afterbay dam and Bear River below Rollins reservoir dam, and also specifies that the plan also include a method to provide real-time streamflow information for streamflows on the South Yuba River immediately below Canyon Creek.

- BLM condition 38: similar to Forest Service condition 60.

- BLM condition 39: similar to Forest Service condition 61.

- BLM condition 40: similar to Forest Service condition 62.

- BLM condition 41: similar to Forest Service condition 50.

- BLM condition 42: similar to Forest Service condition 1.

- BLM condition 43: similar to Forest Service condition 2.

- BLM condition 52: (Similar to Forest Service condition 21.) As part of the occupancy and use of the project area and as a continuing responsibility, reasonably identify and report all known or observed hazardous conditions on or directly affecting BLM lands within the project boundary that would affect the improvements, resources, or pose a risk of injury to individuals. Abate those conditions, except those caused by third parties or nor related to the occupancy and use authorized by the license.

- BLM condition 53: similar to Forest Service condition 43.

- BLM condition 57: similar to Forest Service condition 22.

The following ten NID alternative conditions filed under EPAct are unresolved: 13, Modification of 4(e) Conditions in Event of Anadromous Fish Reintroduction; 14, Invasive Aquatic Species Management; 22, Aquatic Benthic Macroinvertebrate Monitoring Program; 25, Recreation Plan; 42,

Consultation; 43, Consultation Group Specific to Yuba-Bear Project; 46, Existing Claims; 54, Access; 61, Use of BLM Roads for Project Access; and 62, Access by the United States.

## 2.3 STAFF ALTERNATIVE[11]

### 2.3.1 Upper Drum-Spaulding Project

Under the staff alternative, the project would include PG&E's proposed environmental measures (see section 2.2.3.1), as modified below, and additional staff-recommended measures.

#### 2.3.1.1 PG&E Protection, Mitigation, and Enhancement Measures Modified by Staff

Our modifications to PG&E's proposed measures are shown below:

**Terrestrial Resources**

- Modify the proposed Integrated Vegetation Management Plan to extend management to accessible non-federal project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and include the protection of culturally significant plant species after consultation with the tribes.

- Prepare and implement a Wildlife Crossing Management Plan that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.

- Develop and implement an Avian Management Plan that includes provisions for raptor monitoring and protection and limited operating periods (LOPs) for the protection of special-status birds and their habitat.

- Incorporate proposed bat management measures into a Bat Management Plan.

**Recreation Resources**

- Modify the September 2013 Recreation Plan with regard to the implementation schedule, trail development, campground upgrades, accessibility improvements, parking and road improvements, signage, water systems, maintenance, and recreation monitoring and to exclude provisions for campground hosts or added amenities at campground host sites, and enhancements to trails, trailheads, or trail facilities that do not serve a project purpose.

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet for Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam (at Cisco Grove), South Yuba River below Lake Spaulding (at Lang's Crossing), and the Bear River at Highway 20, within one year of license issuance, as modified to include 15-minute interval reporting of streamflow information for the four reaches (Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam [at Cisco Grove], South Yuba River below Lake Spaulding at Lang's Crossing, and the Bear River at Highway 20)

[11] In some cases, we include a "Staff Alternative with Mandatory Conditions" that includes the mandatory conditions that are excluded from the Staff Alternative. Since there is not a significant difference between the Staff Alternative and Staff Alternative with Mandatory Conditions, we do not evaluate it as a separate alternative in this EIS.

where it is currently provided in 15-minute intervals and require submittal of the plan to the Commission for approval.

**Land Use and Aesthetic Resources**

- Modify the proposed Fire Prevention and Response Plan to include all project lands and to include a period of review and revision.

- Modify the Hazardous Substances Plan to apply to all project lands.

#### 2.3.1.2 Additional Measures Identified by Staff for the Upper Drum-Spaulding Project

In addition to the foregoing measures proposed by PG&E, as modified by staff, the staff alternative also includes the following additional measures identified by staff based on agency, tribal, and non-governmental organization recommendations and our analysis:

- Implement extreme critically dry water year type flows in the second year of two sequential critically dry years in three specified project-affected reaches.

- Develop and implement a Large Woody Debris (LWD) Management Plan that would monitor existing conditions and guide development of stream-reach and facility-specific management plans to pass LWD at project dams and diversions for protection and enhancement of downstream aquatic habitat.

- Develop and implement a Bear River Management Plan to assess riparian vegetation and bank stability conditions in the Bear River above the Drum afterbay on Forest Service lands that may be affected by high flow pulses during winter spills from Drum canal. As part of the plan, provide baseline and long-term monitoring of riparian vegetation, erosion and bank stability, and fixed geomorphic baseline channel transects.

- Modify measures to protect channel morphology and riparian vegetation of the Bear River upstream of Forest Service lands to include use of level loggers and monumented cross-sections.

- Provide additional summer flows to the South Yuba River below Lake Spaulding dam (Spaulding No. 1 and No. 2 Development) to manage water temperature for resident aquatic resources by implementing the Supplemental Flow Schedule specified by Forest Service condition 29.

- Establish Consultation Group to support implementation, review, and management of the South Yuba River supplemental flow releases below Lake Spaulding dam.

- Develop and implement a Jordan Creek Diversion Decommissioning Plan for the proposed removal of water diversion and transport structures that have not been used for project operations for many years.

- In lieu of funding California Fish and Wildlife for fish stocking, develop and implement a Fish Stocking Plan for the project to ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs (replaces PG&E's proposal to pay for fish stocking). The fish stocking plan would address annual stocking in Lake Spaulding, Lake Valley reservoir, Fuller Lake, and Lower Lindsey Lake; stocking every other year until the first Form 80 reporting year in Fordyce Lake and Meadow Lake, and includes provisions for stocking fish in additional project reservoirs (Carr, Culbertson, Feeley, Upper

Lindsey, Lower Rock, Upper Rock, Blue and White Rock Lakes, and Lake Sterling) based on monitoring of recreational use and angling pressure over the term of the new license.

### 2.3.2 Lower Drum Project

Under the staff alternative, the project would include PG&E's proposed environmental measures (see section 2.2.3.2), as modified below, and additional staff-recommended measures.

#### 2.3.2.1 PG&E Protection, Mitigation, and Enhancement Measures Modified by Staff

Our modifications to PG&E's proposed measures are shown below:

**Terrestrial Resources**

- Modify the proposed Vegetation Management Plan to extend management to accessible non-federal project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and include the protection of culturally significant plant species after consultation with the tribes.

- Prepare and implement a Wildlife Crossing Management Plan that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.

- Develop and implement an Avian Management Plan that includes provisions for raptor monitoring and protection.

- Incorporate proposed bat management measures into a Bat Management Plan.

**Land Use and Aesthetic Resources**

- Modify the proposed Fire Prevention and Response Plan to include all project lands and to include a period of review and revision.

- Modify the Hazardous Substances Plan to apply to all project lands.

#### 2.3.2.2 Additional Measures Identified by Staff for the Lower Drum Project

In addition to the foregoing measures proposed by PG&E, as modified by staff, the staff alternative also includes the following additional measures identified by staff based on agency, tribal, and non-governmental organization recommendations and our analysis:

- Develop and implement an Aquatic Benthic Macroinvertebrate Monitoring Plan consistent with Forest Service recommendation 3 to monitor effects of flow and operational changes on aquatic benthic community.

- Develop and implement Water Temperature and Stage Monitoring Plan consistent with Forest Service recommendation 2 to monitor effects of flow and operational changes on aquatic habitat.

- Develop and implement a fish stocking plan for the project to ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs. The fish stocking plan would address annual stocking in Halsey forebay, and includes provisions for stocking fish in additional project reservoirs, including Rock Creek, based on monitoring of recreational use and angling pressure over the term of the new license.

### 2.3.3 Deer Creek Project

Under the staff alternative, the project would include PG&E's proposed environmental measures (see section 2.2.3.1), as modified below, and additional staff-recommended measures.

#### 2.3.3.1 PG&E Protection, Mitigation, and Enhancement Measures Modified by Staff

Our modifications to PG&E's proposed measures are shown below:

**Terrestrial Resources**

- Modify the proposed Integrated Vegetation Management Plan to extend management to accessible non-federal project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and include the protection of culturally significant plant species after consultation with the tribes.

- Prepare and implement a Wildlife Crossing Management Plan that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.

- Develop and implement an Avian Management Plan that includes provisions for raptor monitoring and protection.

- Incorporate proposed bat management measures into a Bat Management Plan.

**Land Use and Aesthetic Resources**

- Modify the proposed Fire Prevention and Response Plan to include all project lands and to include a period of review and revision.

- Modify the Hazardous Substances Plan to apply to all project lands.

#### 2.3.3.2 Additional Measures Identified by Staff for the Deer Creek Project

The staff alternative does not include additional measures for the Deer Creek Project.

### 2.3.4 Yuba-Bear Project

#### 2.3.4.1 NID Protection, Mitigation, and Enhancement Measures Modified by Staff

The staff alternative incorporates NID's proposed environmental measures (see section 2.2.3.2, *Proposed Environmental Measures*), as modified by staff:

**Geology and Soils**

- Finalize the Clear and Trap Creeks Channel Stabilization Plan to include other potential erosion sites determined in consultation with the agencies and post-restoration monitoring to ensure that restoration activities have been successful and effective over time. Coordinate plan with Canal Release Point Plan.

**Aquatic Resources**

- Develop and implement an Aquatic Invasive Species Management and Monitoring Plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

**Terrestrial Resources**

- Modify the Integrated Vegetation Management Plan to extend management to accessible non-federal project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and include the protection of culturally significant plant species after consultation with tribes.

- Prepare and implement a Wildlife Crossing Management Plan that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.

- Develop and implement an Avian Management Plan that includes provisions for raptor monitoring and protection and LOPs for the protection of special-status birds and their habitat.

- Incorporate proposed bat management measures into a Bat Management Plan.

**Recreation Resources**

- Modify the Recreation Plan with regard to the implementation schedule, trail development, campground upgrades, accessibility, parking and road improvements, boat launches, water systems, and monitoring, and to exclude provisions for campground hosts or added amenities at campground host sites, and enhancements to trails, trailheads, or trail facilities that do not serve a project purpose.

- Provide reservoir storage information via the internet *year-round* for the following locations: Jackson Meadows reservoir; French Lake; Faucherie Lake; Sawmill Lake; Jackson Lake; Bowman Lake; and Rollins Lake (Measure YB-RR2).

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet for the Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam, within one year of license issuance, as modified to include 15-minute interval reporting of streamflow information for these reaches (Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam) where it is currently provided in 15-minute intervals and require submittal of the plan to the Commission for approval.

**Land Use and Aesthetic Resources**

- Modify the proposed Fire Prevention and Response Plan to include all project lands and to include a period of review and revision.

- Modify the Rollins upgrade construction hazardous materials spill prevention, control and countermeasure plan, to address spill prevention, control, and countermeasures for all project uses/activities on all project lands.

- Modify the recreation facilities construction hazardous materials spill prevention, control and countermeasure plan to address spill prevention, control, and countermeasures for all project uses/activities on all project lands.

#### 2.3.4.2 Additional Measures Identified by Staff for the Yuba-Bear Project

In addition to the foregoing measures proposed by NID, as modified by staff, the staff alternative also includes the following additional measures identified by staff based on agency, tribal, and non-governmental organization recommendations and our analysis:

- Implement extreme critically dry water year type flows in the second year of two sequential critically dry years for Bear River below the Rollins dam.

- Prepare and implement a LWD management plan to ensure passage of LWD at project dams and diversions to support downstream aquatic habitat, as necessary, including the Middle Yuba River below Jackson Meadows dam, Canyon Creek below Bowman dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins dam.

- Implement minimum streamflows below Fall Creek diversion dam to protect and enhance aquatic habitat.

- Develop and implement an aquatic benthic macroinvertebrate monitoring plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

- In lieu of funding California Fish and Wildlife for fish stocking, develop and implement a Fish Stocking Plan for the project to ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs (replaces NID's proposal to pay for fish stocking). The fish stocking plan would address annual stocking in Rollins reservoir, Jackson Meadows reservoir, Bowman Lake, and Faucherie Lake, stocking Sawmill Lake every other year until the first Form 80 reporting year after implementation of the plan, and also include provisions for stocking fish in additional project reservoirs (such as French Lake) based on changes in recreational use and angling pressure over the term of the new license.

## 2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

We considered several alternatives to the applicants' proposal, but eliminated them from further analysis because they are not reasonable in the circumstances of this case. They are: (1) issuing a non-power license; (2) Federal Government takeover of the project; and (3) retiring the project.

### 2.4.1 Issuing a Non-Power License

A non-power license is a temporary license that the Commission will terminate when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a non-power license, and we have no basis for

concluding that either project should no longer be used to produce power. Thus, we do not consider a non-power license a realistic alternative to relicensing the projects in this circumstance.

### 2.4.2 Federal Government Takeover of the Projects

We do not consider federal takeover of the Drum-Spaulding Project to be a reasonable alternative.[12] Federal takeover and operation of the project would require Congressional approval. Although that fact alone would not preclude further consideration of this alternative, there is no evidence to indicate that federal takeover should be recommended to Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

### 2.4.3 Retiring the Projects

Project retirement of either the Drum-Spaulding or Yuba-Bear Projects could be accomplished with or without dam removal. Either alterative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions. No participant has suggested that dam removal would be appropriate in either of these cases, and we have no basis for recommending it. Project reservoirs serve other important purposes, such as providing recreational opportunities, consumptive water supply, and flood control, regardless of whether power is produced. Thus, although we analyze PG&E's proposal to remove the Jordan Creek diversion dam as part of its licensing proposal, dam removal is not a reasonable alternative to relicensing either project with appropriate protection, mitigation, and enhancement measures.

The second project retirement alternative would involve retaining the dams and control structures and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This alternative would require us to identify another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated this alternative. Nor have we any basis for recommending it. Because the power supplied by the projects is needed, a source of replacement power would have to be identified. In these circumstances, although we analyze PG&E's proposal to retire the Alta powerhouse unit 2 as part of its licensing proposal, we do not consider removal of the electric generating equipment to be a reasonable alternative.

[12] Federal takeover is not applicable where the applicant, such as NID, is a state or municipal entity.

# 3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the resources in the vicinity of the existing Drum-Spaulding and Yuba-Bear Projects; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and other recommended environmental measures. Sections are organized by resource area (aquatic, recreation, etc.), and we first describe each resource's affected environment, which includes historic and current conditions. The existing condition is the baseline against which environmental effects of the proposed action and alternatives are compared. Next, we describe the environmental effects of the proposed projects, including an assessment of the effects of proposed protection, mitigation, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives.

Throughout this section, we refer to the Drum-Spaulding Project as PG&E's existing project, consisting of 12 developments. PG&E proposes to split the Drum-Spaulding Project into three, separately licensed projects, the Upper Drum-Spaulding (5 developments), Lower Drum (4 developments), and Deer Creek (1 development) Projects. We generally describe the resources associated with the Drum-Spaulding Project but, where necessary and appropriate, we discuss resources, proposed and recommended measures, and effects by the individual project. Given that agency comments and section 4(e) conditions were filed in reference to the Drum-Spaulding Project, it was necessary to exercise judgment in determining which conditions were applicable to the individualized projects.

Unless otherwise identified, the sources of our information are the license applications for the projects (PG&E, 2011a; NID, 2011a). We provide citations for information obtained from other sources, including subsequent filings related to the projects.

## 3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects are located on the western slope of the Sierra Nevada in northern California, within Nevada, Placer, and Sierra Counties. The Sierra Nevada Range is about 400 miles long and runs south-southeast to north-northwest in the eastern portion of California. The Sierra Nevada crest forms the eastern limit of the Yuba and Bear River basins and trends north-northwest. Drainage within the basins is west to southwest from the Sierra Crest to the adjacent floor of the Sacramento Valley. To the east of the basins, downfaulting of the eastern Sierra face has affected drainage evolution by creating channels that now have their headwaters facing east. The project areas include facilities ranging in elevation from about 435 feet msl at the Newcastle Development (Lower Drum Project) powerhouse to 7,840 feet msl at the White Rock Lake dam (Upper Drum-Spaulding Project). The projects are located in the Sacramento River Hydrologic Region of California. Portions of each project are located in the South Yuba River and Bear River Basins. In addition, some Yuba-Bear Project facilities are located in the Middle Yuba River Basin, and some Drum-Spaulding Project facilities are located in the North Fork of the American River Basin. The two projects are intimately interconnected at both upstream and downstream reaches.

Land within the basins has a patchwork of ownership. At the upper elevations above 3,000 feet, the Forest Service manages a majority of the land as part of Tahoe National Forest. Other land managers and owners above 3,000 feet include private corporations such as timber companies, NID, PG&E, and other private entities. Below 3,000 feet, land in the basins is predominantly privately owned, with small federally owned portions managed by the Forest Service as part of Tahoe National Forest, by the BLM as part of the Sierra Resource Management Area, and by Reclamation. The portions of land within the project areas managed by federal agencies are administered according to their respective resource management plans. The counties are the primary agencies for establishing land use policies for private land within the basins; County General Plans provide the land use policies for each county. In general,

most of the land in Placer, Nevada, and Sierra Counties near the projects is designated for timber, grazing, and open space uses. This is particularly true in the upper portions of the basins. At the lower elevations, the lands are more often designated by the counties for residential and agricultural uses.

The basins experience warm, dry summers and cool winters with precipitation falling generally as snow above 5,000 feet in elevation and as rain in the lower elevations. The National Weather Service maintains a monitoring station (no. 044713) located at Blue Canyon, California. Blue Canyon is at an elevation of 5,280 feet, which is roughly the elevation mid-point of the project vicinities. July air temperatures at Blue Canyon range from an average high of 77.3°F to an average low of 59.3°F. The average high temperature for January is 43.6°F, while the average low temperature is 31.3°F. The annual average high and low temperatures for Blue Canyon are 58.3°F and 42.9°F, respectively. Annual mean total precipitation at Blue Canyon is 69.89 inches, most of which (65 percent) occurs from December through March. The summer months of June through August produce 2 percent of the total annual average precipitation.

Distinct vegetation types in the vicinity of the projects are distributed along an elevation gradient creating bands with characteristic or dominant species. These bands somewhat overlap and intergrade with each other forming transition zones on their outer edges. Vegetation in the foothills is dominated by an overstory of gray pine and ponderosa pine, with a mixture of small stands of hardwoods and low-elevation chaparral shrubs. In riparian areas, black cottonwood, white alder, and valley oak are common. At mid-elevations, dominant vegetation includes incense cedar, Douglas fir, white fir, madrone and sugar pine, and significant stands of Brewer's oak, which occupy south-facing slopes and areas of annual grasslands. Chaparral species include whiteleaf manzanita, greenleaf manzanita, mountain whitethorn, wedgeleaf ceanothus, deerbrush, and poison oak. Riparian areas are dominated by white alders, maple, and willows. At higher elevations, the forested areas are dominated by incense cedar, red fir, white fir, and Jeffrey pine overstory, with lodgepole pines in moist soils in meadows and along shorelines. Black oak, willow, quaking aspen, and mountain alder are common deciduous trees and may form a subcanopy beneath the conifer overstory. Some areas are barren, devoid of vegetation due to rocky and steep terrain with little to no soil layer. The shrub layer is dominated by mountain whitethorn, huckleberry oak, pinemat manzanita, and bush chinquapin.

Including the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, there are 11 hydroelectric projects located in the Yuba and Bear River Basins (table 3-1). Additionally, there are two U.S. Army Corps of Engineers debris dams on the mainstem of the Yuba River. The more upstream facility is Englebright dam, which is located 24 miles upstream of the Yuba River's confluence with the Feather River. The dam forms the Corps' Englebright reservoir, which is about 9 miles long and has a usable storage capacity of about 70,000 acre-feet. Daguerre Point dam, which has no appreciable storage, is located 12.6 miles downstream of Englebright dam and 11.4 miles upstream of the Yuba River's confluence with the Feather River.

Table 3-1. Existing FERC-licensed water projects in the Yuba and Bear River Basins. (Source: NID, 2011a)

| FERC Project No. | Project Name | License Holder | Waterway | River Watershed | License Expiration Date | FERC Authorized Capacity (MW) |
|---|---|---|---|---|---|---|
| 1403 | Narrows | PG&E | Yuba River | Yuba | January 2023 | 12.00 |

Table 3-1. Existing FERC-licensed water projects in the Yuba and Bear River Basins. (Source: NID, 2011a)

| FERC Project No. | Project Name | License Holder | Waterway | River Watershed | License Expiration Date | FERC Authorized Capacity (MW) |
|---|---|---|---|---|---|---|
| 2246 | Yuba River | YCWA | Yuba River | Yuba | March 2016 | 361.90 |
| 3075 | Virginia Ranch Dam | BVID | Yuba River | Yuba | Exempt | 1.00 |
| 6780 | Deadwood Creek | YCWA | Deadwood Creek | Yuba | August 2038 | 19.63 |
| 5930 | Scotts Flat | NID | Deer Creek | Yuba | Exempt | 0.83 |
| 2266 | Yuba-Bear | NID | Yuba, Bear Rivers and tributaries | Yuba, Bear | April 2013 | 79.32 |
| 2310 | Drum-Spaulding | PG&E | South Yuba, Bear, North Fork American Rivers and tributaries | Yuba, Bear, North Fork American | April 2013 | 190.0 |
| 2981 | Lake Combie | NID | Bear River | Bear | Exempt | 1.50 |
| 7731 | Combie North Aqueduct | NID | Bear River | Bear | Exempt | 0.35 |
| 2997 | Camp Far West | SSWD | Bear River | Bear | June 2021 | 6.80 |
| 7580 | Vanjop No. 1 | SSWD | Bear River | Bear | Exempt | 0.42 |

BVID = Browns Valley Irrigation District
SSWD = South Sutter Water District

## 3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) (40 CFR section 1508.7), cumulative effects is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application and agency and public comments, we have identified water quantity and water temperature as having the potential to be cumulatively affected by the

proposed projects in combination with other past, present, and foreseeable future activities.[1] Cumulative effects on aquatic biota are primarily the result of factors affecting water quantity and temperature.

Other activities in the area that could interact with the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects to affect resources cumulatively include other hydroelectric projects and water diversions in the Yuba and Bear River Basins (section 3.1). Englebright reservoir receives flow from the North Yuba, Middle Yuba, and South Yuba Rivers and reregulates flows to the lower Yuba River. Under the Yuba River Accord[2] discharge to the lower Yuba River from Englebright reservoir via PG&E's non-project Narrows 1 (maximum capacity 730 cfs) and NID's Narrows 2 (maximum capacity 3,400 cfs) powerhouses and the Englebright dam low level outlet are managed primarily through releases from the New Bullards Bar dam via NID's non-project New Colgate powerhouse (maximum capacity 3,430 cfs) and to a lesser extent from the low level outlet. Daguerre Point dam downstream of Englebright dam has negligible storage due to accumulation of mining debris and minimal effect on flows in the Yuba River.

Flows in Mormon Ravine in the American River Basin are dominated by flows from the Lower Drum Project's Newcastle Development and cumulatively influence the size and persistence of the cold water pool in Folsom reservoir, in conjunction with other upstream hydroelectric projects and diversions from: (1) the Middle and North Fork American Rivers (Middle Fork American River Project [FERC No. 2079-069]); (2) Upper American River Project (FERC No. 2101); (3) Georgetown Divide Public Utility District's Stumpy Meadows Project (a non-FERC regulated project); (4) Foresthill Public Utility District's Sugar Pine Dam Project; (5) PCWA's Pulp Mill Canal Diversion Dam Project; and (6) PCWA's American River pump station. Operation of each of these projects is expected to be similar in the future compared to current operations.

Non-project diversions and withdrawals by other users affect instream flows in project-affected reaches. NID and PCWA are the two largest water providers with non-project diversions from project-affected reaches and canals. Recent demands for water years 2001-2009 were about 139,000 acre-feet for NID and 105,000 acre-feet for PCWA. Annual water demand is projected to increase to 171,000 acre-feet by 2032 and 201,000 acre-feet by 2062 for NID and 114,000 acre-feet by 2032 and 118,000 acre-feet by 2062 for PCWA. NID has significant delivery points: (1) below the Deer Creek powerhouse on the South Fork Deer Creek; (2) below the Bear River canal diversion dam on the Bear River; (3) from Rock Creek reservoir; (4) from South canal; and (5) from Auburn Ravine. Major PCWA delivery points are located: (1) below Alta powerhouse on the Little Bear River; (2) upstream of Halsey forebay from Bear River canal; (3) from Upper Wise canal upstream of Rock Creek reservoir; (4) from Wise forebay; and

[1] In Scoping Document 2, we identified water and aquatic resources as the resources that would be addressed in the cumulative effects analysis. Our evaluation of water quantity and temperature and their associated influence on aquatic biota captures those effects.

[2] The Yuba Accord is the collaborative agreement between YCWA and 18 state and federal agencies and non-governmental organizations that affect flows in the lower Yuba River form YCWA's Yuba River Project to benefit restoration of anadromous salmonids. The Yuba Accord is comprised of 3 primary components including: Fisheries Agreement (YCWA et al. 2007) with increased minimum streamflows to benefit wild salmon and steelhead; Water Purchase Agreement to transfer water for other users including environmental flows for the Sacramento-San Joaquin Delta; and seven Conjunctive Use Agreements to improve water supply through a comprehensive groundwater program.

(5) at several locations along South canal. NID's and PG&E's historical water rights for water delivery are senior to and hold priority over hydroelectric power generation. Consumptive water deliveries are made by PG&E to PCWA on a contractual basis. The Commission does not have jurisdiction over water rights or how an entity exercises their water rights. However, the protection, mitigation, and enhancement measures developed through this NEPA process would help minimize the cumulative effects of hydroelectric generation and consumptive water demand.

Timber harvesting, grazing, agriculture, and mining activities in these watersheds can also affect water quantity (rate and quantity of infiltration and runoff) and quality (including temperature, turbidity, and metal contaminant concentrations) in associated sub-basins and are outside of the Commission's authority to regulate. These activities affect channel and bank stability, size, diversity, and thickness of substrate material, and riparian vegetation and cover; regulated flows have the potential to exacerbate the effects of these activities on aquatic habitat and resources.

### 3.2.1 Geographic Scope

The geographic scope of the cumulative effects analysis defines the physical limits or boundaries of the proposed actions' effects on resources. Because the proposed actions would affect resources differently, the geographic scope for each resource may vary. During the scoping process we made the determination (Scoping Document 2) that the geographic scope for the cumulative effects on water quantity and temperature would extend generally from the headwaters of the various project waterbodies downstream to Englebright Lake on the South Yuba River, Our House dam on the Middle Yuba River, Lake Combie on the Bear River, and Folsom Lake on the American River. NMFS, California Fish and Wildlife, and Foothills Water Network commented that the draft EIS should have considered cumulative effects of the projects on the lower Yuba River below Englebright dam. In response to these comments, the geographic scope of the cumulative effects analysis of flow and water temperature has been expanded to include project interactions with non-project facilities in the Middle Yuba downstream of Our House dam, the North Yuba River, and the lower Yuba River downstream of Englebright dam.

### 3.2.2 Temporal Scope

The temporal scope of our cumulative analysis in the EIS includes past, present, and future actions and their possible cumulative effects on each resource. Based on the license terms, the temporal scope looks 30 to 50 years into the future, concentrating on the effect of reasonably foreseeable future actions on the resources. We consider the baseline as existing conditions at the time of relicensing. The historical discussions are, by necessity, limited to the amount of available information for each resource. We developed the resource baseline conditions using information provided in the license application, agency comments, and comprehensive plans.

## 3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the specific cumulative and site-specific environmental issues.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EIS. Based on this, we have determined that geology and soils; aquatic resources; terrestrial resources; threatened and endangered species; recreation resources; cultural resources; and land use and aesthetic resources may be affected by the proposed action and action alternatives. We present our recommendations for the proposed action and action alternatives in

sections 5.1.2, 5.2.2, 5.3.2, and 5.4.2, *Comprehensive Development and Recommended Alternative*, for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, respectively.

### 3.3.1 Geology and Soils

#### 3.3.1.1 Affected Environment

##### 3.3.1.1.1 Geologic and Physiographic Setting

The existing Drum-Spaulding and Yuba-Bear Projects are sited within eight major geologic formations, which affect surficial processes, erodibility, and drainage development: Shoofly and Calaveras formations, Bowman Lake and Sierra Nevada batholiths, Yuba River pluton, Smartville complex, Valley Springs formation, and the Mehrten formation. Bedrock geology within the project vicinity is mainly composed of Paleozoic metasediments and metavolcanics (i.e., Shoofly and Calaveras formations), Paleozoic and Mesozoic granitic rocks (i.e., Bowman Lake and Sierra Nevada batholiths and Yuba River pluton), and a Mesozoic ophiolite complex (i.e., Smartville complex). Younger bedrock geology within the project vicinity includes Eocene marine rocks and Eocene auriferous sediments (i.e., Tertiary river gravels) deposited by the ancestral Yuba River. Other Tertiary units present include Miocene-Pliocene rhyolites, rhyolitic sediments (i.e., Valley Springs formation), and andesitic lahars (i.e., Mehrten formation) that cap some ridgetops. Much of the higher-elevation terrain underlain by Mesozoic granitic rocks has been overridden by ice.

The major physiographic feature within the project vicinity is the Sierra Nevada Range, which is about 400 miles long and runs south-southeast to north-northwest in the eastern portion of California. The Sierra Nevada crest forms the eastern limit of the Yuba and Bear River Basins and trends north-northwest. Drainage within the Yuba and Bear River Basins is west to southwest from the Sierra Crest to the adjacent floor of the Sacramento Valley. To the east of the basins, down faulting of the eastern Sierra face has affected drainage evolution by creating channels that now have their headwaters facing east.

Uplifting and tilting of the Sierra Block reorganized drainage networks and initiated a period of sustained channel incision, and many of the modern river channels have elevations below Tertiary-age river channels. The ancestral (Tertiary Period) Yuba River had cut about 1,000 feet below a surface defined by San Juan, Washington, and Harmony ridges. These ancestral deep channels drained north-northwest across the strike of the modern drainages. The south branch of the ancestral Yuba River flowed north from Gold Run to Badger Hill, then southwest to Smartsville and Marysville. The ancestral channels were filled first by very coarse, boulder material rich in gold, followed by finer gravel and sand deposits, also rich in gold. These Tertiary gravel deposits are the source of the gold extensively mined in the late 1800s.

Tertiary channels/gravels were buried by rhyolitic and andesitic volcanics, then severely eroded and exposed by deep fluvial incision. The modern Yuba and Bear Rivers began incising 5 million years ago. Modern foothill channels strike perpendicular to the ancestral channels and have downcut, leaving the deposits of the ancestral channels as upland gravels.

The basins were also affected by extensive Quaternary Period glacial erosion. Pre-glacial Bear River headwaters were captured by the South Yuba River in response to ice-damming of the upper Bear River, probably during maximum glacial advance, making the upper Bear River a glacial trough filled with outwash. Today, outwash deposits extend downstream from Bear Valley and grade into coarse channel lag gravel and boulders upstream of Drum powerhouse. The South Yuba Gorge truncates the Bear Valley trough at its upper end, which has isolated the Bear Valley from substantial sediment or hydrologic input.

The modern Yuba and Bear River Basins drain the northwestern Sierra Nevada via a series of deep canyons separated by high, steep-sided ridges and a parallel drainage network. The parallel drainage network results in narrow ridges between small tributaries, small tributary watersheds, and low tributary sediment loads under natural conditions; prehistoric debris fans at tributary junctions were not common. Stratigraphic evidence indicates the presence of stepped, Quaternary Period terraces similar to piedmont channels flowing out of the Sierra Nevada, but these terraces were generally buried by debris and sediment associated with mining activities. Downcutting, as noted specifically in the Bear River, through the relatively soft Paleozoic metamorphic rock (Shoofly Complex) has created a deep, v-shaped canyon where short, steep-sided tributary drainages are typical. Distinctive v-shaped inner gorge areas are common in all of the major drainages in the vicinity of the projects.

**Seismicity**

The projects are in an area of low to moderate seismicity, with most seismic activity concentrated east and southeast of the project areas near Lake Tahoe and to the northwest of the project areas, south of Lake Oroville. Expected seismic shaking intensities within the projects area from these nearby faults are considered to be low.

A number of north-to-northwest trending faults cross the projects, most of which are associated with the Foothills Fault System. Among the more significant faults are the Grass Valley Fault, the Melones Fault Zone, the Big Bend/Wolf Creek Fault Zone, the Giant Gap Fault, and the Camel Peak Fault Zone. None of the mapped faults within the project areas has been active in Quaternary time. A portion of the Giant Gap fault south of the projects is designated as having been active in Quaternary time. The nearest active fault (defined by the California Geological Survey as movement within the past 11,400 years) is the Cleveland Hill Fault located to the northwest of the projects near Lake Oroville; that fault had recorded movement in 1975. Other active faults are located to the east and southeast of the projects near Lake Tahoe.

#### 3.3.1.1.2 Reservoir Shorelines

**Erosion Sites**

Sites for erosion evaluation in the project areas were selected based on their potential to affect aquatic resources of concern (water quality and biota), project infrastructure, public and private access, and public health and safety. The majority of the projects' reservoir shorelines are composed of bedrock, sand, and rock fragments up to the high-water surface elevations of the reservoirs. Water lines are visible along bedrock shorelines in many of the reservoirs when water levels are lowered, reflecting the various stages of operation in the reservoirs. Above the high-water line, tree vegetation dominates the shorelines and the landscape, much of which is evergreen. Similar vegetation also exists on rock outcroppings that form small islands in some of the reservoirs. With the exception of Rollins reservoir (Yuba-Bear Project), reservoir shorelines are free of residences.

Reservoirs throughout the watershed are generally not at risk of shoreline erosion because they are composed of bedrock and/or have gently sloping shorelines, and most reservoirs do not experience daily water levels fluctuations that would threaten slopes. The forebays that are off-channel fluctuate daily but turbid releases have not been reported as an issue or observed by PG&E or NID. In a few isolated areas, trees may have fallen into the reservoirs. These trees are gathered by PG&E and NID at a log boom or during reservoir maintenance and piled offsite or burned in piles. Judging from the small amounts of debris pulled from the reservoirs (discussed in the LWD section of section 3.3.1.1.3, *Project-affected Stream Reaches*, below), debris removal and disposal are infrequent. Shorelines are considered stable on all project reservoirs.

**Sediment Deposition**

Alluvial deposits have accumulated in some of the projects' larger reservoirs (e.g., Lake Spaulding [Upper Drum-Spaulding Project] and Rollins reservoir [Yuba-Bear Project]), though this deposition has not required PG&E and NID to dredge or otherwise remove sediment from any project reservoirs or to modify operations of the projects.

Prior to relicensing, PG&E and NID performed bathymetric surveys of the projects' larger reservoirs. Table 3-2 provides an estimate of rate of sedimentation in these reservoirs based on the applicants' recent bathymetric surveys as compared to as-built drawings. Changes in volume are based on as-built surveys, and the accuracy of these surveys cannot be independently verified. In some cases, the calculated sedimentation rate is close to the "noise" of the uncertainty due to accuracy of the as-built data.

None of the deposition rates in table 3-2 is high compared to selected reservoirs in the U.S., in which the loss of storage ranged from 0.9 to 60.2 percent, and the median was 9.4 percent. As a regional comparison, the Corps' Englebright reservoir, with over 461 square miles of drainage, accumulated 17,750 acre-feet of sediment (4.5 percent) over 61 years, which results in a deposition rate of 0.6 acre-feet per square mile per year. Jackson Meadows reservoir (Yuba-Bear Project), Dutch Flat afterbay (Yuba-Bear Project), and Rollins reservoir (Yuba-Bear Project) are on the high end of the regional sedimentation rate, but not as compared to a wide range of reservoirs nationwide. Mining sediments have accumulated in Rollins reservoir, which contributes to a higher deposition rate, and Drum afterbay (Yuba-Bear Project) was affected by sediment delivered due to a flume failure in 1986. There are wide variations in rates of sediment production and reservoir sedimentation within physiographic provinces, so there is no defined "typical" rate. Also, as stated above, PG&E and NID have not dredged nor otherwise removed sediment for any project reservoir.

**Sediment Delivery**

Besides the projects' roads and trails that are discussed below, there are no known potential major upland sources of sediment or erosion, such as slope failures or mass wasting areas, associated with the projects. Recreation facilities, particularly in more gently sloping areas, have the potential to contribute sediment from surface erosion, although their surface area is negligible in comparison to the size of the watershed.

In 2008 and 2009, PG&E and NID inspected 70 discrete Primary Project Roads or Trails segments encompassing 57 miles of road and 4 miles of developed trail. The applicants assessed the condition of all road features (e.g., surface, water crossings, culverts, bridges, and drainages) to determine if the road or trail met appropriate maintenance levels, and noted any environmental damage, such as excessive erosion or bank instability. More than 1,200 discrete features were identified, including 204 water crossings and 289 drainage features (e.g., culverts, drainage ditches). Systematic analysis of attribute data, including condition, maintenance requirements, and erosion potential, was used to establish a ranking process applicable to both discrete features and entire road segments. Each road segment was ranked as "excellent," "good," or "poor."

Nineteen segments (about 30 percent) of the Primary Project Roads were ranked as "poor," generally because of the condition of water crossings (e.g., undersized), drainage features (e.g., damaged culvert), or environmental damage (e.g., surface erosion and sedimentation at culvert outlet). Table 3-3 lists these 19 road segments, including length, overall erosion risk, and identified problem. All of the Primary Project Trails were ranked as being in "good" condition.

Table 3-2. Sedimentation deposition in the larger reservoirs of the Upper Drum-Spaulding, Lower Drum, and Yuba-Bear Projects. (Source: PG&E, 2011a; NID, 2011a)

| Reservoir | Contributing Drainage Area ($mi^2$) | In-Service Year | Years Between Service Data and Bathymetric Survey | Gross Storage (ac-ft) | | Difference | | Rate of Deposition ($ac\text{-}ft/mi^2/yr$) |
|---|---|---|---|---|---|---|---|---|
| **UPPER DRUM-SPAULDING ROJECT** | | | | | | | | |
| Blue | 0.24 | 1875 | 134 | Unknown | 4,042 | Unknown | Unknown | Unknown |
| Fordyce Lake | 31.7 | 1864 | 145 | 50,073 | 49,525 | -548 | -1.10% | 0.1 |
| Lake Valley | 4.54 | 1887 | 120 | 7,964 | 7,902 | -62 | -0.80% | 0.1 |
| Lake Spaulding | 118 | 1912 | 96 | 75,034 | 75,912 | 878 | 1.20% | * |
| **LOWER DRUM PROJECT** | | | | | | | | |
| Rock Creek | 2.17 | 1916 | 91 | 548 | 485 | -63 | -11.50% | 0.3 |
| **YUBA-BEAR PROJECT** | | | | | | | | |
| Jackson Meadows | 37.6 | 1965 | 42 | 69,205 | 67,435 | -1,770 | -2.60% | 1.1 |
| Bowman Lake | 10.7 | 1928 | 81 | 68,510 | 68,363 | -147 | 0.20% | 0.2 |
| Dutch Flat afterbay | 9.2 | 1965 | 42 | 2,037 | 1,397 | -640 | -31.40% | 1.7 |
| Rollins | 104 | 1965 | 42 | 65,988 | 58,682 | -7,306 | -11.10% | 1.7 |

Table 3-3. Upper Drum-Spaulding and Yuba-Bear Projects roads with identified erosion problems. (Source: PG&E, 2011a; NID, 2011a)

| Road Name | Length (miles) | Overall Erosion Risk | Average Road Width (feet) | Road Surface Treatment | Overall Road Condition | Identified Problems |
|---|---|---|---|---|---|---|
| **UPPER DRUM-SPAULDING PROJECT[a]** | | | | | | |
| Lower Peak Road | 0.4 | High | 12 | Native Rock | Poor | Erosion/several hazard trees |
| Lang's Crossing Spillway Road | 0.6 | Medium | 20 | Native Rock | Poor | Erosion |
| Drum Canal Access Road | 1.7 | Medium | 12 | Gravel/Native Rock | Poor | Erosion |
| PG&E Road | 1.2 | Low | 13 | Paved/Gravel | Poor | Erosion |
| Drum Canal Road | 1.7 | Low | 13 | Gravel/Rock | Poor | Erosion |
| Pittman Spill Channel North | 1.8 | High | 12 | Native Rock | Poor | Erosion/Landslide |
| Pittman Spill Channel South | 1.5 | High | 12 | Native Rock | Poor | Erosion/Landslide |
| Boardman Canal/PG&E Canal Road | 0.2 | High | 12 | Native Rock | Poor | Erosion |
| Drum No. 3 Penstock Access | 1.0 | High | 11 | Native Rock | Poor | Erosion |
| Downstream End of Little Tunnel | 2.2 | High | 12 | Native Rock | Poor | Erosion/Landslide |
| Telephone House Road | 0.7 | High | 12 | Native Soil | Poor | Erosion |
| Downstream Steephollow | 1.4 | High | 11 | Native Rock | Poor | Erosion |
| Chalk Bluff Spur Road | 0.8 | High | 12 | Native Soil | Poor | Erosion/Landslide |
| Drum Power House | 4.4 | High | 14 | Paved | Poor | Erosion/Landslide/ Blind Spots |
| 13 Mile Spill | 2.1 | Medium | 13 | Gravel Rock | Poor | Erosion/Landslide |

Table 3-3. Upper Drum-Spaulding and Yuba-Bear Projects roads with identified erosion problems. (Source: PG&E, 2011a; NID, 2011a)

| Road Name | Length (miles) | Overall Erosion Risk | Average Road Width (feet) | Road Surface Treatment | Overall Road Condition | Identified Problems |
|---|---|---|---|---|---|---|
| **YUBA-BEAR PROJECT** | | | | | | |
| Bowman-Spaulding Berm Road | 0.8 | Medium | 10 | Native Rock | Poor | Erosion/Landslide |
| Chicago Park Forebay Road | 1.7 | High | 13 | Gravel/Rock | Poor | Erosion |
| Chicago Park Forebay Road | 0.6 | High | 14 | Gravel/Rock | Poor | Landslide |
| French Lake Road | 2.1 | Medium | 12 | Native Rock | Poor | Erosion |

[a] With the separation of the Drum-Spaulding Project into the three separate projects, all of the project roads included under the Drum-Spaulding Project are part of the Upper Drum-Spaulding Project.

#### 3.3.1.1.3 Project-affected Stream Reaches

Project-affected stream reaches are generally carved into steep canyons and are frequently characterized by exposed bedrock. Peak streamflows, which typically occur from snowfall runoff, continue to carve the streambeds into bedrock, and channel substrate generally consists of various sizes of rock fragments, boulders, and bedrock. Channel gradients are also relatively steep, up to and exceeding 10 percent in some localized areas.

Most stream channels are characterized by a coarse bed dominated by gravel- to cobble-size material, with low width-to-depth ratio, moderate to high slopes in relatively straight channels that may be either unconfined or confined. Channels often lack rhythmic bedforms, though flow obstructions such as boulders, bedrock outcrops, and LWD may force local pool and bar formation. Sediment supply is attendant on parent material, localized bank and hillslope failures, mobilized terrace material through side channel development, historic and current mining activities, and occasionally surface erosion.

There are large mining sediment deposits in most of the stream reaches affected by both projects to the west of Highway 80 that continue to affect the location of the stream and the riparian corridor by creating immobile channel boundaries and conditions that are not conducive to riparian colonization. For example, large deposits removed from the channel and placed alongside the channel inhibit riparian growth and channel migration (e.g., South Yuba River near Poorman Creek, Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development). Another example is the large amount of hydraulic mining debris (that does not hold water) that fills valleys (e.g., Bear River below Dutch Flat afterbay [Yuba-Bear Project, Chicago Park Development]). The size of material deposited in the channel during flood events, and material remaining after winnowing of finer material, often greatly exceeds the dominant channel flow competence (i.e., sediment mobility during regulated median and high flows), and only the finer particles are mobile at the frequently occurring flows. The lack of finer material and spawning gravel in most stream reaches and the mobility of the finer material and spawning gravel suggest that the transport capacity exceeds the availability of finer material and spawning-sized gravel particularly in stream reaches heavily impacted by legacy mining debris.

High-energy flow events, such as floods in 1986 and 1997, are important as "reset" mechanisms in most project-affected stream reaches and work in combination with the effects of legacy mining debris. For example, in the South and Middle Yuba Rivers, the 1997 event exceeded 30,000 and 20,000 cfs respectively, which is an 18- and 22-year recurrence interval (based on mean daily annual peaks). Figure 3-1 shows examples of the influence of major storm events on hydrographs of four project-affected stream reaches: Canyon Creek below Bowman Lake dam (Yuba-Bear Project, Bowman Development), Middle Yuba River above Wolf Creek (Yuba-Bear Project, Bowman Development), North Fork of the North Fork American River below Lake Valley canal diversion dam (Drum-Spaulding Project, Drum No. 1 and No. 2 Development), and Bear River at Highway 20 (Drum-Spaulding Project, Drum No. 1 and No. 2 Development) in Bear Valley. The blue lines represent unregulated estimates of what the hydrograph would look like with no regulation, and the red lines are the observed values (the Middle Yuba River above Wolf Creek had no gage, so values are hydrologic model estimates) representing regulated conditions at these same locations. The 1986 and 1997 flows were substantial in the Middle and South Yuba and the Bear River drainages west of Highway 80. In the case of the Bear River, 400 cfs was exceeded six times between 1993 and 2004. The gage for this site is very near the headwaters and most of this flow has historically been delivered from Drum canal because Bear River is periodically used as a conveyance reach to deliver water for both projects to Drum afterbay. In the North Fork of the North Fork American River, which is east of Highway 80, large events (though much lower than unregulated estimates) were observed in 1995, 1996, and 2002; the gage was out of service for the 1997 event. Unregulated synthesized data indicate that the water years of 1980, 1982, 1986, and 1997 likely influenced the drainages to the east of Highway 80, in addition to the observed 2002 event.

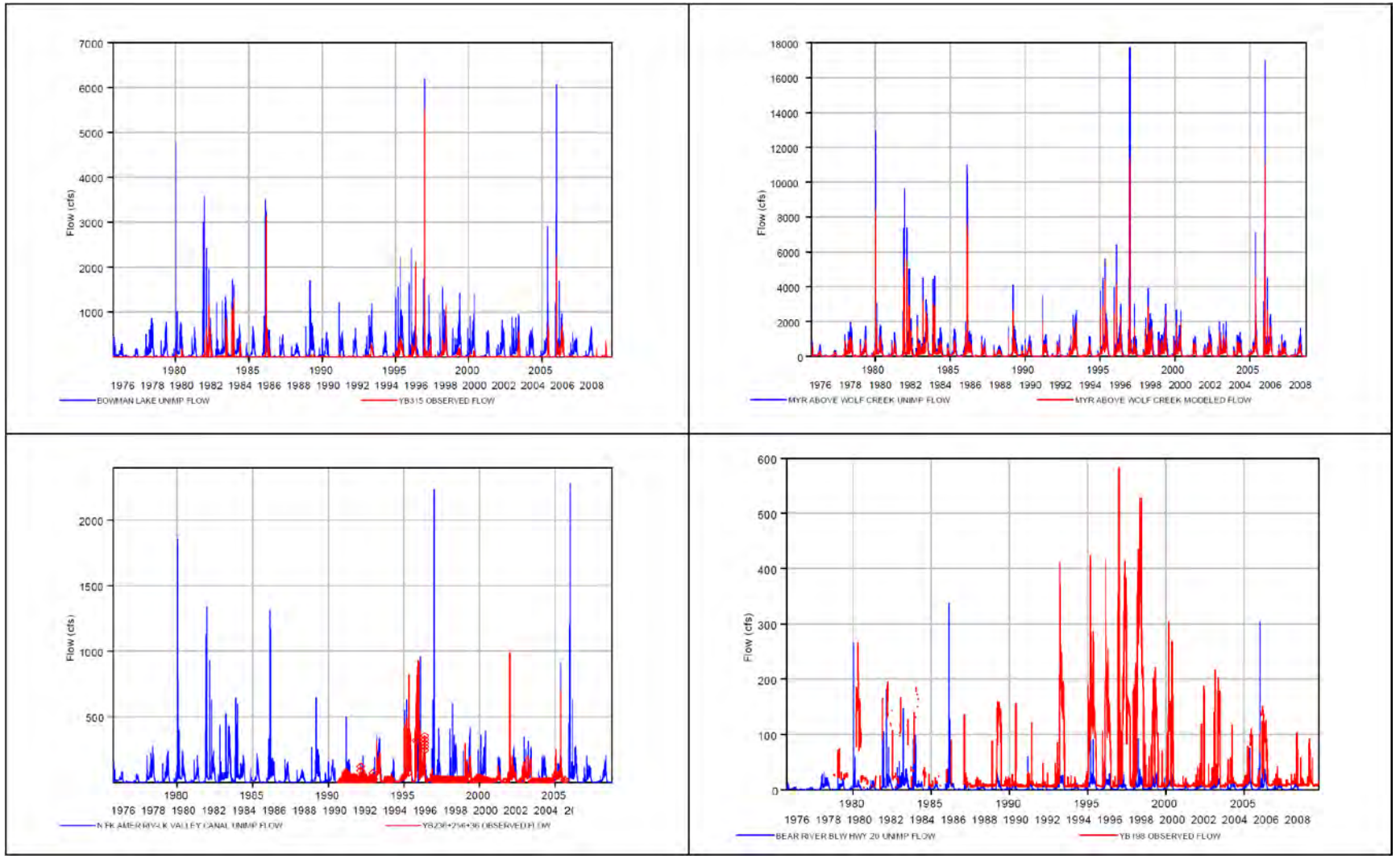


Figure 3-1. Examples of hydrographs of storm events in the area affected by the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects. Upper left is Canyon Creek at Bowman Lake, upper right is Middle Yuba River above Wolf Creek, lower left is North Fork of the North Fork American River at Lake Valley canal diversion, and lower right is Bear River at Highway 20 (blue is unregulated [unimpaired], red is observed/modeled). (Source: PG&E, 2011a; NID, 2011a)

**Bankfull and Flood Discharges**

Regulated bankfull discharge return intervals in the stream reaches studied by PG&E and NID ranged from less than 1 up to 3 years (table 3-4), which is low compared to the range of return intervals of channel-forming flows (bankfull) in stable channels. However, the return interval is based on a relatively short period of record, and the peaks are dampened by using the mean annual daily peaks (i.e., lower values occur more frequently relative to higher values). Under regulated conditions, the first depositional surfaces that the streams encounter (also known as the "first break") were at approximate recurrence intervals of less than 1 year to 29 years, with a median of about 1.5 years, which is closer to the range determined by researchers for bankfull discharge in stable channels. The estimated recurrence interval for regulated and unregulated floodprone discharge ranged from less than 2 years to over 500 years. This wide range is due not only to the difficulty in identifying bankfull depth in this morphologic setting, but also to the importance of flood events (e.g., the 1997 flood as a "reset" mechanism that created large deposits within and adjacent to the channel). Additionally, the recurrence interval is based on only 33 years of data and is based on the mean daily annual peaks. Floodprone surfaces have a greater probability of being inundated under unregulated relative to existing conditions. However, floodprone surfaces are based on maximum bankfull depth, which would likely be different under unregulated conditions, so the surfaces may not be "formed" at the same elevation. Floodprone return frequency would then be different; it is not just a matter of comparing the hydrology between regulated and unregulated conditions, but also a matter of the hydrological effect on channel morphology. It is a somewhat iterative process and there is inertia in the system (i.e., there may be a shift in hydrology but the change in hydrology has not yet caused a change in morphology).

**Sediment Transport**

PG&E and NID found that the majority of channel morphology study sites evaluated are characterized by large substrate, vertical confinement, low bank erodibility, and low fine sediment accumulation (PG&E and NID, 2011b). These conditions are indicative of low sediment supply relative to transport capability, which is common in steeper Sierra Nevada streams. PG&E and NID also evaluated the mobility of the substrate and trout spawning gravels at 25- and 50-percent exceedance flows under regulated and unregulated conditions. The study determined that flow regulation does not often change the frequency with which the median bed particle size would be mobilized under unregulated flow conditions. The larger particles within the cross sections were rarely mobile under 25- and 50-percent exceedance conditions for either regulated or unregulated conditions. Generally, the larger material in the channel exceeds the dominant channel flow competence (i.e., sediment mobility during regulated median and high flows). Only the smaller particles were mobile under regulated or unregulated conditions and were slightly more mobile under regulated conditions.

In evaluating individual cross sections, there was no change in the mobility of the median particle size in 47 of 49 cross sections under 50-percent exceedance flow conditions, and 41 of 49 transects under 25-percent exceedance flows. Under 50-percent exceedance flow, particles were more mobile under unregulated conditions in two cross sections. With 25-percent exceedance flows, median particles were more mobile under regulated conditions in five cross sections and under unregulated conditions in three cross sections.

Table 3-4. Bankfull, first break, and floodprone estimated discharges, and recurrence intervals (based on modeled mean daily annual maximums [1976-2008]) for regulated and unregulated conditions. (Source: PG&E, 2011a; NID, 2011a)

| Site | Transect | Bankfull | | First Break | | Floodprone | |
|---|---|---|---|---|---|---|---|
| | | Discharge (cfs) | Recurrence Interval Regulated/ Unregulated (years) | Discharge (cfs) | Recurrence Interval Regulated/ Unregulated (years) | Discharge (cfs) | Recurrence Interval Regulated/ Unregulated (years) |
| **UPPER DRUM-SPAULDING PROJECT** | | | | | | | |
| Fordyce Lake dam stream reach | T7 | 207 | 1/<1 | 311 | 1.2/1 | 1,390 | 3/2 |
| | T13 | 254 | 1/1 | 371 | 1.2/1 | 5,466 | 70/13 |
| | T19 | 614 | 1.5/1.2 | bankfull | 1.5/1.2 | 6,308 | 149/18 |
| Bear River reach #2, meadow sub-reach | LM2 | 68 | <1/2.7 | bankfull | <1/2.7 | 356 | 12 |
| | MM5 | 185 | 1.5/9.2 | bankfull | 1.5/9.2 | 2,545 | >500 |
| | UM2 | 78 | <1/3 | bankfull | <1/3 | 944 | >500 |
| Lake Valley reservoir dam stream reach | T5 | 63 | 1.1/1 | bankfull | 1.1/1 | 876 | 66/9 |
| | T6 | 80 | 1.2/1 | bankfull | 1.2/1 | 1,655 | >500/30 |
| | T7 | 24 | <1/<1 | 84 | 1.2/1 | 240 | 3/2 |
| | T13 | 14 | <1/<1 | 168 | 1.5/1.4 | 1,318 | 269/18 |
| **UPPER DRUM-SPAULDING AND YUBA-BEAR PROJECTS** | | | | | | | |
| Jackson Meadows dam stream reach | T1 | 486 | 2.5/1.3 | bankfull | 2.5/1.3 | 6,538 | 114/31 |
| | T11 | 536 | 2.71.4 | bankfull | 2.7/1.4 | 6,251 | 98/29 |
| Milton diversion dam stream reach | T1 | 554 | 1.1/1 | 1,275 | 1.6/1.3 | 8,533 | 15/9 |
| | T3 | 297 | 1.05/1 | 1,157 | 1.5/1.3 | 6,515 | 11/6 |
| | T6 | 206 | 1.01/<1 | 1,524 | 1.9/1.4 | 3,156 | 2.8/2 |

Table 3-4. Bankfull, first break, and floodprone estimated discharges, and recurrence intervals (based on modeled mean daily annual maximums [1976-2008]) for regulated and unregulated conditions. (Source: PG&E, 2011a; NID, 2011a)

| Site | Transect | Bankfull | | First Break | | Floodprone | |
|---|---|---|---|---|---|---|---|
| | | Discharge (cfs) | Recurrence Interval Regulated/ Unregulated (years) | Discharge (cfs) | Recurrence Interval Regulated/ Unregulated (years) | Discharge (cfs) | Recurrence Interval Regulated/ Unregulated (years) |
| Faucherie Lake dam stream reach | T7 | 127 | 1.3/1.1 | 1,532 | 29/22 | 5,973 | >500/>500 |
| | T15 | 144 | 1.4/1.1 | 466 | 3.8/2.7 | 3,274 | 305/162 |
| | T18 | 36 | 1.0/<1 | 338 | 2.6/2 | 875 | 10/7 |
| Bowman-Spaulding diversion dam stream reach | T3 | 141 | 1.1/<1 | 223 | 1.2/1 | 1,792 | 14/3 |
| | T7 | 188 | 1.1/1 | 942 | 4/2 | 2,062 | 19/4 |
| | Gage | 250 | 1.6/1 | bankfull | 1.6/1 | 700 | 3.5/1.5 |
| Dutch Flat afterbay dam stream reach | T4 | 183 | 3/1.3 | 292 | 2.5/1.5 | 2,199 | 3.5/7 |
| | T13 | 189 | 3/1.3 | bankfull | 3/1.3 | 1,962 | 25/6 |
| | T18 | 86 | 1.5/1.1 | bankfull | 1.5/1.1 | 617 | 4/2 |
| **LOWER DRUM AND YUBA-BEAR PROJECTS** | | | | | | | |
| South Yuba reach #4 | T6 | 258 | 1.0/<1 | bankfull | 1.0<1 | 3,693 | 2.4/1 |
| | T14 | 282 | 1.0/<1 | 759 | 1.2/<1 | 4,961 | 2.8/1.5 |
| | T16 | 195 | 1.0/<1 | 332 | 1.0/<1 | 1,910 | 1.6/1 |
| Bear River canal diversion dam stream reach[a] | T1 | 1,180 | 1.5/1.5 | bankfull | 1.5/1.5 | 2,960 | 2.5/2.5 |
| | T2 | 1,250 | 1.5/1.5 | bankfull | 1.5/1.5 | 3,650 | 2.8/2.8 |
| | T3 | 650 | 1.2/1.2 | bankfull | 1.2/1.2 | 2,100 | 2/2 |

[a]With the separation of the Drum-Spaulding Project into the three projects, the transects in the Bear River Canal diversion dam stream reach that were part of the Drum-Spaulding Project are now part of the Lower Drum Project.

There were some differences between regulated and unregulated conditions in the mobility of trout spawning-sized gravels. Trout spawning gravels were mobile at 18 of 25 transects evaluated at the channel morphology study sites. Gravels were mobile at slightly more transects under regulated conditions for both median (50-percent exceedance) and high flows (25-percent exceedance). Of 25 transects, 17 demonstrated no change in trout spawning gravel mobility under regulated conditions as compared to unregulated flow conditions. In seven transects, median-sized trout spawning gravels were more mobile under regulated flow conditions, and in one transect the gravels were more mobile under unregulated conditions.

**Channel Stability**

Sediment supply and vertical and lateral stability were assessed for each project-affected stream reach (PG&E and NID, 2011c). Of the 94 evaluated stream reaches affected by these projects, including the mainstems of the Middle and South Yuba Rivers, 68 had low sediment supply and little lateral or vertical instability. These stream reaches are stable in their current form and location due to bedrock control of bed and banks, and resistant parent material that is not easily eroded and provides limited quantities of sediment material; as a result, they are considered transport stream reaches (i.e., steep channels, dominated by non-depositional processes). Twelve of the remaining stream reaches had a moderate, intermittent sediment supply (i.e., short sections where banks are eroding occasionally, separated by long sections of banks that are not eroding), where some depositional characteristics occur.

Specific sediment inputs and/or stability issues were identified in 15 project-affected stream reaches, described below. These sediment sources are from local bank failures and upstream events such as erosion in project spill channels. Channel stability analysis was also performed for 6 of 15 of these stream reaches (PG&E and NID, 2011b). These six stream reaches with data to evaluate channel stability are more fully described below for specific sediment sources: Fordyce Creek below Fordyce Lake dam (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development), Bear River reach #2 above Drum afterbay (Meadow sub-reach; Upper Drum-Spaulding Project, Drum No. 1 and No. 2 Development), Middle Yuba River below Jackson Meadows dam (Yuba-Bear Project, Bowman Development), Canyon Creek below Faucherie Lake dam (Yuba-Bear Project, Bowman Development), Canyon Creek below Bowman-Spaulding diversion dam (Yuba-Bear Project), and Bear River below Dutch Flat afterbay dam (Yuba-Bear Project, Chicago Development). The type and location of erosion and deposition in the channel and within the riparian zone and the ability of the channel to withstand lateral or vertical movement were used to assess bank and channel stability.

**Upper Drum-Spaulding Project**

*Texas Creek below Lower Rock Lake Dam (Reach #1) (Spaulding No. 3 Development)*

Lower Rock Lake dam stream reach is a 3.6-mile-long section of Texas Creek between Lower Rock Lake dam (elevation 6,622 feet msl) and Lindsey Creek (elevation 5,800 feet msl). The channel is shallow and mostly confined between moderate slopes composed of non-cohesive glacial and colluvial material. Coarse boulder and smaller-sized material are stored in the main channel and the dynamic, somewhat narrow riparian zone vegetated by mountain alder. Just below Bowman Road, there is a 310-foot-long, 10-foot-high exposed and eroding bank from a Bowman Road failure. The stream has widened and split, but vegetative recovery is narrowing the exposed channel. The toe of the slope is somewhat protected by boulders and LWD with rootwads that protect the slope and store material. These eroding banks may be a source of spawning-sized gravels, because despite an average gradient of 5 percent, there are 65 square feet of spawning-sized gravel deposits (many stream reaches in the area lack any gravel deposits).

*Fordyce Creek below Fordyce Lake Dam (Spaulding No. 1 and No. 2 Development)*

Fordyce Lake dam stream reach is a 10.5-mile-long reach between Fordyce Lake dam (elevation 6,400 feet msl) and Lake Spaulding (elevation 5,040 feet msl). About 78 percent of the channel has about a 1.8 percent gradient, but there are short sections at and above 4 percent. The channel flows through thinly vegetated mature forest and shrubs on granite bedrock. The granite bedrock is generally resistant to erosion, but there are some sources of sand in the reach that have resulted in sandy deposits in the deeper sections of the channel. Most of the channel is entrenched within bedrock, and laterally and vertically stable due to boulder and bedrock control. There are short alluvial sections usually less than 0.2 mile long, where terraces and flood plains exist. These short alluvial sections are subject to erosion and incision, and there are 1,405 feet (50 percent of the alluvial section of channel) where one or both banks are exposed and bank erodibility hazard is high to very high, though channel stability is still fair. Undermined, vertical banks in the short alluvial sections are beginning to lie back at a more natural angle typical of undisturbed areas, and flood plains/point bars are forming within the previously incised channel. There are also remnant small, marginal sandy deposits within the more confined, bedrock-dominated sections that have been and continue to be degraded. The reach is used as a conveyance, currently transporting flows of 300 to 500 cfs during the summer months, when historical unregulated flows were at a minimum (e.g., 10 to 100 cfs). This sustained high flow during the summer months may have reduced the margin deposits because they occur during the growing season, are sustained the entire summer, and may have also created incision in the short alluvial sections.

*Unnamed Tributary below Fuller Lake Dam (Spaulding No. 1 and No. 2 Development)*

Fuller Lake dam stream reach is a 1-mile-long unnamed drainage that extends from Fuller Lake (elevation 5,320 feet msl) to Jordan Creek (elevation 4,600 feet msl). The area is typified by fairly steep slopes with mature forest until the lower 0.2 mile, which is thinly vegetated, steep (over 30 percent) granite bedrock. This stream reach receives spills from Fuller Lake through an automatic siphon when the lake is too full or due to a plugged trash rack. There are about 1,000 feet of 2- to 6-foot-high vertical exposed and eroding banks within 4,200 feet of stream (12 percent of the stream reach) downstream of the lake before the streamflows over the resistant bedrock cliff to Jordan Creek. Though not gaged, Fuller Lake was very high during the 1997 flood event; incision is likely due to spill from this event. There is no sediment plume or fan at the junction with Jordan Creek, so it appears that sediment input has not been significant and/or there has been sufficient flow in Jordan Creek to transport the added sediment. Stream-side trees are being undermined and added to the active channel, and provide LWD to Fuller Lake dam stream reach, which stores sediment and provides roughness to reduce erosive energy.

*Jordan Creek below Jordan Canal Diversion Dam (Spaulding No. 1 and No. 2 Development)*

Jordan Creek diversion, on Jordan Creek, is a pond with a surface area of 0.01 acre and a gross storage capacity of less than 0.1 acre-feet, impounded by a dam, a masonry structure 3 feet high. Jordan Creek canal from the Jordan Creek diversion impoundment consists of a 0.07-mile-long flume and a 0.53-mile-long natural waterway discharging into Lake Spaulding. The area is typified by fairly steep slopes surrounded by densely wooded mature forests. Based on photography provided in the amended final license application, some sediment and debris has accumulated behind the diversion dam. No information was provided on the physical status of the canal; however, the amended final license application states that both the diversion dam and the canal have not been operated for many years and are not necessary for current or future operations.

Jordan Creek diversion dam stream reach is short (1.6 miles) and extends from the Jordan Creek diversion dam (elevation 5,200 feet msl) to the South Yuba River (elevation 4,480 feet msl). The stream reach consists of two sub-reaches: the upper sub-reach is a steep, transport section that flows through densely wooded mature forests on steep slopes, while the lower sub-reach is a wide, glacially formed

valley with a few hardwoods within the valley floor bounded by a thin mixed forest on adjacent steep valley slopes. The lower glacial valley has also been affected by large spills from Lake Spaulding spill channel. The spills have scoured the glacial valley for about 1 mile, where substrate is boulder sized, flow is interstitial, and alluvial processes are dominated by high-energy spill-flow. The largest four spill events were in 1986, 1996, 1997, and 2007; instantaneous peaks measured in the South Yuba River at Lang's Crossing (includes flow from spill events that travel through Jordan Creek and direct releases from Lake Spaulding) ranged from 20,400 cfs to over 34,000 cfs. The active and surface-flow portion of the channel in the lower one-third of the lower sub-reach is about 10 to 30 feet wide in a valley that is 140 to 235 feet wide. There are vertical eroding banks/valley walls for about 3,000 feet, though eroded material from this potential source of sediment is not evident in the channel.

*Bear River above Drum afterbay (Reach #1) (Spaulding No. 1 and No. 2 Development)*

Bear River reach #1 extends 0.3 mile from Bear River at the point of inflow from Drum canal (measured at gage YB-137) (elevation 4,800 feet msl) to the point of inflow from South Yuba canal (measured at gage YB-139) (elevation 4,600 feet msl). Bear River reach #1 is dominated by boulders and cobble, and splits around a vegetated island above the Bowman-Spaulding Road bridge. At the bridge, the channel flows over bedrock, then through a vertically and laterally stable, planar, cobble/gravel channel for a short distance to the junction with the South Yuba canal inflow. Flows into Bear River reach #1 over the last 10 years have generally been below 400 cfs, although in 2006 there were sustained flows above 400 cfs.

*Bear River above Drum afterbay (Reach #2) (Spaulding No. 1 and No. 2 Development)*

Bear River reach #2 extends 7.6 miles from Bear River at the point of inflow from South Yuba canal to Drum canal (Drum-Spaulding Project). This stream reach consists of two sub-reaches: the upper Meadow sub-reach is 2.3 miles long and extends from 4,600 to 4,480 feet msl elevation, and the lower Boardman sub-reach is 5.3 miles long and extends from 4,480 to 3,400 feet msl elevation. The Meadow sub-reach flows through a large meadow dominated by grasses and sedges with extensive willow and shrubs growing on the channel margin. The lower Boardman sub-reach flows through a mature forest and shrub community and includes the Zeibright Mine in the middle of the stream reach and the Pittman Spill in the lower part of the stream reach.

Peak flows that have moved through this stream reach are the result of major storm events and the periodic release of water from the project's Drum and South Yuba canals. Effects of releases may have caused or exacerbated channel incision and bank failures in the Meadow sub-reach above and below Highway 20. Comparison of observed regulated flows and synthesized unregulated flows indicate that releases through this reach have occasionally exceeded estimated peak unregulated values. Peak regulated flows for the past 30 years of record were often lower than unregulated high flows, but peak releases in excess of 100 cfs occurred with greater frequency. Under unregulated conditions, there would generally be little flow through this reach during the months of May through October, with periodic high flow events in November through April that rarely exceed 300 cfs, except in storm events. Under regulated conditions, there is a sustained 5 cfs minimum flow throughout the year (measured at YB-198), with frequent high winter and early spring flow events that generally do not exceed 400 cfs. Between 1993 and 1997, peak flows were higher, more frequent, and sustained longer than unregulated conditions, with six high flow events that ranged from just over 300 cfs to nearly 580 cfs. The higher sustained flows in 1997 were primarily due to the New Year's Day flood event, which sent a large pulse of sediment into Drum afterbay and incapacitated the hydroelectric powerhouses. The powerhouses were placed on an extended outage due to sedimentation; water diverted from NID's and PG&E's facilities in the Middle and South Yuba Rivers was subsequently diverted through Bear Valley and directly into Drum afterbay (typically, these flows would be moved into the Bear River watershed via Drum canal).

In the Meadow sub-reach, while there is evidence of active erosion in some locations (about 345 feet), most of the banks are recovering from the effects of grazing and high flows. The characteristics of the Meadow sub-reach differ slightly based on location, as described below.

In the Upper Meadow (top of reach to about Highway 20), the channel is slightly entrenched where intermittent flood plains exist, with potential for lateral adjustments through fine grained, though cohesive, sediment. Bank erosion hazard is high due to vertical, occasionally undermined banks in several locations where there is vegetative or root protection. The adjacent steep meadow slopes are significantly higher than the stream channel and appear to be supported by groundwater sources and not through hydraulic connection or overbank deposits from the river.

In the Middle Meadow (between Highway 20 and the Lower Meadow), there are indications of incision (e.g., exposed tree roots and vertical banks), and about 10 percent of the stream reach has recent erosion, such as block failures and slumping. The channel is entrenched, with little potential for lateral adjustments because banks are composed of a cobble-boulder berm/banks on one side and terrace slope with strong vegetative control on the other, and bank erodibility hazard is low. Vertical stability is controlled by immobile substrate. There is boulder and imbricated cobble material that limits any further vertical incision.

In the Lower Meadow (last half mile of the sub-reach), the channel is slightly entrenched, with potential for lateral adjustment through natural meandering. Following removal of livestock from the area, willows and other woody species have increased dramatically, as seen on historical aerial photos. Woody riparian vegetation has served to stabilize affected stream banks. Lateral movement of the stream through the meadow is limited by the incised nature of the channel and continuing growth of willows and sedges. Banks are becoming more vegetated, and the toes of the banks are often protected by vegetation or an incipient, inset flood plain. The outside of bends have experienced some bank failures, which is expected in a meandering stream, and the inside of the bends are often well-vegetated and have a resistant riparian zone with sedges, willows, and an active flood plain. There are aquatic plants, such as aquatic buttercup (*Ranunculus aquatilis*) that are growing thickly on low-gradient riffles, which have affected the mobility and size distribution of the gravels on the riffles.

In the Boardman sub-reach, the 1.3-mile-long channel is mostly transport-dominated and there is little erosion (1 percent). The reach is mostly laterally and vertically stable. An exception to this stability is the section between the Pittman spill at RM 28.8 and just above Drum powerhouse at RM 27.6, which was widened and disturbed due to the flood effects of the Pittman spill. The initial Pittman spill occurred in 1986 when the Drum siphon failed and 550,000 cubic yards of sediment were added to Bear River. A debris torrent of sediment and water widened the active channel considerably for about 1.2 miles. Restoration activities and monitoring have been implemented at the failure site since 1986. The channel is dominated by lateral and vertical bedrock controls except for the last 0.2 mile above Drum afterbay. Channel mobility analysis estimates that particles up to 11.2 inches are mobile at 455 cfs (2-year and 2.7-year regulated and unregulated return intervals, respectively) in at least a portion of the channel. Reach-averaged median grain size is 6.3 inches, and median regulated flow is 407 cfs. This indicates that particles greater than the median particle sizes are mobile, the channel bed will continue to coarsen, and transport capability likely exceeds sediment supply.

## Yuba-Bear Project

*Middle Yuba River below Jackson Meadows Dam (Bowman Development)*

Jackson Meadows dam stream reach is a 1.6-mile-long section of the Middle Yuba River that extends from Jackson Meadows dam (elevation 5,900 feet msl) to the Milton diversion dam impoundment (elevation 5,700 feet msl). The surrounding area is mostly riparian forest on low terraces, with significant

sections of unvegetated rocky slopes. There is an extensive wetland at the inflow to Milton diversion dam impoundment that captures sediment, and flow is distributed through numerous surface and sub-surface channels (i.e., about 3,600 feet of the 1.6-mile-long reach). Historical spillway erosion has resulted in cobble lag deposits, which affect about 1,800 feet of channel (i.e., 20 percent of the reach), and have created side channels through riparian forests. The channel has little potential for lateral and vertical adjustments in the sections of the stream that are steeper and confined. Along the lower section of the reach (285 feet long; 3 percent of the stream reach), a 10-foot-high exposed bank occurs where bank erodibility hazard is greater; an estimated 2,000 cubic yards of mixed sand/gravel material have been delivered to the channel. The unstable banks are due to non-cohesive lag deposits forming one bank (moderate bank erosion hazard) and erosion along the base of the terrace (extreme bank erosion hazard). Within this lower, unconfined section of channel adjacent to the exposed bank, the channel is slightly entrenched, with potential for lateral and vertical adjustments. Banks on one side are stable, vegetated, and part of the active flood plain; bank erosion hazard is very low to low in this area.

*Jackson Creek below Jackson Lake Dam (Bowman Development)*

Jackson Lake dam stream reach is a 3.0-mile-long section of Jackson Creek that extends from Jackson Lake dam (elevation 6,585 feet msl) to Bowman Lake (elevation 5,580 feet msl). The surrounding area is mostly wooded hillslopes, with a meadow at the top of the reach near the outflow of Jackson Lake. About 27 percent of the reach is considered "unstable." The lower 0.8 mile of the reach flows through unconsolidated debris fan deposits that resulted from a large rain-on-snow event in 1997. These deposits changed the course of Jackson Creek, which now flows through coarse boulder and finer, poorly sorted alluvial fan debris. The channel is exposed with little overhead cover or three-dimensional heterogeneity, and flow is interstitial through coarse substrate during the low-flow period. Banks are erodible, with little bank cohesiveness; 65 percent of the streambanks within this fan are actively eroding. Most of the sediment is trapped behind the Meadow Lake Road crossing that has two culverts to pass the water.

*Canyon Creek below Faucherie Lake Dam (Bowman Development)*

Faucherie Lake dam stream reach is a 1.8-mile-long section of Canyon Creek that extends from Faucherie dam (elevation 6,132 feet msl) to Sawmill dam (elevation 5,863 feet msl). The surrounding area is mostly moderately vegetated mature forest and shrubs on gentle slopes. This channel is slightly entrenched in more- alluvial sections and moderately entrenched within steeper sections that are bounded by more resistant and steeper banks. The channel in the lower gradient, alluvial section has potential for lateral and vertical adjustments and is wider than expected given the drainage area, so further riparian widening is possible. Near the Faucherie Lake dam, there is little potential for adjustments within the steeper sections bounded by more resistant bed and banks. In the lower, more bedrock-controlled portion of the stream reach, the channel is moderately entrenched, with little potential for lateral and vertical adjustments, and bank erosion hazard is very low due to bedrock/boulder controls.

Uncontrolled spill from Faucherie Lake dam occurred 70 percent of the time (2,512 out of 3,584 days) from December 1999 to 2008; the eight highest spill discharges ranged from an estimated 430 cfs to just over 1,000 cfs and averaged about 600 cfs. The spill flow is not gaged, so the volumes were estimated based on height above spill crest. The spill channel has been eroded to bedrock, and little further erosion is expected, though there may be some gravel and sediment added from adjacent side slopes. Most of the erosion in the Faucherie Lake dam spillway channel occurred during the 1997 rain-on-snow event in Canyon Creek. The eroded spill channel is about 1,300 feet long (14 percent of the 1.8-mile-long reach). The storm flow passed through the riparian forest that is separated from the main channel for about 350 feet. Sediments transported from the spill channel are mostly stored in the side channel, but there are gravel deposits in the main channel that could have come from spill channel

erosion. Erosion within the flood-flow channel in the riparian forest is restricted to the upper third of the side channel; most of the material is re-deposited before the floodflow channel re-enters the main channel. Sediment from additional spill erosion would be transported to the junction with the main channel during the next spill event. There are currently deposits of trout spawning-sized gravel in the portion of the main channel bypassed by the flood-flow channel, indicating that some finer grained materials are entering the mainstem from upstream. Further significant spill erosion is considered unlikely.

*Canyon Creek below Bowman-Spaulding Diversion Dam (Bowman Development)*

Bowman-Spaulding diversion dam stream reach is a 4.4-mile-long section of Canyon Creek that extends from the Bowman-Spaulding diversion dam (elevation 5,160 feet msl) to Texas Creek (elevation 4,640 feet msl). The upper half of the area is typified by exposed and thinly vegetated granite bedrock, while the lower half is more dense mature forest on steep side slopes. This channel is moderately entrenched, with banks and substrate somewhat deformable. Although the potential exists for dynamic bed and bank adjustment, the banks are fairly stable, composed of cobbles and reinforced with perennial riparian roots. The bank erodibility hazard is moderate to low, although there is some residual undermining of upper banks due to the large 1997 flood flows.

An emergency release of 20,000 cfs from Bowman reservoir in 1997 washed through the spill channel. Material was deposited above the junction with the main channel; some material extends into the main channel at the USGS flow gaging station and directly influences about 2,100 feet of channel (9 percent of the reach). Most of the gravel and finer sediment has subsequently been transported from this stream reach, though there are some gravel and cobble bars that are remnants of that spill and other localized inputs.

A dump gate at the outlet of the 84-inch reinforced concrete pipe downstream of tunnel #2 of the Bowman-Spaulding conduit was used to release high flows between 1997 and 2000, which created a 1,300-foot-long, 6- to 20-foot-wide channel down a steep slope to Canyon Creek, resulting in up to an estimated 1,400 cubic yards of material added to Canyon Creek above Texas Creek. There is some fine sediment stored in pools, with an average of 13 percent of the residual pool volume filled with fine sediment. Of the limited supply of trout spawning gravels, 2 to 15 percent is less than 0.08 inch. While both fine and coarse sediment were likely delivered from hillslope erosion associated with releases from the canals, most of the material appears to have been transported downstream through the active channel. Limited gravel and cobble bars, and some pool-tailout gravels, are all that remain in this transport-dominated stream reach as a result of these releases.

*Clear Creek below Clear Creek Diversion Gate (Dutch Flat No. 2 Development)*

Clear Creek diversion gate stream reach is a short reach (0.9 mile) that extends from Bowman-Spaulding conduit (elevation 5,360 feet msl) to Fall Creek (elevation 5,200 feet msl). The surrounding area is mostly gently sloping terraces with harvested and mature timber. Side slopes are moderate and covered with mature forest and shrubs. A dump gate can be used to release water from the conduit into the creek. This practice has resulted in an eroded slope about 415 feet long and 10-20 feet wide. The slope supplies gravel, sand, and finer material directly to Clear Creek. Other than this localized input, the stream is laterally and vertically stable with no streambank erosion.

*Fall Creek below Fall Creek Diversion Dam (Dutch Flat No. 2 Development)*

Fall Creek diversion dam stream reach is a 2.0-mile-long section of Fall Creek that extends from the Bowman-Spaulding conduit (elevation 5,320 feet msl) to the South Yuba River (elevation 3,200 feet msl). The surrounding area is mostly moderately dense mature forest on moderate to gentle slopes until the creek flows over thinly vegetated granite bedrock cliffs for the lower 1.2 miles. The channel below

the Bowman-Spaulding conduit has widened and coarsened for about 300 feet (i.e., 3 percent of the entire stream reach) due to emergency releases from Bowman-Spaulding conduit during the 1997 flood. The main channel is composed of cobbles and boulders set within larger, immobile boulders. Willows have colonized the exposed margins, and the vegetative recovery has begun to narrow the exposed area. Smaller releases occur occasionally to drain the conduit of residual water during outages. Exposed banks (i.e., 600 feet of a 0.8-mile-long reach; 14 percent of the non-bedrock portion of the stream reach) and upstream sources supply trout-spawning-sized gravels to the depositional part of the stream reach above the cliff section. The lower part of the stream reach is transport-dominated as it spills over bedrock cliffs, and storage of gravels is limited.

*Trap Creek below Trap Creek Diversion Gate (Dutch Flat No. 2 Development)*

Trap Creek diversion gate stream reach is a 1.2-mile-long reach that extends from Bowman-Spaulding conduit (elevation 5,360 feet msl) to Fall Creek (elevation 3,600 feet msl). There is a 1,100-foot-long eroded section within the historical Trap Creek channel where emergency releases from the spill gate have created vertical, eroding banks by undermining the adjacent moderate slopes vegetated with mature forest and shrubs. The eroded section is within the upper 0.85 mile of the stream reach within glacial parent material and has a 13 percent gradient. The lower 0.35 mile flows over steep (57 percent gradient) resistant granite bedrock, adjacent to thinly forested steep slopes. This lower section is transport-dominated and has low, local sediment supply.

*Bear River below Dutch Flat Afterbay Dam (Chicago Park Development)*

The Dutch Flat afterbay dam stream reach is the 5.4-mile-long section of the Bear River that extends from Dutch Flat afterbay (elevation 2,560 feet msl) to Chicago Park powerhouse (elevation 2,240 feet msl). The channel flows through and within multiple terraces that are composed of hydraulic mining debris. Terraces are thinly vegetated with some small conifers and low densities of shrubs and herbs. Hillslopes are steep and densely vegetated with mature trees and shrubs. Some willows and alders are becoming established along the channel margin, but these are often undermined by continuous erosion (high to extreme bank erodibility hazard). Streambanks are erodible and droughty due to the character of the mining sediment (coarse cobble to sand-sized material with few organics) that composes bed, banks, and terraces. Riparian growth and sediment deposition in the channel margin are poorly developed along many of the non-cohesive banks. There is some inset, incipient flood plain development along portions of the channel where bank erodibility hazard is lower. Overall, the channel is moderately entrenched, with potential for lateral and vertical adjustments. Boulders and bedrock knobs create pools and increase depth and channel heterogeneity, though these elements are rare. Particles of 2.75 inches (larger than trout spawning gravel) are estimated to be mobile at 128 cfs (1.8-year and 1.2-year regulated and unregulated return intervals, respectively), so it is likely that spawning-sized gravels are transported readily. There were few patches of trout-spawning gravels in the stream reach.

*Bear River below Chicago Park Powerhouse (Chicago Park Development)*

The Chicago Park powerhouse stream reach is the 1.5-mile-long section of the Bear River that extends from Chicago Park powerhouse (elevation 2,240 feet msl) to Rollins reservoir (normal maximum water surface elevation of 2,171 feet msl). The braided stream reach consists of numerous shifting channels over a broad flood plain. There are willows and alders along the channel margin, but they are young and poorly resistant to flow stresses; a thinly vegetated shrub and herb layer is the dominant cover on the flood plain. Hillslopes are steep with moderately dense trees and shrubs. Streambanks are erodible and droughty as a result of high amounts of mining sediment that compose bed, banks, and terraces. About 2,200 feet of one or both banks of a 0.52-mile-long stretch is actively eroding (40 percent erosion). Riparian growth and sediment deposition in the channel margin are not supported along many of the non-cohesive banks, but there is some incipient and inset flood plain development along portions of

the channel. Boulders and bedrock knobs create pools and increase depth and channel heterogeneity, though these elements are rare and the channel is mostly shallow and dominated by low-gradient riffles and glides.

**Large Woody Debris (LWD)**

LWD consists of trees and woody material that fall into the active stream channel and flood plain that can be mobilized during high flow events and provide structure that can enhance channel morphology and aquatic habitat. PG&E and NID evaluated the quantity and diversity of LWD in selected project-affected reaches. All pieces of wood (dead or dying) lying within the bankfull width of the channel were counted if they measured one-half bankfull width or longer. Only downed wood with a portion lying within the bankfull channel was recorded. Individual pieces were separated into size classes based on diameter and total length. The diameter size classes were: 6 to 12 inches, 12 to 24 inches, 24 to 36 inches, and greater than 36 inches. The length size classes were: 3 to 10 feet, 10 to 25 feet, 25 to 50 feet, 50 to 75 feet, and greater than 75 feet. The number of pieces of LWD found within the channel width that was wetted during the assessment was a separate category, essentially a sub-set of the total number of pieces found within the bankfull width (PG&E and NID, 2011c).

The channels in most project-affected stream reaches are steep and confined offering limited opportunity for generation and retention of LWD and long-term sediment storage within the bankfull channel perimeter. Sierra Nevada streams have been found to have mean LWD piece frequency ranging from 9.5 to 24.6 pieces per 100 meters (153-396 per mile), with a median value of 27 pieces per mile. However, 48 project-affected streams in which LWD was counted had a range of 0-307 pieces per mile. Based on the estimated volume of wood removed from project reservoirs where records are kept, the range was 0.0002 to 0.03 cubic meters per hectare (0.02 to 2.6 cubic feet per acre). This volume is based on truckloads removed and drainage area above the reservoir. Mean volume of LWD observed in Sierra Nevada streams ranged from 36 to 320 cubic meters per hectare (3,141 to 27,924 cubic feet per acre). Therefore, it appears the project-affected stream reaches have much less volume of LWD in the channels than was found in other parts of the Sierra Nevada, and significant amounts of debris are not being stored in the reservoirs. There may be more wood sinking or stored in locations other than the channel (e.g., above mean high water line in the reservoirs), so the volume collected from the reservoirs may be an underestimate. The exception to low amounts of LWD transported to project reservoirs was in the Bear River during the 1986 and 1997 floods when Drum afterbay was filled with trees. The amount was not quantified, but existing in-channel wood in the stream reach above Drum afterbay (Bear River reach #2) is estimated to be 24 pieces per mile; therefore, this amount was likely greater during the storm events. None of the other Bear River stream reaches or diversions had significant amounts of wood, so there may have been more streamside trees that were undermined and transported in this stream reach, particularly during these flood events, compared to the other stream reaches.

### 3.3.1.2 Environmental Effects

#### 3.3.1.2.1 Slope Stability and Erosion

**Upper Drum-Spaulding Project**

**Erosion and Sediment Control and Management and Slope Assessment and Facility Release**

Project operations and recreational usage of project facilities have the potential to cause or exacerbate local erosion. The resulting slope failure and turbid runoff can result in impaired water quality. Steep slopes or channels affected by planned or emergency discharges from project canals and conduits are particularly at risk. Heavy use, maintenance, and construction activities at project facilities and recreation areas also create opportunities for erosion and runoff to project-affected waters.

Amended revised Forest Service condition 50 and BLM condition 50 specify that PG&E implement the Erosion and Sediment Control and Management Plan filed April 11, 2014. This plan provides guidance and establishes procedures for treating erosion sites and controlling sedimentation at existing project and project-affected areas on lands managed by the Forest Service and BLM. Measures and procedures for erosion control during new construction and non-routine maintenance would be included in the plan. The plan includes: (1) initial and periodic inventory and monitoring of erosion sites; (2) criteria for prioritizing and ranking erosion sites for treatment; (3) a list of standard control measures consistent with Forest Service and BLM regulations that can be customized to site-specific conditions; (4) maintenance of a schedule for treatment (e.g., repair, mitigate, monitor) of identified prioritized erosion sites; (5) monitoring effectiveness of completed erosion control treatment measures and rescheduling further treatment, as necessary; (6) protocols for emergency erosion and sediment control; and (7) a process for documentation and reporting inventory, monitoring, and treatment projects and results with geographic information system (GIS) database mapping capability.

Amended revised Forest Service condition 49 and BLM condition 19 specify that PG&E implement the Canal Release Point Plan to address erosion potential at discharge points from project facilities including past canal breaches. The plan includes: (1) assessment of landslide hazards for slopes above and below project facilities and conducting slope stability analysis at sites that are moderately to highly unstable; (2) assessment of erosive conditions at sites affected by past canal breaches and recommendation for repair of these sites; (3) assessment of conditions at penstocks and other project drainage facilities used as emergency and maintenance release points, and recommended improvements to these facilities that would minimize potential erosion and adverse impacts to resources associated with their operation; and (4) measures to reduce risk of slope failure associated with project facilities and operations.

PG&E has agreed (May 12, 2014) to implement these two plans. PG&E would adhere to local, state, and federal erosion control planning and permitting processes, along with internal BMPs. In addition, the plan provides for periodic review and update of the plan with the Forest Service, BLM, and other appropriate agencies.

California Fish and Wildlife filed two resource recommendations (measures 11and 22) and two administrative conditions (conditions 27 and 28) related to erosion control and management both project-wide and specifically related to steep slopes below penstocks, open canals, and other project drainage structures. Measure 11, similar to Forest Service condition 49 and BLM condition 19 would require PG&E to submit an approved plan to minimize adverse resource effects associated with releases for penstocks and other maintenance and emergency drainage structures. Measure 22 recommends that PG&E implement project-wide erosion control and sediment management procedures and practices that are the same as those specified by Forest Service condition 50 and BLM condition 50. California Fish and Wildlife condition 27 recommends that PG&E develop a plan to assess the stability and hazard of steep project-affected slopes that is the same as that proposed by Forest Service condition 49 and BLM condition 19. California Fish and Wildlife condition 28 would require PG&E to submit an approved Watershed Restoration Plan that would include: a description of steep slopes and project drainage structures where damage has occurred, as would be developed in its measure 11 and condition 27; locations where future damage could occur; measures and schedules for restoration of damaged slopes; a schedule for inspection of sites; and a process for notifying the Forest Service of damage to resources.

*Our Analysis*

Project operations and maintenance have the potential to expose project and project-affected lands to erosion and sedimentation. Relicensing surveys indicate that stream reaches characterized by channel and bank instability are relatively limited in project-affected reaches (section 3.3.1.1.3, *Channel*

*Stability*). Particularly in upper elevation portions of the Upper Drum-Spaulding Project area, stream reaches are confined, vertically and horizontally, by bedrock and relatively immobile boulder substrate and banks. Areas identified with high instability and erosion potential are typically associated with steep, rugged terrain above and below project facilities (e.g., canals and conduits); these areas can be particularly vulnerable sites where historical emergency and severe event spills have occurred causing riparian damage and eroded stream channels. Stream reaches within the boundary of the Lower Drum and Deer Creek Projects are also associated with high gradient areas that could be vulnerable to erosion and sedimentation.

Forest Service comments on the draft EIS (August 22, 2013) identified five components missing from the licensee's proposed plan reviewed in the draft EIS:

- Assessment and repair of past canal breaches.
- It is unclear whether the licensee's plan includes slope stability assessment of canals.
- Inventory of all project-affected lands so that potential erosion on non-federal lands associated with project facilities is addressed. The proposed inventory criteria would miss effects on lands under other ownership associated with operation and maintenance of project facilities.
- Description of documentation, reporting, or mapping.
- The monitoring plan should describe the monitoring program overall and provide detail on monitoring effectiveness of erosion control and stabilization treatments (i.e., frequency, protocols, etc.).

These deficiencies have been addressed satisfactorily by the two plans filed in April 2014. The Erosion and Sediment Control and Management Plan would assure that the generic project-wide measures in for control of erosion and sedimentation in project-affected areas can be implemented to protect resources in a more timely manner, even if the details for site-specific actions under the Canal Release Point Plan require more extended consultation and design.

California Fish and Wildlife recommendations outline general tasks to be included in the plan, guidelines for the types of information to be collected and monitored, and objectives for maintenance and restoration of resources affected by erosion and sedimentation that are essentially captured in the plans filed by Forest Service and agreed to by PG&E. The essential elements of the watershed restoration plan recommended by California Fish and Wildlife are encompassed by the two plans field by the Forest Service in April 2014.

The Erosion and Sediment Control and Management Plan and Canal Release Point Plan for the Upper Drum-Spaulding Project address and integrate the primary issues and concerns identified by the Forest Service, BLM, and California Fish and Wildlife. The plans include details of the scope and methods for inventory and prioritization of erosion sites and slopes at risk due to project operations and maintenance. Emergency and routine spillway and release points from project canals are identified in the plan. Methods for evaluation of priority sites and development of design alternatives for repair, restoration, or mitigation of these sites and scheduling implementation of selected designs are also included. Specific measures are presented to address slope stability in the vicinity of project water conveyance structures, canal spillway operations, emergency operations, and new construction. PG&E would implement a schedule to the inventory and prioritization historical erosion sites, study priority sites, and develop design recommendations within 3 years of license issuance. Final designs to minimize and prevent future erosion and sedimentation damage at each of these sites including an implementation

schedule would be developed in consultation with the agencies. General procedures are outlined to address planned erosion treatment programs and those implemented to stabilize and mitigate emergency situations. The plans itemize the local, state, and federal permits that would be necessary for various types of treatment actions and provides a process flow chart decision train to categorize the type of action and approvals necessary for a specific action (figure 3-2). Erosion issues specific to other individual resource plans are addressed in appropriate detail within those plans (e.g., HPMP, Recreation Plan).

Implementation of the plans, for each of the three proposed projects, at all project-affected lands regardless of whether they are under the jurisdiction of the Forest Service or BLM would minimize the potential for erosion associated with project operations and maintenance and would provide a mechanism for ongoing assessment of project facilities and implementation of appropriate prevention and restoration measures. Agency consultation, as needed, would ensure that erosion control and restoration measures implemented on federal lands are consistent with agency guidelines.

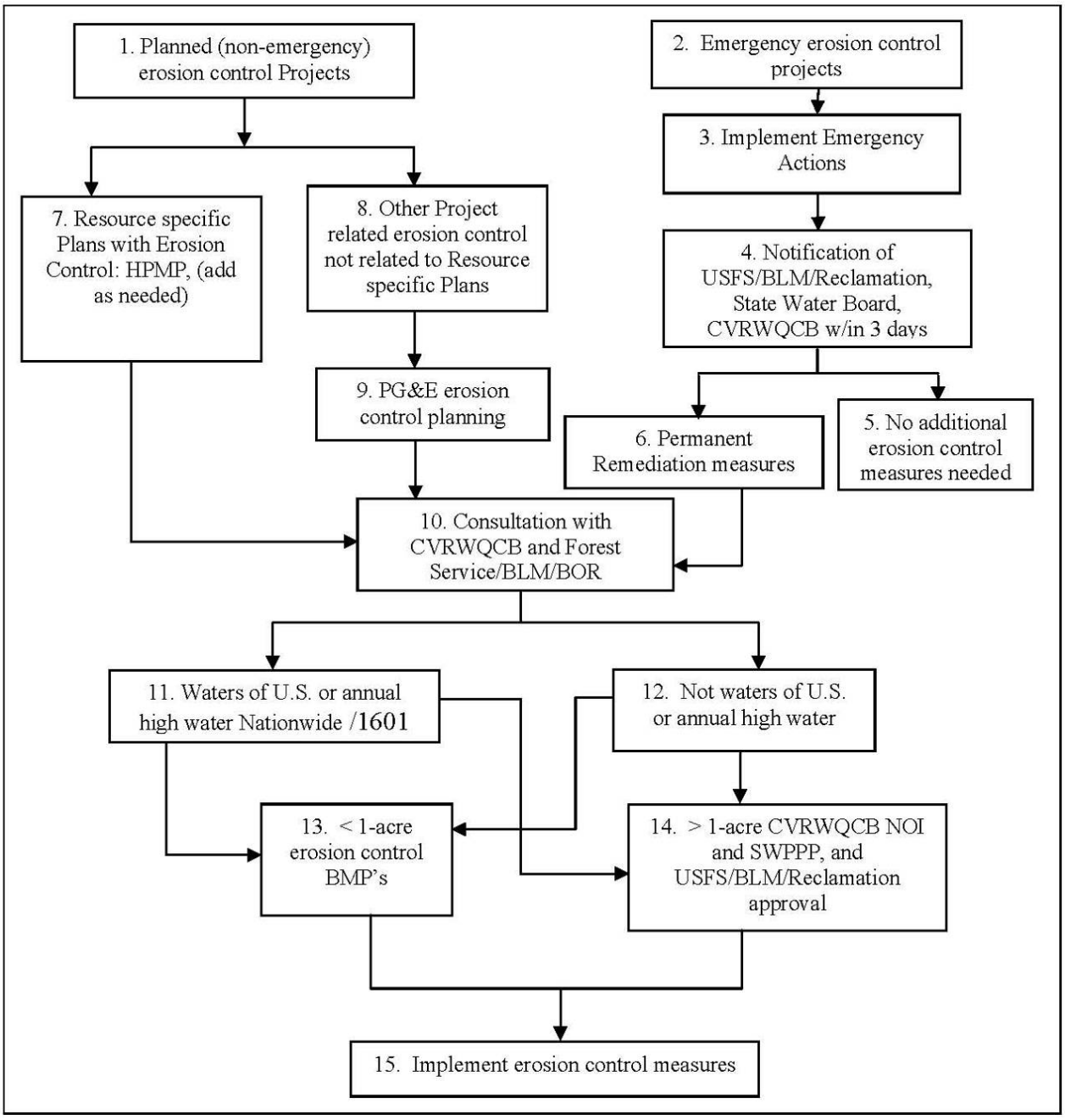


Figure 3-2. Erosion and Sediment Control Plan process flow chart. (Source: PG&E, 2011a; NID, 2011a)

**Decommissioning of the Jordan Creek Diversion and Jordan Canal**

PG&E proposes the decommissioning of the Jordan Creek diversion dam and Jordan canal facilities (part of the Upper Drum-Spaulding Project), but did not provide a decommissioning plan or an evaluation of environmental effects in its application. Removal or deconstruction of the Jordan Creek diversion and Jordan canal could cause or exacerbate local erosion; resulting slope failure and turbid runoff can result in impaired water quality.

*Our Analysis*

Ground disturbance during deconstruction of the Jordan Creek diversion dam and Jordan canal could result in erosion, turbid runoff, and sedimentation in project-affected waters, including Lake Spaulding, Jordan Creek, and the South Yuba River. Development of a detailed Decommissioning Erosion Control and Restoration Plan for the removal of the Jordan Creek diversion dam and canal would ensure adequate restoration of the disturbed area. Any plan should detail measures, protocols, and monitoring procedures that would facilitate control and management of deconstruction-related erosion and sedimentation and ensure effective protection, mitigation, and enhancement of Forest Service and BLM managed resources.

**Yuba-Bear Project**

**Erosion and Sediment Control and Management and Slope Assessment and Facility Release**

Project operations and recreational usage of project facilities have the potential to cause or exacerbate local erosion; resulting slope failure and turbid runoff can result in impaired water quality. Steep slopes or channels affected by planned or emergency discharges from project canals and conduits are particularly at risk. Heavy use, maintenance, and construction activities at project facilities and recreation areas also create opportunities for erosion and runoff to project-affected waters.

Amended revised Forest Service condition 50 and BLM condition 41 specify that NID implement the Erosion and Sediment Control and Management Plan filed April 11, 2014. This plan provides guidance and establishes procedures for treating erosion sites and controlling sedimentation at existing project and project-affected areas on lands managed by the Forest Service and BLM. Measures and procedures for erosion control during new construction and non-routine maintenance would be included in the plan. The plan includes: (1) initial and periodic inventory and monitoring of erosion sites; (2) criteria for prioritizing and ranking erosion sites for treatment; (3) a list of standard control measures consistent with Forest Service and BLM regulations that can be customized to site-specific conditions; (4) maintenance of a schedule for treatment (e.g., repair, mitigate, monitor) of identified prioritized erosion sites; (5) monitoring effectiveness of completed erosion control treatment measures and rescheduling further treatment, as necessary; (6) protocols for emergency erosion and sediment control; and (7) a process for documentation and reporting inventory, monitoring, and treatment projects and results with geographic information system (GIS) database mapping capability.

Amended revised Forest Service condition 49 and BLM condition 24, specify that NID implements the Canal Release Point Plan to address erosion potential at discharge points from project facilities including past canal breaches. The plan includes: (1) assessment of landslide hazards for slopes above and below project facilities and conducting slope stability analysis at sites that are moderately to highly unstable; (2) assessment of erosive conditions at sites affected by past canal breaches and recommendation for repair of these sites; (3) assessment of conditions at penstocks and other project drainage facilities used as emergency and maintenance release points, and recommended improvements to these facilities that would minimize potential erosion and adverse impacts to resources associated with

their operation; and (4) measures to reduce risk of slope failure associated with project facilities and operations.

NID has agreed (May 20, 2014) to implement these two plans. NID would adhere to local, state, and federal erosion control planning and permitting processes, along with internal BMPs. In addition, the plan provides for periodic review and update of the plan with the Forest Service, BLM, and other appropriate agencies.

Amended revised Forest Service condition 48, specifies that NID develop and implement a stabilization plan to address channel areas identified by Forest Service on NFS lands that are undergoing resource damage associated with historical project operations. The plan would specifically require NID prepare stabilization plans at a minimum to address Clear Creek, Trap Creek, and Christmas Tree waterway where past spills below the Bowman-Spaulding canal have caused significant erosion. NID filed a Clear and Trap Creek Channel Stabilization Plan with its amended license application (Appendix E4) and proposes to implement this plan within 1 year of license issuance as an alternative (August 29, 2012) to the Forest Service condition. This condition and NID's alternative are discussed in more detail below under habitat restoration.

California Department of Fish and Wildlife recommended that NID develop and implement a Slope Stability Plan (recommendation 27) and a Watershed Restoration Plan (recommendation 28).

*Our Analysis*

Project operations and maintenance have the potential to expose project and project-affected lands to erosion and sedimentation; steep, rugged terrain above and below project facilities, especially canals and conduits, can be particularly vulnerable sites. A plan detailing measures, protocols, and monitoring procedures would facilitate control and management of project-related erosion and sedimentation for a project with the geographic scope of the Yuba-Bear Project and remoteness of many project facilities and ensure effective protection, mitigation, and enhancement of Forest Service and BLM managed resources.

The plans require NID to periodically review the plans with the agencies and update the plans, as necessary. The Forest Service condition does not propose a specific plan for channel stabilization, but requires NID to develop the plan in consultation with the agencies for implementation within 1 year of license issuance.

Forest Service comments on the draft EIS (August 22, 2013) identified five components missing from the licensee's proposed plan reviewed in the draft EIS:

- Assessment and repair of past canal breaches.
- It is unclear whether the licensee's plan includes slope stability assessment of canals.
- Inventory of all project-affected lands so that potential erosion on non-federal lands associated with project facilities is addressed. The proposed inventory criteria would miss effects on lands under other ownership associated with operation and maintenance of project facilities.
- Description of documentation, reporting, or mapping.

- The monitoring plan should describe the monitoring program overall and provide detail on monitoring effectiveness of erosion control and stabilization treatments (i.e., frequency, protocols, etc.).

These deficiencies have been addressed satisfactorily by the two plans filed in April 2014. The Erosion and Sediment Control and Management Plan would assure that the generic project-wide measures in for control of erosion and sedimentation in project-affected areas can be implemented to protect resources in a more timely manner, even if the details for site-specific actions under the Canal Release Point Plan and the Channel Stabilization Plan (to be developed within 1 year of license issuance) require more extended consultation and design.

California Fish and Wildlife recommendations outline general tasks to be included in the plan, guidelines for the types of information to be collected and monitored, and objectives for maintenance and restoration of resources affected by erosion and sedimentation that are essentially captured in the plans filed by Forest Service and agreed to by PG&E. The essential elements of the watershed restoration plan recommended by California Fish and Wildlife are encompassed by the two plans field by the Forest Service in April 2014.

The Erosion and Sediment Control and Management Plan and Canal Release Point Plan for the Yuba-Bear Project addresses and integrates the primary issues and concerns identified by the Forest Service, BLM, and California Fish and Wildlife. The plans include details of the scope and methods for inventory and prioritization of erosion sites and slopes at risk due to project operations and maintenance. Emergency and routine spillway and release points from project canals are identified in the plan. Methods for evaluation of priority sites and development of design alternatives for repair, restoration, or mitigation of these sites and scheduling implementation of selected designs are also included. Specific measures are presented to address slope stability in the vicinity of project water conveyance structures, canal spillway operations, emergency operations, and new construction. NID would implement a schedule to the inventory and prioritization historical erosion sites, study priority sites, and develop design recommendations within 3 years of license issuance. Final designs to minimize and prevent future erosion and sedimentation damage at each of these sites including an implementation schedule would be developed in consultation with the agencies. General procedures are outlined to address planned erosion treatment programs and those implemented to stabilize and mitigate emergency situations. The plans itemize the local, state, and federal permits that would be necessary for various types of treatment actions and provides a process flow chart decision train to categorize the type of action and approvals necessary for a specific action (figure 3-2). Erosion issues specific to other individual resource plans are addressed in appropriate detail within those plans (e.g., HPMP, Recreation Plan).

Implementation of the Erosion and Sediment Control and Management Plan and Canal Release Point Plan at all project-affected lands regardless of whether they are under jurisdiction of the Forest Service or BLM would minimize the potential for erosion associated with project operations and maintenance and would provide a mechanism for ongoing assessment of project facilities and implementation of prevention and restoration measures. Agency consultation, as needed, would ensure that erosion control and restoration measures implemented on federal lands are consistent with agency guidelines.

**Rollins Powerhouse Upgrade**

Upgrading the Rollins powerhouse with construction of a second generation unit could result in increased erosion during excavation, construction, and other ground-disturbing activities. NID proposes to develop and implement a Construction Erosion Control and Restoration Plan specific to the Rollins upgrade (measure YB-G&S1). Following the Commission's approval of the Rollins upgrade in the new

license, NID would prepare detailed design and construction plans and select a contractor to construct the upgrade. The Construction Erosion Control and Restoration Plan would then be prepared to specifically control and manage erosion based on the selected contractor's construction approach and site plan. The plan would be submitted 90 days prior to the scheduled start of construction on the Rollins upgrade and would provide a 30-day period for agency review.

*Our Analysis*—Ground disturbance during construction of the Rollins upgrade could result in erosion, turbid runoff, and sedimentation in project-affected water including Rollins reservoir, Bear River, and Bear River canal. NID's proposed Construction Erosion Control and Restoration Plan following license issuance, in conjunction with preparation of detailed construction plans for the Rollins upgrade when the project is prepared to move forward, would prevent erosion during construction of the Rollins upgrade and ensure adequate restoration of the disturbed area.

**Recreation Facility Erosion Control**

Construction, maintenance, and intensive use at project recreation facilities could result in erosion from disturbance of vegetation and soil and general wear. In order to prevent project-related erosion impacts, NID proposes to develop and implement a recreation facilities construction erosion control and restoration plan (YB-G&S2) at least 90 days prior to initiating construction at any recreation facility. NID submitted a plan for operational maintenance and rehabilitation of recreation facilities (Recreation Facilities Plan), which is discussed in detail in section 3.3.5.2, *Recreational Resources, Environmental Effects*. Small erosion control projects at recreation facilities could be performed under the project-wide Erosion Control and Slope Maintenance Plan discussed above; however, significant construction projects at recreation facilities would require preparation of a plan specific to that construction effort and become part of the construction plan.

*Our Analysis*

Construction and maintenance of recreational facilities could result in erosion associated with site disturbance and potential discharge of turbid runoff to project-affected waters. Implementation of a detailed Construction Erosion Control and Restoration Plan, as proposed by NID, would minimize the potential for erosion impacts. The plan would use standardized specifications and site-specific modifications for design and location of erosion control measures and BMPs and would establish a schedule for compliance monitoring and inspections during site work to ensure that design plans are adequate and implemented appropriately. Agency consultation would ensure that erosion control and restoration measures implemented on federal lands are consistent with agency guidelines and meet permitting requirements.

#### 3.3.1.2.2 Habitat Restoration

**Upper Drum-Spaulding Project**

**Bear Valley Meadow Reach of Bear River Upstream of Drum Afterbay**

Aquatic and riparian habitat in Bear Valley Meadow has been affected by project operation and maintenance and former non-project agricultural uses. Of particular concern are fluctuations and sharp increases in flow through the stream reach that result from spills and operations and maintenance of Drum canal. Under terrestrial resources, PG&E proposes to assess, manage, and restore habitat conditions in the Bear River between Bear Valley meadow and Drum afterbay (DS-TR4) (section 3.3.2.2.1, *Riparian and Wetland Vegetation*). Forest Service included a sub-part under condition 50 to develop a Bear River Management Plan Above Drum Afterbay designed to assess baseline and ongoing conditions on Forest Service lands implementing qualitative and quantitative methods in this project-affected stream reach.

California Fish and Wildlife indicated (August 2013) its support for the Forest Service Bear River Management conditions, if the protection extended to all public trust resources and not only those on Forest Service managed lands. The Forest Service [10(a) recommendation 7] and California Fish and Wildlife [10(j) recommendation 7, part 6] recommend measures to limit and manage the frequency and magnitude of spills from Drum canal during winter and planned outages. Spills would be distributed at three locations (Bear River spill [RM 35.3], Bear Valley spill [RM 33.6], and Tahoe spill [RM31.75]) and limited to no more than 20 cfs at the Bear River spill. The recommendations set ramping schedules for increases and decreases in spill-related flows. The Forest Service recommendation was the result of negotiations among PG&E and relicensing stakeholders to resolve differences in the scope of the various plans.

The Forest Service (condition 50 and recommendation 7) and California Fish and Wildlife [10(j) recommendation 8] include a baseline evaluation of existing conditions in this stream reach to document conditions including channel and flood plain morphology, substrate/sediment conditions, bank stability and erosion, and riparian vegetation. Baseline surveys would include use of level loggers to determine a stage-discharge relationship at three locations in Bear River meadow and establishment of up to five monumented channel transects to document bed and bank profiles and position. Based on the results of the baseline surveys, continuing qualitative monitoring (visual and photographic documentation) would be implemented in selected erosion-prone areas and quantitative monitoring of conditions at the monumented channel transects. Quantitative surveys (longitudinal profile, monumented transects, and level loggers) would be conducted during years 1, 5, and 10, and every 5 years thereafter. During the first 5 years following license issuance, the qualitative surveys (photo monitoring, riparian vegetation and bank stability, walking survey, and spill channel evaluation) would be conducted annually and in conjunction with 400 cfs or greater discharge events measured at YB-198, upstream of Drum afterbay. After 5 years of monitoring, survey frequency would be reduced to 3-year intervals and following event flows greater than 400 cfs. PG&E would prepare an annual report following each survey year summarizing the results and providing recommendations in collaboration with the Forest Service for subsequent monitoring surveys. The reports would identify locations of project-related adverse effects, if any, and recommendations for remediation of areas damaged as a result of project operations. Potential economic effects of recommendations on power generation and water supply would be provided in the reports.

*Our Analysis*

Bear River channel and riparian zone have historically been affected by both project operations and maintenance and non-project land use activities related to agriculture and cattle grazing. With the information available, it is difficult to differentiate the effects of these project and non-project stressors on channel morphology and stability and aquatic and riparian habitat quality in this stream reach. PCWA (September 14, 2012) presents qualitative evidence that the channel location has been stable since the late 1930s, channel erosion and down-cutting are minimal despite project operations, and riparian vegetation and habitat are recovering from grazing impacts. PCWA points to re-establishment of riparian vegetation subsequent to prohibition of cattle grazing in the Bear River meadow portion of the stream reach.

PG&E and the relicensing stakeholders have proposed a plan that would generate quantitative baseline data to assess project-related effects in this stream reach and ongoing monitoring to measure changes to stream channel and riparian conditions over time and specifically in response to high flow conditions associated with project operations. Channel morphology and substrate surveys at fixed transects would provide data to evaluate changes over time and response to specific high flow events. Locations exhibiting erosion and bank stability issues would be photographically documented for evaluation of changes over time and response to high flow events. The plan details data requirements and establishes a mechanism for annual review, evaluation, and recommendations for alleviation of project-

related effects in this stream reach. If these studies indicate that project-related effects on the stream reach are minimal or have been mitigated, the annual consultation process provides a mechanism to recommend continuation, reduction, or eventual elimination of this measure. Interim measures proposed to manage operational spills from Drum canal that result in rapid changes and high flows through this reach of Bear River (section 3.3.2.2.3, *Canal Outage Effects on Instream Flow*) would reduce effects that may be occurring under the existing license until the results of the proposed baseline and spill event studies provide adequate information to determine if and where further mitigation should be recommended. Implementation of the plan throughout this stream reach on all public trust lands would ensure protection of the Bear River channel and riparian zone upstream of the Drum afterbay affected by operation and maintenance of the Drum canal.

**Yuba-Bear Project**

**Clear and Trap Creek Channel Stabilization**

Clear and Trap Creeks are tributaries to Fall Creek and, under existing conditions, all flow from their upper watersheds is diverted into the Bowman-Spaulding canal. Operation and maintenance of the Bowman-Spaulding canal result in occasional pulsed discharges from the canal spill gates that have caused channel instability, bank failure, and erosion of Clear and Trap Creeks between the canal and Fall Creek. Canal releases have also incised a gully into the hillslope below the canal at the Christmas Tree wasteway to Clear Creek.

Final Forest Service condition 48 and California Fish and Wildlife recommendation 7, Part 10 specify that NID develop and implement a channel stabilization plan within 1 year of license issuance to include at a minimum, Clear Creek, Trap Creek, and Christmas Tree wasteway; the condition does not provided detail of what the plan should include. NID filed an alternative condition that would require NID to implement the Clear and Trap Creeks Channel Stabilization Plan filed on August 29, 2012. NID again proposed (May 20, 2014) to implement the August 2012 plan filed with their amended license application.

NID's proposed Clear and Trap Creeks Channel Stabilization provides a detailed phased program to assess existing conditions and develop conceptual alternative measures for restoration of these three stream reaches: Clear Creek, Christmas Tree wasteway, and Trap Creek below the Bowman-Spaulding canal (YB-G&S3). Specifically, the NID proposes: (1) to develop a detailed design for the stabilization measures in consultation with the FS and other appropriate agencies; and (2) complete the stabilization activities within 5 years of license issuance.

The relicensing survey of Clear and Trap Creeks identified the extent of channel degradation and appropriate stream reaches for restoration. NID developed conceptual restoration design alternatives and construction sequencing including estimated costs.

*Our Analysis*

Historical operations of the Bowman-Spaulding canal have caused erosion and destabilization of the channels of Clear and Trap Creeks downstream of the canal. Ongoing bank failure and erosion extend over much of the respective stream reaches downstream to Fall Creek and are likely to continue disrupting aquatic habitat and potentially degrading water quality without intervention.

The Forest Service filed comments on the NID alternative and Clear and Trap Creek Channel Stabilization Plan with their final 4(e) conditions (November 21, 2013) indicating that additional negotiations and field work related to the Channel Stabilization Plan have resulted in considerable

progress toward a final plan, but that further modifications are required. Forest Service identified several additions required to complete the proposed plan:

- Add several other locations with active resource damage, identified during field work (sites not specified in the comment);
- Add monitoring to determine effectiveness of stabilization measures implemented; and
- Provide coordination with the Canal Release Point Plan (filed April 11, 2014 and accepted by NID, May 20, 2014).

Implementation of NID's comprehensive plan for restoration of the degraded channels of Clear Creek, Trap Creek, and Christmas Tree wasteway would adequately mitigate past damage and protect these stream reaches in the future. Finalization of the plan through consultation with the agencies should address the additional restoration and monitoring components identified by the Forest Service. Agency review and consultation, detailed construction plans, and environmental permitting would ensure protection of resources during restoration construction activities.

### 3.3.2 Aquatic Resources

#### 3.3.2.1 Affected Environment

##### 3.3.2.1.1 Water Quantity

The Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects include 29 reservoirs, 9 major water conduits, 12 powerhouses with associated switchyards, 6 transmission lines, 1 distribution line, and appurtenant facilities and structures.[3] The Yuba-Bear Project includes 11 reservoirs, 4 major water conduits, 4 powerhouses with associated switchyards, 1 transmission line, and appurtenant facilities and structures. The following section describes key information regarding each reservoir and impoundment, grouped by project development. Physical characteristics of each reservoir, forebay, and afterbay are summarized in table 3-5.[4] Figures 3-3 through 3-16[5] show historic trends in seasonal storage for each reservoir. In their license applications, PG&E and NID use the term unimpaired to refer to flow conditions without project dams, diversions, and powerhouses; that is, these represent hydrology under unregulated conditions. We use the term unregulated in this document to refer to flows that would exist if the project, project facilities, and water delivery systems did not exist.

[3] With the separation of the existing Drum-Spaulding Project into the three projects, the project facility breakdown is as follows: (1) the Upper Drum-Spaulding Project includes 24 reservoirs, 4 major water conduits, 7 powerhouses with associated switchyards, 4 transmission lines, and appurtenant facilities and structures; (2) the Lower Drum Project includes 4 reservoirs, 3 major water conduits, 4 powerhouses with associated switchyards, 1 transmission line, 1 distribution line, and appurtenant facilities and structures; (3) the Deer Creek Project includes 1 reservoir, 2 major water conduits, 1 powerhouse with associated switchyard, 1 transmission line, and appurtenant facilities and structures.

[4] The tables referenced in section 3.3.2.1, *Aquatic Resources, Affected Environment*, are provided in appendix A-1.

[5] The figures referenced in section 3.3.2.1, *Aquatic Resources, Affected Environment*, are provided in appendix B-1.

**Upper Drum-Spaulding Project**

**Water Storage**

*Spaulding No. 3 Development*

Upper Rock Lake

Upper Rock Lake has a maximum surface area of 19.8 acres, is 0.3 mile long, and has a maximum storage capacity of 275 acre-feet (usable storage is 207 acre-feet). Historical monthly storage for the period of record (water years 1976-2008)[6] is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-6. Maximum drawdown occurs in October or November. The reservoir shoreline is 0.9 mile long. Upper Rock Lake is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. As a result, this reservoir has minimal carryover storage. The drainage area into Upper Rock Lake is 0.18 square mile and is unregulated. The reservoir does not have any major tributaries contributing inflow. Water is normally released from Upper Rock Lake to Lower Rock Lake via the Upper Rock Lake dam spillway and a low-level outlet tunnel to Texas Creek.

Lower Rock Lake

Lower Rock Lake has a maximum surface area of 7.6 acres, is 0.2 mile long, and has an unknown maximum storage capacity (usable storage is 48 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-7. Maximum drawdown occurs in October or November. The reservoir shoreline is 0.4 mile long. The drainage area into Lower Rock Lake is 0.29 square miles, with the majority of inflows regulated by local accretion and releases from Upper Rock Lake. Lower Rock Lake is operated to capture spring and early summer runoff, and to release flow in the summer and fall months to augment storage in Lake Spaulding. Similar to Upper Rock Lake, there is minimal carryover storage in Lower Rock Lake. There are no major tributaries contributing inflow to the reservoir. Water is normally released from Lower Rock Lake to Texas Creek via the Lower Rock Lake dam spillway and a low-level outlet tunnel. Texas Creek is a tributary to Canyon Creek downstream of Bowman Lake.

Culbertson Lake

Culbertson Lake has a maximum surface area of 70.5 acres, is 0.7 mile long, and has a maximum storage capacity of 3,150 acre-feet (usable storage is 953 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-8. Maximum drawdown occurs in October or November. The reservoir shoreline is 2 miles long. The drainage area of Culbertson Lake is 0.47 square mile and is unregulated. Culbertson Lake is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. Similar to Upper Rock Lake, there is minimal carryover storage in Culbertson Lake. There are no major tributaries contributing inflow to the reservoir. Water is normally released from Culbertson Lake to an unnamed tributary of Texas Creek via the Culbertson Lake dam spillway and a low-level outlet tunnel.

[6] The historical period of record for streamflow and reservoir storage data is water years 1976 through 2008. A water year begins on October 1 and ends the following September 30.

Upper Lindsey Lake

Upper Lindsey Lake has a maximum surface area of 3.9 acres, is 0.12 mile long, and has an unknown maximum storage capacity (usable storage is 18 acre-feet). PG&E did not present storage frequency data for Upper Lindsey Lake. The reservoir shoreline is 0.5 mile long. The drainage area into Upper Lindsey Lake is 0.16 square mile and is unregulated. Upper Lindsey Lake is operated to capture spring and early summer runoff, and to release flow in the summer and fall months to augment storage in Lake Spaulding. Similar to Upper Rock Lake, there is minimal carryover storage in Upper Lindsey Lake. There are no major tributaries contributing inflow to the reservoir. Water is normally released from Upper Lindsey Lake to Middle Lindsey Lake via the Upper Lindsey Lake dam spillway and a low-level outlet tunnel to Lindsey Creek.

Middle Lindsey Lake

Middle Lindsey Lake has a maximum surface area of 21.5 acres, is 0.3 mile long, and has an unknown maximum storage capacity (usable storage is 110 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-9. Maximum drawdown occurs in October or November. The reservoir shoreline is 1.2 miles long. The drainage area of Middle Lindsey Lake is 0.38 square mile, with the majority of inflow regulated by local accretion and releases from Upper Lindsey Lake. Middle Lindsey Lake is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. Similar to Upper Lindsey Lake, there is minimal carryover storage in Middle Lindsey Lake. There are no major tributaries contributing inflow to the reservoir. Water is normally released from Middle Lindsey Lake to Lower Lindsey Lake via the Middle Lindsey Lake dam spillway and a low-level outlet tunnel to Lindsey Creek.

Lower Lindsey Lake

Lower Lindsey Lake reservoir has a maximum surface area of 29.4 acres, is 0.4 mile long, and has an unknown maximum storage capacity (usable storage is 278 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-10. Maximum drawdown occurs in October, November, December, or January. The reservoir shoreline is 0.9 mile long. The drainage area of Lower Lindsey Lake is 0.88 square mile, with the majority of inflow regulated by local accretion and releases from Middle Lindsey Lake. Lower Lindsey Lake is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. Similar to Upper Lindsey Lake, there is minimal carryover storage in Lower Lindsey Lake. There are no major tributaries contributing inflow to the reservoir. Water is normally released from Lower Lindsey Lake to Lindsey Creek via the Lower Lindsey Lake dam spillway and a low-level outlet tunnel. Lindsey Creek is a tributary to Texas Creek upstream of the Bowman-Spaulding conduit.

Feeley Lake

Feeley Lake has a maximum surface area of 52 acres, is 0.5 mile long, and has an unknown maximum storage capacity (usable storage is 739 acre-feet). PG&E did not present storage frequency data for Feeley Lake. The reservoir shoreline is 1.6 miles long. The drainage area into Feeley Lake is 0.4 square mile and is unregulated. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. As a result, there is minimal carryover storage in Feeley Lake. Because the reservoir is located at high elevation, it does not have any major tributaries contributing inflow. Water is normally released from Feeley Lake to Carr Lake via the Feeley Lake dam spillway and low-level outlet to Lake Creek.

Carr Lake

Carr Lake has a maximum surface area of 15.8 acres, is 0.2 mile long, and has an unknown maximum storage capacity (usable storage is 150 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-11. Maximum drawdown occurs between December and February. The reservoir shoreline is 0.6 mile long. The drainage area into Carr Lake is 0.48 square mile, with the majority of inflow regulated by local accretion and releases from Feeley Lake. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. As a result, there is minimal carryover storage in Carr Lake. Carr Lake does not have any major tributaries contributing inflow. Water is normally released to the Bowman-Spaulding conduit via the Carr Lake dam spillway and low-level outlet to Lake Creek. Lake Creek is a tributary to Fall Creek upstream of the intersection with the Bowman-Spaulding conduit. Fall Creek is a tributary to the South Yuba River downstream of Lake Spaulding.

Blue Lake

Blue Lake has a maximum surface area of 59.7 acres, is 0.4 mile long, and has a maximum storage capacity of 4,042 acre-feet (usable storage is 1,158 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-12. Maximum drawdown occurs in December to January. Throughout the year, the 50 percent exceedance value is about half of the 10 percent exceedance value. This frequency analysis indicates that Blue Lake is rarely at full capacity. The reservoir shoreline is 1.3 miles long. The drainage area into Blue Lake is 0.24 square mile and is unregulated. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. As a result, there is minimal carryover storage in Blue Lake. Blue Lake does not have any major tributaries contributing inflow. Water is normally released to Rucker Lake via the Blue Lake dam spillway and low-level outlet to Rucker Creek.

Rucker Lake

Rucker Lake has a maximum surface area of 78.6 acres, is 0.6 mile long, and has an unknown maximum storage capacity (usable storage is 648 acre-feet). PG&E did not present storage frequency data for Rucker Lake. The reservoir shoreline is 1.5 miles long. The drainage area into Rucker Lake is 1.65 square miles, with the majority of inflow regulated by local accretion and releases from Blue Lake. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. As a result, there is minimal carryover storage in Rucker Lake. Rucker Lake does not have any major tributaries contributing inflow. Water is normally released to the Bowman-Spaulding conduit via the Rucker Lake dam spillway and low-level outlet to Rucker Creek. Rucker Creek is a tributary to Clear Creek and then to the South Yuba River downstream of Lake Spaulding.

Fuller Lake

Fuller Lake has a maximum surface area of 70.2 acres, is 0.5 mile long, and has an unknown maximum storage capacity (usable storage is 1,109 acre-feet). PG&E did not present storage frequency data for Fuller Lake. The reservoir shoreline is 0.3 mile long. The drainage area into Fuller Lake reservoir is 0.54 square mile and is unregulated. Water diverted through Bowman-Spaulding conduit contributes to the majority of inflow into Fuller Lake. The reservoir is operated as a re-regulating pool for hydropower generation shaping. Water is normally released from Fuller Lake to Lake Spaulding through the Spaulding no. 3 powerhouse via Fuller Lake dam spillway, low-level outlet, penstock, and

Bowman-Spaulding conduit. Minimum, mean, and maximum flows through the Spaulding no. 3 powerhouse are 0, 200.2, and 412 cfs, respectively (USGS gage 11416200/YB-253).

*Spaulding No. 1 and No. 2 Development*

Meadow Lake

Meadow Lake has a maximum surface area of 240 acres, is 1.2 miles long, and has a maximum storage capacity of 4,935 acre-feet (usable storage is 4,841 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-13. Maximum drawdown occurs in November to December. The reservoir shoreline is 3.3 miles long. The drainage area into Meadow Lake is 1.3 square miles and is unregulated. Meadow Lake is the second highest reservoir within the project and, similar to White Rock Lake reservoir, receives a large amount of snowmelt influence. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Fordyce Lake and Lake Spaulding. As a result, there is minimal carryover storage in Meadow Lake. Meadow Lake has one small, unnamed stream that contributes some inflow to the reservoir. Water is normally released to Fordyce Lake via the Meadow Lake dam spillway and low-level outlet tunnel via the unnamed tributary to Fordyce Lake.

White Rock Lake

White Rock Lake has a maximum surface area of 88.9 acres, is 0.5 mile long, and has an unknown maximum storage capacity (usable storage is 570 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-14. Maximum drawdown occurs in November to December. The reservoir shoreline is 1.6 miles long. The drainage area into White Rock Lake is 1.17 square miles and is unregulated. The White Rock Creek watershed above White Rock Lake includes the highest altitude within the project vicinity and, thus, has the largest amount of snowmelt influence of the project reservoirs. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Fordyce Lake and Lake Spaulding. As a result, there is minimal carryover storage in White Rock Lake. White Rock Lake does not have any major tributaries contributing inflow to the reservoir. Water is normally released to Fordyce Lake via the White Rock Lake dam spillway and low-level outlet to White Rock Creek and then to North Creek.

Lake Sterling

Lake Sterling has a maximum surface area of 104.7 acres, is 0.5 mile long, and has an unknown maximum storage capacity (usable storage is 1,764 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-15. Maximum drawdown occurs in November to December. The reservoir shoreline is 1.8 miles long. The drainage area into Lake Sterling reservoir is 1.06 square miles and is unregulated. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Fordyce Lake and Lake Spaulding. As a result, there is minimal carryover storage in Lake Sterling. Lake Sterling has no major tributaries that contribute inflow. Water is normally released from Lake Sterling to Fordyce Lake via the Lake Sterling dam spillway and low-level outlet to Bloody Creek.

Fordyce Lake

Fordyce Lake has a maximum surface area of 716.2 acres, is 3.4 miles long, and has a maximum storage capacity of 49,525 acre-feet (usable storage is 49,426 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in

table 3-16. Maximum drawdown occurs in November to December. Historically June is the only month when Fordyce Lake approaches maximum storage and full pond. The reservoir shoreline is 10.4 miles long. The drainage area into Fordyce Lake is 31.29 square miles and is unregulated. Releases from White Rock Lake, Meadow Lake, and Lake Sterling contribute the majority of inflow to Fordyce Lake. Fordyce Lake is also the confluence of seven small, unnamed streams, which contribute some inflow. The reservoir is operated for water delivery scheduling and carryover storage maintenance in Fordyce Creek. Water is normally released from Fordyce Lake to Lake Spaulding via the Fordyce Lake dam spillway and low-level outlet to Fordyce Creek.

Kidd Lake

Kidd Lake has a maximum surface area of 86.7 acres, is 0.5 mile long, and has an unknown maximum storage capacity (usable storage is 1,505 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-17. Maximum drawdown occurs in November to December. The reservoir shoreline is 1.7 miles long. The drainage area into Kidd Lake is 0.56 square mile and is unregulated. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. As a result, there is minimal carryover storage in Kidd Lake. There are no major tributaries contributing inflow to Kidd Lake. Water is normally released from Kidd Lake to Lake Spaulding via the Kidd Lake dam spillway and low-level outlet to an unnamed tributary to the upper South Yuba River, and then to the South Yuba River.

Upper Peak Lake

Upper Peak Lake has a maximum surface area of 83.8 acres, is 0.6 mile long, and has an unknown maximum storage capacity (usable storage is 1,736 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-18. Maximum drawdown occurs in November to December. The reservoir shoreline is 2.4 miles long. The drainage area into Upper Peak Lake is 0.62 square miles and is unregulated. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. As a result, there is minimal carryover storage in Upper Peak Lake. Water is normally released from Upper Peak Lake to Lower Peak Lake via the Upper Peak Lake dam spillway and low-level outlet.

Lower Peak Lake

Lower Peak Lake has a maximum surface area of 33 acres, is 0.4 mile long, and has an unknown maximum storage capacity (usable storage is 484 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-19. Maximum drawdown occurs in November to December. The reservoir shoreline is 1.1 miles long. The drainage area into Lower Peak Lake is 1.01 square miles, with the majority of inflow regulated by local accretion and released from Upper Peak Lake. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment storage in Lake Spaulding. As a result, there is minimal carryover storage in Lower Peak Lake. Water is normally released from Lower Peak Lake to Lake Spaulding via the Lower Peak Lake dam spillway and low-level outlet, Cascade Creek, and South Yuba River.

Lake Spaulding

Lake Spaulding has a maximum surface area of 682 acres, is 2.2 miles long, and has a maximum and usable storage capacity of 75,912 acre-feet. Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-20. Maximum

drawdown occurs in December to February. Storage is closest to maximum capacity from May through July, but rarely reaches full pool. The reservoir shoreline is 8.6 miles long. The drainage area into Lake Spaulding is 117.7 square miles and is mostly unregulated. However, inflows to Lake Spaulding are regulated by releases from Fordyce Lake and flow diverted through Bowman-Spaulding and Jordan canals. The reservoir is principally used for water delivery scheduling and carryover storage maintenance in the South Yuba River. Gonelson Canyon also flows into Lake Spaulding on the southeastern edge of the reservoir. Lake Spaulding releases water to several different project-affected reaches: Jordan Creek, South Yuba River, South Yuba canal, and Drum canal. Releases to Jordan Creek are made through the Lake Spaulding no. 2 dam via an unnamed tributary to Jordan Creek. Releases to the South Yuba River are made through the Lake Spaulding no. 1 dam via the low-level outlet and through the Spaulding no. 2 powerhouse on the South Yuba canal. Releases to the South Yuba canal are made through the Spaulding no. 2 powerhouse via the low-level outlet and the Spaulding no. 2 powerhouse penstock. Releases to Drum canal are made through the Spaulding no. 1 powerhouse via the low-level outlet and the Spaulding no. 1 powerhouse penstock. Minimum, mean, and maximum recorded daily flows through the Spaulding no. 1 and no. 2 powerhouses are 0, 501, and 864 cfs, and 0, 73, and 235 cfs, respectively (USGS gages 11414154/YB-251 and 11414155/YB-252).

*Drum No. 1 and No. 2 Development*

Lake Valley Reservoir

Lake Valley reservoir has a maximum surface area of 303.9 acres, is 1.9 miles long, and has a maximum and usable storage capacity of 7,902 acre-feet. Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-21. Maximum drawdown occurs between November and February. The reservoir shoreline is 4.7 miles long. The drainage area into Lake Valley reservoir is 4.36 square miles and is unregulated. Lake Valley reservoir is also the confluence point of seven unnamed intermittent streams. The reservoir is operated for water delivery scheduling and carryover storage maintenance in the North Fork of the North Fork American River. Water is normally released from Lake Valley reservoir to Drum forebay in the Bear River Basin via the Lake Valley dam spillway and low-level outlet to the North Fork of the North Fork American River, Lake Valley canal diversion dam, Lake Valley canal, and Drum canal.

Kelly Lake

Kelly Lake has a maximum surface area of 28 acres, is 0.3 mile long, and has an unknown maximum storage capacity (usable storage is 352 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-22. Maximum drawdown occurs in November. The reservoir shoreline is 0.8 mile long. The drainage area into Kelley Lake reservoir is 0.53 square mile and is unregulated. The reservoir is operated to capture spring and early summer runoff, and to release flow in the summer and fall to augment flows diverted from the North Fork of the North Fork American River to the Bear River Basin. As a result, the reservoir has minimal carryover storage. Water is normally released from Kelly Lake to Drum forebay via the Kelly Lake dam spillway and low-level outlet, Sixmile Creek, the North Fork of the North Fork American River, Lake Valley canal, and Drum canal.

Drum Forebay

Drum forebay has a maximum surface area of 20 acres, is 0.3 mile long, and has a maximum storage capacity of 621 acre-feet (usable storage is 436 acre-feet). PG&E did not present storage frequency data for Drum forebay. The reservoir shoreline is 0.8 mile long. Inflow to the forebay is regulated by local accretion and releases to Drum canal through the Spaulding no. 1 powerhouse and Lake Valley canal. Water is normally released from Drum forebay to either Alta forebay or to Drum

afterbay through the Drum no. 1 and no. 2 powerhouses. Releases to Alta forebay are made via the Drum forebay dam spillway and low-level outlet, Towle diversion canal, Canyon Creek, and Towle canal. Releases to the Drum no. 1 and no. 2 powerhouses are made via the Drum forebay dam spillway, low-level outlet, and penstocks. Minimum, mean, and maximum recorded daily flows through the Drum no. 1 and no. 2 powerhouses are 0, 166, and 640 cfs, and 0, 320, and 680 cfs, respectively (USGS gage 11414194/YB-248 and 11414195/YB-249).

*Alta Development*

Alta forebay has a maximum surface area of 5 acres, is 0.14 mile long, and has a maximum storage capacity of 37.5 acre-feet (usable storage is 19.4 acre-feet). PG&E did not present storage frequency data for Alta forebay. The reservoir shoreline is 0.3 mile long. Inflow into Alta forebay is regulated by local accretion, releases from Drum forebay to Towle canal via Towle diversion canal and Canyon Creek (tributary to North Fork of the North Fork American River). The reservoir is operated as a re-regulating reservoir to buffer variations in upstream canal flows. The majority of water released from Alta forebay through Alta powerhouse on Little Bear Creek is diverted to PCWA's Lower Boardman canal. The remaining flow is released to Dutch Flat afterbay through Alta powerhouse and the Little Bear River. Minimum, mean, and maximum recorded daily flows through Alta powerhouse are 0, 15, and 57 cfs,[7] respectively (USGS gage 11421725/YB-246).

*Dutch Flat No. 1 Development*

Drum afterbay (Drum-Spaulding Project) on the Bear River has a maximum surface area of 10 acres, is 0.4 mile long, and has a maximum storage capacity of 154.5 acre-feet (usable storage is 150.4 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-23. Drum afterbay is operated as a re-regulating reservoir and the frequency analysis indicates that it operates at full pool throughout the year in most years. The reservoir shoreline is 1.0 mile long. The Bear River watershed above Drum afterbay is 11.91 square miles and is unregulated except for releases from the Drum canal and South Yuba canal waste gates. Releases from Drum forebay and local accretion contribute some inflow to the afterbay. The reservoir is operated as a re-regulating pool for hydropower generation shaping. Water is normally released from Drum afterbay either to the Bear River and Dutch Flat afterbay, to Dutch Flat afterbay through Dutch Flat no. 1 powerhouse, or to Dutch Flat forebay via Dutch Flat no. 2 flume. Minimum, mean, and maximum recorded daily flows through Dutch Flat no. 1 powerhouse are 0, 224, and 8,770 cfs, respectively (USGS gage 11421750/YB-194).

**Project-affected Stream Reaches**

*Spaulding No. 3 Development*

Texas Creek below Upper Rock Lake Dam

Texas Creek, a tributary to Canyon Creek, is only 0.1 mile long between Upper Rock Lake and Lower Rock Lake. The minimum streamflow requirement in the reach below Upper Rock Lake dam under the existing license is 0.1 cfs with a target flow of 0.25 cfs between July 1 and September 30; the existing license provides an equation for downward adjustment of minimum flow based on storage on

[7] While Alta powerhouse unit 2 was decommissioned in 2007, the flows at this gage were observed with both units in service.

July 1, with a correction for evaporation during dry years. Historical monthly streamflow in this reach is summarized at the 10, 50 (median), and 90 percent exceedance values for the period of record in table 3-28. Median ($50^{th}$ percentile) monthly flow is 0 cfs between July and November; peak median flow (1.7 to 2.3 cfs) occurs during April and May. Peak flows at the 10 percent exceedance (3.2 to 4.7 cfs) are more than double the median flows and occur between April and June. PG&E did not estimate unregulated flows for this high elevation, low flow reach.

Texas Creek below Lower Rock Lake Dam

Below Lower Rock Lake dam, Texas Creek extends 3.6 miles to the confluence of Lindsey Creek, then another 0.5 mile to the Bowman-Spaulding conduit. The upper portion of this reach has an average elevation of 6,011 feet msl and a channel gradient of 10.6 percent. The lower 0.5 mile has a similar gradient at an average elevation of 5,560 feet msl. The minimum streamflow requirement in this reach under the existing license is 0.1 cfs with a target flow of 0.25 cfs between July 1 and September 30; the existing license provides an equation for downward adjustment of minimum flow based on storage on July 1, with a correction for evaporation during dry years. Historical monthly streamflow in this reach is summarized at the 10, 50 (median), and 90 percent exceedance values for the period of record in table 3-29. The lowest monthly median ($50^{th}$ percentile) flow is 0.3 cfs between June and August; peak median flow is 1.0 cfs in October; however, no data are available for the period of January through April. The estimated unregulated data indicate that the median monthly would be 0 cfs between July and October, with the peak median flow in April and May (2.8 to 3.8 cfs). Peak monthly unregulated flows at the 10 percent exceedance are more than double the median flows.

Unnamed Tributary below Culbertson Lake Dam

The Culbertson Lake dam reach is a 0.2-mile-long unnamed tributary of Texas Creek with an average elevation of 6,420 feet msl and a channel gradient of 5.3 percent. The minimum streamflow requirement in this reach under the existing license is 0.3 cfs, with a target flow of 0.75 cfs year round; the existing license provides an equation for downward adjustment of minimum flow based on storage on July 1 with a correction for evaporation during dry years. Historical monthly streamflow in this reach is summarized at the 10, 50 (median), and 90 percent exceedance values for the period of record in table 3-30. The monthly median ($50^{th}$ percentile) flows are 0.7 to 0.9 cfs year round; however, no data are available for the period of January through March. Peak monthly flows at the 10 percent exceedance (0.9 to 1.2 cfs) are slightly higher than the median flows. The estimated unregulated data indicate that the median monthly flow would be 0 cfs between August and October with the peak median flow in April and May (4.6 to 6.4 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to three times the median flows.

Lindsey Creek below Upper Lindsey Lake Dam

Below Upper Lindsey Lake dam, Lindsey Creek, a tributary to Texas Creek, is 0.1 mile long down to Middle Lindsey Lake. The reach has an average elevation of 6,468 feet msl and a channel gradient of 11.0 percent. There is no minimum streamflow requirement in this reach under the existing license. PG&E did not present historical (regulated) data for this reach. The estimated unregulated data (table 3-31) indicate that the median monthly flow would be less than 0.2 cfs between July and January, with the peak median flow in April and May (1.6 to 2.4 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to six times the median flows.

Lindsey Creek below Middle Lindsey Lake Dam

Below Middle Lindsey Lake dam, Lindsey Creek, a tributary to Texas Creek, is 0.3 mile long extending to Lower Lindsey Lake. The reach has an average elevation of 6,336 feet msl and a channel

gradient of 12.9 percent. The minimum streamflow requirement in this reach under the existing license is 0.1 cfs, with a target flow of 0.25 cfs year round; the existing license provides an equation for downward adjustment of minimum flow based on storage on July 1, with a correction for evaporation during dry years. Historical monthly streamflow in this reach is summarized at the 10, 50 (median), and 90 percent exceedance values for the period of record in table 3-32. The monthly median (50$^{th}$ percentile) flow was 0 cfs in November and December and 0.3 to 0.5 cfs the rest of the year. Peak monthly flows at the 10 percent exceedance (0.2 to 0.8 cfs) are generally double the median flows. The estimated unregulated data indicate that the median monthly flow would be less than 0.1 cfs between July and November with the peak median flow in April and May (3.7 to 5.2 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to four times the median flows.

Lindsey Creek below Lower Lindsey Lake Dam

The Lower Lindsey Lake dam reach extends 1.4 miles downstream to the confluence with Texas Creek. The reach has an average elevation of 5,940 feet msl and a channel gradient of 7.1 percent. The minimum streamflow requirement in this reach under the existing license is 0.2 cfs, with a target flow of 0.5 cfs year round; the existing license provides an equation for downward adjustment of minimum flow based on storage on July 1, with a correction for evaporation during dry years. Historical monthly streamflow in this reach is summarized at the 10, 50 (median), and 90 percent exceedance values for the period of record in table 3-33. The monthly median (50$^{th}$ percentile) flow was fairly constant, ranging from 0.6 to 0.9 cfs in April through January. Peak monthly flows at the 10 percent exceedance (0.9 to 1.1 cfs) are generally the same to 1.5 times the median flows. The estimated unregulated data indicate that the median monthly would be 0.1 cfs between July and October with the peak median flow in April and May (8.6 to 12.0 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to three times the median flows.

Lake Creek below Feeley Lake Dam

This reach of Lake Creek, a tributary to Fall Creek, extends 0.1 mile from Feeley Lake dam downstream to Carr Lake. The average elevation of this reach is 6,694 feet msl, and the channel gradient is 4.7 percent. The minimum streamflow requirement in this reach under the existing license is 0.2 cfs, with a target flow of 0.5 cfs year round; the existing license provides an equation for downward adjustment of minimum flow based on storage on July 1, with a correction for evaporation during dry years. Historical monthly streamflow in this reach is summarized at the 10, 50 (median), and 90 percent exceedance values for the period of record in table 3-34. The monthly median (50$^{th}$ percentile) flow was 0.6 to 0.8 cfs throughout the year. Peak monthly flows at the 10 percent exceedance (2.2 to 2.3 cfs) occurred in September and October. The estimated unregulated data indicate that the median monthly would be less than 0.1 cfs between July and November, with the peak median flow in April and May (4.0 to 5.7 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to four times the median flows.

Lake Creek below Carr Lake Dam

This reach of Lake Creek extends 2.2 miles from Carr Lake dam downstream to the confluence with Fall Creek. The average elevation of this reach is 6,112 feet msl and the channel gradient is 10 percent. The minimum streamflow requirement in this reach under the existing license is 0.2 cfs, with a target flow of 0.5 cfs year round; the existing license provides an equation for downward adjustment of minimum flow based on storage on July 1, with a correction for evaporation during dry years. Historical monthly streamflow in this reach is summarized at the 10, 50 (median), and 90 percent exceedance values for the period of record in table 3-35. The monthly median (50$^{th}$ percentile) flow was 0.4 to 1.2 cfs from December through September and 2.0 to 2.2 cfs in October and November. Peak monthly flows at the 10 percent exceedance (293.8 to 414.6 cfs) occurred in April and May. The estimated unregulated

data indicate that the median monthly would be less than 0.1 cfs between July and November, with the peak median flow in April and May (4.8 to 6.8 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to four times the median flows.

Rucker Creek below Blue Lake Dam

Blue Lake dam reach of Rucker Creek is about 0.7 mile long between Blue Lake and Rucker Lake. The average elevation of the reach is 5,691 feet msl with a channel gradient of 9.5 percent. The minimum streamflow requirement in this reach under the existing license is 0.2 cfs, with a target flow of 0.5 cfs year round; the existing license provides an equation for downward adjustment of minimum flow based on storage on July 1, with a correction for evaporation during dry years. PG&E did not present historical monthly streamflow in this reach. The estimated unregulated data in table 3-36 indicate that the median monthly would be 0 cfs between July and October, with the peak median flow in April and May (2.2 to 2.9 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to six times the median flows.

Rucker Creek below Rucker Lake Dam

Rucker Lake dam reach of Rucker Creek is about 0.4 mile long, extending downstream to the Bowman-Spaulding conduit. The average elevation of the reach is 5,371 feet msl with a channel gradient of 2.8 percent. The minimum streamflow requirement in this reach under the existing license is 0.2 cfs, with a target flow of 0.5 cfs year round; the existing license provides an equation for downward adjustment of minimum flow based on storage on July1, with a correction for evaporation during dry years. PG&E did not present historical monthly streamflow in this reach. The estimated unregulated data in table 3-37 indicate that the median monthly flow would be less than 1 cfs between July and November, with the peak median flow in April and May (15.0 to 19.8 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to ten times the median flows.

Unnamed Tributary below Fuller Lake Dam

The tributary to Jordan Creek that flows out of Fuller Lake dam is about 1 mile long. The average elevation of the reach is 4,960 feet msl and the channel gradient is 14.5 percent. The Fuller Lake dam reach does not have a minimum streamflow requirement under the existing license. PG&E did not present historical monthly streamflow in this reach. The estimated unregulated data in table 3-38 indicate that the median monthly flow would be 0 cfs between July and September with the peak median flow in April and May (4.6 to 6.1 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to three times the median flows.

*Spaulding No. 1 and No. 2 Development*

Unnamed Tributary below Meadow Lake Dam

Meadow Lake dam reach is a tributary to the upper South Yuba River upstream from Spaulding dam. This reach is 1.4 miles long with an average elevation of 6,845 feet msl and a channel gradient of 11.9 percent. This reach does not have a minimum streamflow requirement under the existing license. PG&E did not present historical monthly streamflow in this reach. The estimated unregulated data in table 3-39 indicate that the median monthly flow would be 0.1 cfs between August and October with the peak median flow in April and May (10.2 to 19.8 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to seven times the median flows.

White Rock Creek below White Rock Diversion Dam

White Rock Lake diversion dam reach is a tributary to North Creek upstream of Fordyce Lake. This reach is about 2.7 miles long with an average elevation of 7,360 feet msl and a channel gradient of 6.5 percent. This reach does not have a minimum streamflow requirement under the existing license. PG&E did not present historical monthly streamflow in this reach. The estimated unregulated data in table 3-40 indicate that the median monthly would be 0.1 cfs between August and October with the peak median flow in April through June (7.6 to 19.3 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to five times the median flows.

Bloody Creek below Lake Sterling Dam

Bloody Creek between Lake Sterling and the upper South Yuba River upstream of Lake Spaulding is about 0.3 mile long. The average elevation is 6,695 feet msl with a channel gradient of 31.3 percent. The Lake Sterling dam reach does not have a minimum streamflow requirement under the existing license. PG&E did not present historical monthly streamflow in this reach. The estimated unregulated data in table 3-41 indicate that the median monthly flow would be 0.1 cfs between August and October with the peak median flow in April and May (8.2 to 15.1 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to three times the median flows.

Fordyce Creek below Fordyce Lake Dam

Fordyce Creek below Fordyce Lake dam (i.e., Fordyce Lake dam reach) is 10.5 miles long and extends from the outlet at Fordyce Lake dam (elevation [El.] 6,280 feet msl at RM 10.5) to the normal maximum water surface elevation of Lake Spaulding (El. 5,014.6 feet msl at RM 0.0). The average channel gradient is 15.1 percent. Minimum flow in this reach under the existing license is 5 cfs year round; during unattended winter operation, the initial flow is set at 5 cfs and not less than 3 cfs at maximum lake level winter drawdown. The historical range and seasonality of flows in this reach are summarized in table 3-42 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Estimated unregulated flows for the same period are presented for comparison in table 3-42. The period of peak median flow (128 to 265 cfs) under existing conditions occurs between June and August; lowest flows occur during winter and early spring (12 to 44 cfs). Highest predicted median flows (100 to 455 cfs) under unregulated conditions occur during spring (March through May), with lowest flows (2 to 8.5 cfs) from July through November.

Unnamed Tributary below Kidd Lake Dam

The Kidd Lake dam reach extends about 0.7 mile downstream to its confluence with upper South Yuba River upstream of Lake Spaulding. The average elevation of this reach is 6,340 feet msl, with a channel gradient of 16.6 percent. This reach does not have a minimum streamflow requirement under the existing license. PG&E did not present historical monthly streamflow in this reach. The estimated unregulated data in table 3-43 indicate that the median monthly flow would be 0 cfs between August and October with the peak median flow in April and May (5.0 to 6.7 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to three times the median flows.

Cascade Creek below Lower Peak Lake Dam

The Lower Peak Lake dam reach of Cascade Creek extends about 1.1 miles downstream to the upper South Yuba River. The average elevation of this reach is 6,300 feet msl, with a channel gradient of 9.6 percent. This reach does not have a minimum streamflow requirement under the existing license. PG&E did not present historical monthly streamflow in this reach. The estimated unregulated data in table 3-44 indicate that the median monthly flow would be 0.1 cfs between July and October with the

peak median flow in April and May (9.0 to 12.1 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to four times the median flows.

South Yuba River below Kidd Lake Dam and Lower Peak Lake Dam

The South Yuba River below Kidd Lake dam and Lower Peak Lake dam, also referred to as Upper South Yuba River reach no. 2 at Cisco Grove, lies downstream of the confluence of Cascade Creek with the South Yuba River, and continues 12.2 miles to Lake Spaulding, with an overall average channel gradient of 1.6 percent. Other reaches upstream of this reach include the Upper South Yuba River reach no. 1, Kidd Lake dam reach, and Lower Peak Lake dam reach. Under the existing license, the minimum streamflow in upper South Yuba River at Cisco Grove, California (YB-316 gage) is 5 cfs year round. The historical range and seasonality of flows in this reach are summarized in table 3-45 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Estimated unregulated flows for the same period are presented for comparison in table 3-45. The period of peak median flow (414 to 651 cfs) under existing conditions occurs between April and June; lowest flows occur from July through November (8 to 19 cfs). Highest predicted median flows (424 to 681 cfs) under unregulated conditions occur during spring (April and May), with lowest flows (3.0 to 12.5 cfs) from July through November. Historical and estimated unregulated flows are very similar through this reach, although the lowest median historical monthly flows are slightly higher than unregulated conditions.

South Yuba River below Lake Spaulding Dam

South Yuba River from Lake Spaulding dam (El. 4,680 feet msl at RM 41.5) to the normal maximum water surface elevation of the U.S. Army Corps of Engineer's Englebright reservoir (about El. 535 feet msl at RM 0.0) is 41.1 miles long and has an average gradient of about 2 percent. For relicensing, PG&E divided this section of river into eight reaches. The five lower reaches (between Rucker Creek and Englebright reservoir) are cumulatively affected by the Drum-Spaulding Project, NID's Yuba-Bear Project, and multiple other factors. The three reaches (from upstream to downstream) with direct and indirect effects include:

- South Yuba River below Spaulding dam reach – the 0.2-mile-long section from Spaulding dam to Spaulding no. 2 powerhouse.

- South Yuba River below Spaulding no. 2 powerhouse reach – the 0.7-mile-long section from Spaulding no. 2 powerhouse to Jordan Creek.

- South Yuba River reach no. 1 – the 3.2-mile-long section from Jordan Creek to Rucker Creek (upstream of Lang's Crossing).

The minimum streamflow below Lake Spaulding dam under the existing license is 1.0 cfs year round released at Spaulding no. 2 powerhouse. Minimum total flow released from Lake Spaulding in the South Yuba River at Lang's Crossing is 5.0 cfs year round. Historical streamflow and estimated unregulated flows showing accretion of flow proceeding downstream from Spaulding no. 2 powerhouse to Rucker Creek to Fall Creek to Canyon Creek are provided in table 3-46 to table 3-49. Median flows at the powerhouse range seasonally from 2.3 cfs in December to 6.4 cfs in May, compared to unregulated median flows at this location of 7 cfs in August to about 1,560 cfs in May. Peak historical flows at the 10 percent exceedance are 42 to 44 cfs in May and June, compared to the unregulated 10 percent exceedance of 2,435 to 3,120 cfs (table 3-46). Below the confluence of Canyon Creek, the median historical flows range seasonally from 7.6 cfs in August to 80.7 cfs in May, compared to unregulated median flows ranging from 10.4 cfs in August to 1,771 cfs in May. Peak flows at the 10 percent

exceedance historically in May and June range from about 1,240 to1410 cfs; unregulated flows in May and June range from 2,715 to 3,530 cfs (table 3-49).

*Drum No. 1 and No. 2 Development*

North Fork of the North Fork American River below Lake Valley Reservoir Dam

Lake Valley reservoir dam reach is the 3.1-mile-long section of the North Fork of the North Fork American River from Lake Valley reservoir dam (El. 5,800 feet msl at RM 16.3) to Lake Valley canal diversion dam (El. 5,440 ft at RM 13.2). The average channel gradient is 2.0 percent. This reach has a minimum streamflow requirement of 1 cfs year round under the existing license. The historical range and seasonality of flows in this reach of the North Fork of the North American River are summarized in table 3-51 in terms of median (50$^{th}$ percentile) and upper and lower 10$^{th}$ percentile range of flows for the period of record under the existing license. Median historical flows are 4.2 to 6.0 cfs in June through September; during the rest of the year, median flows are 10.0 to 18.0 cfs. At the 10 percent exceedance, flows in July through September are 19 to 22 cfs; the rest of the year 10 percent exceedance flows are mostly 27.0 to 31.0 cfs, with a peak in May of 43.0 cfs. The estimated unregulated data in table 3-51 indicate that the median monthly would be 0.4 cfs or less between July and October, with the peak median flow in April and May (41.6 to 55.4 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to six times the median flows.

Sixmile Creek below Kelly Lake Dam

The Kelly Lake dam reach of Sixmile Creek is about 0.3 mile long, extending downstream to the North Fork of the North Fork American River. The average elevation of the reach is 5,820 feet msl, with a channel gradient of 4.4 percent. Under the existing license, there is no minimum streamflow requirement; however, Lake Kelly may not be drawn down before August 1. The historical range and seasonality of flows in this reach of Sixmile Creek are summarized in table 3-52 in terms of median (50$^{th}$ percentile) and upper and lower 10$^{th}$ percentile range of flows for the period of record under the existing license. Median historical flows are 0 cfs in January and February, and July through September; during the rest of the year, median flows are 0.5 to 2.5 cfs. At the 10 percent exceedance, flows in July through September are 1 cfs or less; the rest of the year 10 percent exceedance flows are 2.5 to 5.6 cfs. Estimated unregulated median flows are less than 0.2 cfs from July through November, with unregulated peak median flows of 5.0 to 6.7 cfs in April and May. Peak unregulated flows at the 10 percent exceedance are about twice the peak monthly median flows.

North Fork of the North Fork American River below Lake Valley Canal Diversion Dam

Lake Valley canal diversion dam reach is the 13.2-mile-long section of the North Fork of the North Fork American River from Lake Valley canal diversion dam (El. 5,440 feet msl at RM 13.2) to the confluence with the North Fork American River (El. 1,920 feet msl at RM 0.0). The average channel gradient is 5.2 percent. Under the existing license, the minimum streamflow requirement is 1 cfs from October 1 to May 31 and 3 cfs from June 1 through September 30. The historical range and seasonality of flows in this reach of the North Fork of the North Fork American River are summarized in table 3-53 in terms of median (50$^{th}$ percentile) and upper and lower 10$^{th}$ percentile range of flows for the period of record under the existing license. Median historical flows are 1.2 to 1.5 cfs in October through December and 3.2 to 3.4 cfs in June through September; peak median flows are 21.5 to 33.5 cfs in April and May. Two peaks occur at the 10 percent exceedance flows in December and January (98 to 118 cfs) and March through May (72 to 174 cfs). Estimated unregulated median flows are less than 1 cfs from July through October, less than under existing conditions. Unregulated peak median flows would be 84 to 112 cfs in April and May. Peak unregulated flows at the 10 percent exceedance are about two to four times the peak monthly median flows.

Bear River below Drum Canal Spillway Gate

Bear River reach no. 1 is the 0.3-mile-long section of the Bear River that extends from the point of inflow from the Drum canal spillway gate (gage YB-137, El. 4,800 feet msl at RM 35.3) to the point of inflow to the Bear River from the South Yuba canal at gage YB-139 (El. 4,600 feet msl at RM 35.0). The gradient of Bear River reach no. 1 is 13.1 percent. Under the existing license, there is no minimum streamflow requirement at the Drum canal spillway. The historical flow data in table 3-54 indicate that the median monthly flow from the Drum canal spillway is 0 cfs from July through April; peak median flow is 50 cfs in May. At the monthly 10 percent exceedance, flows are 0 cfs from August to November and again in January; flows at 10 percent exceedance peak in March through June (185 to 325 cfs).

Bear River at Highway 20 Crossing between South Yuba Canal Inflow at Gage YB-139

Bear River reach no. 2 is the 7.6-mile-long section of the Bear River that extends from the point of inflow from gage YB-139 (the downstream end of Bear River reach no. 1) to the normal maximum water surface elevation of Drum afterbay (El. 3,400 feet msl at RM 27.4). The gradient of Bear River reach no. 2 is 3.2 percent. Under the existing license, the only minimum flow requirement is a 5-cfs release from the South Yuba canal year round. The historical range and seasonality of flows in this reach of the Bear River are summarized in table 3-55 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Median historical flows are less than 8 cfs in July through November; peak median flow is 77.5 cfs in May. Peak monthly flow at the 10 percent exceedance occurs in March through May (204 to 264 cfs). Estimated unregulated median flows are less than 1 cfs from July through November, less than under existing conditions. During the rest of the year, unregulated monthly median flows would be 1.7 to 9.8 cfs, also significantly less than historical flows under the existing license. Peak unregulated flow at the 10 percent exceedance is 20.8 cfs in May.

*Alta Development*

Canyon Creek below Towle Canal Diversion Dam

Towle canal diversion dam reach is the 3.7-mile-long section of Canyon Creek, a tributary to the North Fork American River, from Towle canal diversion dam (El. 4,200 feet msl at RM 9.3) to the normal maximum water surface elevation of NACO/Thousand Trails' Snowflower reservoir, a non-project facility (El. 3,480 feet msl at RM 2.0). The channel gradient is 3.7 percent. Under the existing license, the minimum flow requirement for this reach is 1 cfs year round or natural streamflow plus 20 percent, whichever is less. The historical range and seasonality of flows in this reach are summarized in table 3-56 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are less than 1 cfs in May through January; peak median flow is 1.1 cfs in February through April. Unregulated median flows are less than 1 cfs from July through November. During the rest of the year, unregulated monthly median flows would be 1.4 to 6.0 cfs. Peak unregulated flow at the 10 percent exceedance is 5.9 to 6.0 cfs in March and April.

Little Bear River below Alta Powerhouse Tailrace

Little Bear River is a tributary of the Bear River. The Alta powerhouse reach is about 2 miles of Little Bear River extending from the Alta powerhouse tailrace to the Dutch Flat afterbay. The reach has an average elevation of 3,140 feet msl and a channel gradient of 8.3 percent. Under the existing license, there is no minimum streamflow requirement for this reach. The historical range and seasonality of flows in this reach of the Little Bear River are summarized in table 3-57 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license.

Historical median monthly flows are 0.2 cfs in June through November; peak median flows are 6.2 to 6.7 cfs in February and March. Peak monthly flow at the 10 percent exceedance occurs in January through April (20 to 29 cfs). Unregulated median flows are less than 1 cfs from July through November. During the rest of the year, unregulated monthly median flows would be 1.3 to 5.3 cfs. Peak unregulated flow at the 10 percent exceedance is 16 cfs in May.

*Dutch Flat No. 1 Development*

Bear River below Drum Afterbay

Drum Afterbay dam reach is the 4.7-mile-long section of the Bear River from Drum afterbay dam (El. 3,280 ft at RM 26.9) to the normal maximum water surface elevation of Dutch Flat afterbay (El. 2,720 ft at RM 22.2). The channel gradient is 2.3 percent. Under the existing license, minimum streamflow between March 1 and September 30 is 10 cfs in normal years and 5 cfs in dry years, as defined in the license; from October 1 through the end of February, the minimum flow is 5 cfs during any year. The historical range and seasonality of flows in this reach of the Bear River below Drum afterbay are summarized in table 3-58 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are 5.9 to 6.1 cfs in October through February; peak median flows are 10 to 11 cfs in March through September. Monthly flow at the 10 percent exceedance peaks at 70 cfs in April and is 7 to 13 cfs throughout most of the rest of the year. Unregulated peak median flows are 47 to 55 cfs from March through May. During most of the rest of the year, unregulated monthly median flows would be 4 to 18 cfs. Peak unregulated flows at the 10 percent exceedance are 109 to 128 cfs in February through May.

**Lower Drum Project**

**Water Storage**

*Halsey Development*

Halsey forebay has a maximum surface area of 18 acres, is 0.2 mile long, and has a maximum capacity of 244 acre-feet (usable storage is 238 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-24. The Halsey forebay storage frequency analysis indicates that it operates at full pool throughout the year in many years. The reservoir shoreline is 0.6 mile long. Inflows into Halsey forebay are regulated by local accretion and flow diverted through Bear River canal. The reservoir is operated to re-regulate inflows for daily peaking purposes in Halsey powerhouse. Water is normally released from Halsey forebay to Halsey afterbay through Halsey powerhouse on the Bear River canal via Halsey forebay dam spillway, low-level outlet, and penstock. Minimum, mean, and maximum recorded daily flows through Halsey powerhouse are 0, 320, and 562 cfs, respectively (USGS gage 11425310/YB-250).

*Wise and Wise No. 2 Developments*

Halsey Afterbay

Halsey afterbay has a maximum surface area of 10.3 acres, is 0.2 mile long, and has a maximum storage capacity of 86 acre-feet (usable storage is 76 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-25. The Halsey afterbay storage frequency analysis indicates that it operates at less than full pool throughout the year in many years. The reservoir shoreline is 0.5 mile long. Halsey afterbay is operated as a re-regulating pool for hydropower generation shaping, capturing flow from the Dry Creek watershed, which is about 3.08 square miles at Halsey afterbay and is unregulated. Most inflow to Halsey afterbay is

regulated by releases from Halsey forebay and powerhouse. Water is normally released from Halsey afterbay to Rock Creek reservoir via Halsey afterbay dam spillway and low-level outlet to Upper Wise canal. Additional releases are made from Halsey afterbay to Dry Creek, which does not have a minimum flow requirement under the current license.

Rock Creek Reservoir

Rock Creek reservoir has a maximum surface area of 58 acres, is 0.6 mile long, and has a maximum storage capacity of 485 acre-feet (usable storage is 482 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-26. Maximum drawdown occurs in November or December; the storage frequency analysis indicates that about half the time Rock Creek reservoir is drawn down significantly. The reservoir shoreline is 1.8 miles long. The drainage area into Rock Creek reservoir is 2.18 square miles and is unregulated. Although the drainage area is unregulated, inflows into Rock Creek reservoir are regulated by releases from Halsey afterbay. The reservoir is operated as a re-regulating pool for hydropower generation shaping and acts as a regulating "interbay" between Halsey afterbay and Wise forebay. Water is normally released from Rock Creek reservoir to Wise forebay in the Auburn Ravine sub-basin via Rock Creek dam spillway and low-level outlet to the Lower Wise canal. Additional releases are made from Rock Creek reservoir to Rock Creek, which does not have a minimum flow requirement under the current license.

Wise Forebay

Wise forebay has a maximum surface area of 4.5 acres, is 0.1 mile long, and has a maximum storage capacity of 32 acre-feet. Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-27. The Wise forebay storage frequency analysis indicates that it operates at less than full pool most of the time, but fluctuation in water surface level is relatively minor. The reservoir shoreline is 0.3 mile long. Inflow to Wise forebay is regulated by releases from Rock Creek reservoir via the Lower Wise canal. Water is released from Wise forebay via the Wise dam spillway, low-level outlet, and penstock through the Wise no. 1 and no. 2 powerhouses. Combined minimum, mean, and maximum recorded daily flows through the Wise no. 1 and no. 2 powerhouses are 0, 288, and 470 cfs, respectively (USGS gage 11425415/YB-254). Most flow is released through the Wise powerhouses to the Newcastle powerhouse header box via South canal. Combined minimum, mean, and maximum recorded daily flows through the Newcastle powerhouse are 0, 140, and 388 cfs, respectively (USGS gage 11425416/YB-289). Releases of water from the Wise powerhouse can be made from South canal to Auburn Ravine (which does not have a minimum flow requirement under the current license) at two locations (Auburn Ravine RM 27.64 and RM 27.35). These releases are made to spill flow in excess of the capacity of South canal during winter, to meet demand for NID water deliveries, and for emergency purposes.

**Project-affected Stream Reaches**

*Halsey Development*

Bear River Diversion Dam and Bear River Canal

The Bear River canal diversion dam is located immediately downstream of the Rollins dam, diverting water to the Halsey Development and for delivery to water users in western Placer County. Water diversion to the Bear River canal serves the primary purpose of water supply delivery; PG&E's project developments, Halsey, Wise, and Newcastle, take advantage of these water transfers to generate electricity. Although there is no specific condition in the current Drum-Spaulding license, the Bear River diversion dam essentially has the same requirement for minimum release to the Bear River as the

requirement at Rollins dam (Yuba-Bear Project, Bowman Development). Flow diverted from the Bear River into the Bear River canal to the Halsey forebay is the flow in excess of the minimum Bear River flow released from Rollins powerhouse and dam (Yuba-Bear Project, Bowman Development) up to the capacity of the canal. The historical flow data in table 3-59 indicate that the median monthly flow in the Bear River canal is 400 to 446 cfs from March through October, peak median flow is 446 cfs in August, and the lowest median flow is 243 cfs in November. At the 10 percent exceedance, flows are relatively constant throughout the year (473 to 483 cfs); flows at the 10 percent exceedance peak in April (483 cfs).

*Wise and Wise No. 2 Developments*

Dry Creek below Halsey Afterbay Dam

Halsey afterbay dam reach of Dry Creek is about 2.2 miles long, between the Halsey afterbay dam and the high-water pool of Redhawk Ranch reservoir (non-project). The reach has an average elevation of 1,450 feet msl and a channel gradient of 1.6 percent. Under the existing license, there is no minimum streamflow requirement for the Halsey afterbay dam reach of Dry Creek. PG&E did not present a historical flow frequency analysis for this reach of Dry Creek. Unregulated peak median flows (table 3-60) are 6.1 to 6.5 cfs during March and April. During most of the rest of the year, unregulated monthly median flows would be 0.7 to 4 cfs. Peak unregulated flows at the 10 percent exceedance are 14 to 20 cfs in January to May.

Rock Creek below Rock Creek Diversion Dam

Rock Creek dam reach of Rock Creek is about 2.1 miles long and extends from Rock Creek dam downstream to the confluence with Dry Creek. The reach has an average elevation of 1,310 feet msl and a channel gradient of 2.4 percent. Under the existing license, there is no minimum streamflow requirement for the Rock Creek dam reach. The historical range and seasonality of flows in this reach of the Bear River below Drum afterbay are summarized in table 3-61 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are 0.1 to 0.3 cfs year round. Lowest monthly flow at the 10 percent exceedance occur in October and March through April (8.4 to 9.4 cfs); throughout most of the rest of the year, flows are generally 20 to 40 cfs. Unregulated peak median flows are 4.0 to 4.3 cfs in March and April. During most of the rest of the year, unregulated monthly median flows would be 0.5 to 2.7 cfs. Peak unregulated flows at the 10 percent exceedance are 10 to 13 cfs in February through May.

Auburn Ravine

The project-affected reach of Auburn Ravine below the Wise and Wise no.2 powerhouses extends from the discharge from PG&E's South canal to Auburn Ravine downstream to the discharge from Auburn tunnel (non-project transfer from North Fork of the American River by PCWA). Under the existing license, there is no minimum flow requirement for releases from the Wise and Wise No. 2 Developments to Auburn Ravine via South canal. The total hydraulic capacity of the Wise and Wise no. 2 powerhouses exceeds the hydraulic capacity of the South canal; excess volume can be released from South canal at a spill gate to Auburn Ravine. Water is released to Auburn Ravine at this location primarily to meet contractual water delivery obligations to NID and PCWA. The historical range and seasonality of flows from the South canal to Auburn Ravine are summarized in table 3-62 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Peak historical median monthly flows are 287 to 300 cfs in December through March; median flows are at their lowest July and November. Monthly flow at the 10 percent exceedance from September through May range from 143 to 340 cfs.

*Newcastle Development*

Mormon Ravine

The Newcastle Development powerhouse is located at the terminus of the South canal. The Mormon Ravine reach is about 0.3 mile long between where flows from the Newcastle Development enter to the normal maximum water surface elevation of Folsom Lake. PG&E delivers water to PCWA from South canal at several locations between the Wise powerhouses and the Newcastle Development to meet water delivery contractual requirements. The Newcastle Development is the most downstream development of the Lower Drum Project; flows through the Newcastle powerhouse for power generation are those in excess of contractual water delivery and upstream storage and minimum streamflow requirements in the Yuba-Bear, Drum-Spaulding, Deer Creek, and Lower Drum Projects. Under the existing license, the required minimum streamflow in Mormon Ravine below Newcastle powerhouse is 5 cfs; during an outage of the South canal, Bear River canal, Upper Wise canal, or Lower Wise canal there is no minimum streamflow in Mormon Ravine. The historical range and seasonality of flows from the Newcastle powerhouse to Mormon Ravine are summarized in table 3-63 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Peak historical median monthly flows are 221 to 278 cfs in December through April; median flows are 0 cfs in October and November and July and August. Monthly flow at the 10 percent exceedance from September through May range from 209 to 321 cfs.

**Deer Creek Project**

**Water Storage**

*Deer Creek Development*

Deer Creek forebay has a maximum surface area of 3.3 acres, is 0.08 mile long, and has a maximum storage capacity of 15.8 acre-feet (usable storage is 10.7 acre-feet). PG&E did not present storage frequency data for Deer Creek forebay. The reservoir shoreline is 0.2 mile long. Inflow to the forebay is regulated by local accretion and releases through the Spaulding no. 2 powerhouse via the South Yuba canal and Chalk Bluff canal. Water is normally released from Deer Creek forebay to the South Fork of Deer Creek, through the Deer Creek powerhouse via the Deer Creek dam spillway, low-level outlet, and penstock. Minimum, mean, and maximum recorded daily flows through Deer Creek powerhouse are 0, 48.1, and 116 cfs, respectively (USGS gage 11414205/YB-247).

**Project-affected Stream Reaches**

*Deer Creek Development*

South Fork Deer Creek below Deer Creek Powerhouse

Deer Creek powerhouse reach is the 0.1-mile-long section of South Fork Deer Creek that extends from the Deer Creek powerhouse (El., 3,600 feet msl at RM 3.0) to NID's Cascade canal diversion dam (El. 3,360 feet msl at RM 2.9), a non-project facility. The average channel gradient is 3.0 percent. Under the existing license, there is no minimum streamflow requirement for this reach. There are no historical data for flows in this reach of South Fork Deer Creek. The historical range and seasonality of flows from the Deer Creek powerhouse into this reach are summarized in table 3-50 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. The period of peak median flow (60 to 62 cfs) under existing conditions occurs between June and September; lowest flows occur during April (0 cfs). At the 10 percent exceedance, peak flows in May and June are 86 to 91 cfs, with flows the rest of the year between 60 and 78 cfs.

**Yuba-Bear Project**

**Water Storage**

*Bowman Development*

Jackson Meadows Reservoir

Jackson Meadows reservoir has a maximum surface area of 1,008 acres, is 2.8 miles long, and has a maximum storage capacity of 67,641 acre-feet (usable storage is 67,435 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-64. Maximum drawdown occurs in November and December; highest median monthly reservoir storage occurs between May and August. The highest monthly storage at the 10 percent exceedance approaches maximum storage capacity between May and August. The reservoir shoreline is 9.9 miles long. Jackson Meadows reservoir is operated to capture and store the spring runoff from the Middle Yuba River watershed, which is about 37.3 square miles at Jackson Meadows reservoir, with the majority of water conveyed via the Middle Yuba River. Several small streams also drain into Jackson Meadows reservoir, including Pass Creek, Woodcamp Creek, and three unnamed tributaries. Historical releases to the Middle Yuba River have been made from Jackson Meadows reservoir to meet project storage and downstream flow requirements.

Milton Diversion Dam Impoundment

Milton diversion dam impoundment has a maximum surface area of 100 acres, is 0.4 mile long, and has a maximum and usable storage capacity of 275 acre-feet. Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-65. Between May and October, median monthly storage is 189 to 193 acre-feet; during most of the rest of the year, storage is between 165 and 168 acre-feet. At the 10 percent exceedance, storage exceeds the storage capacity at 294 to 295 acre-feet in February through June. The reservoir shoreline is 1.3 miles long. The drainage area into Milton diversion dam impoundment is about 39.8 square miles, with the majority of inflows regulated by local accretion and releases from Jackson Meadows reservoir. Milton diversion dam impoundment operates as a flow control feature, diverting up to 450 cfs into the Bowman-Spaulding conduit to Bowman Lake reservoir in the Canyon Creek sub-basin.

Jackson Lake

Jackson Lake has a maximum surface area of 52 acres, is 0.4 mile long, and has a maximum storage capacity of 1,334 acre-feet (usable storage is 975 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-66. Between May and September, median monthly storage is 1,000 to 1,330 acre-feet; during most of the rest of the year, storage is between 848 and 912 acre-feet. At the 10 percent exceedance, storage between February and July is at or above maximum storage capacity. The reservoir shoreline is 1.1 miles long. The reservoir is operated to capture and store the spring runoff from the Jackson Creek watershed, which is about 0.7 square mile at Jackson Lake. Inflow into Jackson Lake is unregulated, but because the reservoir acts as a storage reservoir for the Yuba-Bear Project, discharge into Jackson Creek is regulated. Water is normally released from Jackson Lake to Bowman Lake via the Jackson Lake dam spillway and a low-level outlet tunnel to Jackson Creek.

French Lake

French Lake has a maximum surface area of 356 acres, is 1.6 miles long, and has a maximum and usable storage capacity of 13,940 acre-feet. Historical monthly storage for the period of record is

summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-67. Between May and July, median monthly storage approaches maximum storage capacity; during most of the rest of the year, storage is between 6,700 and 12,000 acre-feet. At the 10 percent exceedance, storage between January and July is at or above maximum storage capacity. The reservoir shoreline is 5.3 miles long. The reservoir is operated to capture and store the spring runoff from Canyon Creek watershed, which is about 4.82 square miles at French Lake. Inflow into French Lake is unregulated, but because the reservoir acts as a major storage reservoir for the Yuba-Bear Project, discharge into Canyon Creek is regulated. Several small streams also drain into French Lake, including three unnamed tributaries, one of which originates from Baltimore Lake, a small non-project reservoir upstream of French Lake. Water is normally released from French Lake reservoir to Faucherie Lake via the French Lake dam spillway and a low-level outlet tunnel to Canyon Creek.

Faucherie Lake

Faucherie Lake has a maximum surface area of 150 acres, is 0.7 mile long, and has a maximum storage capacity of 3,980 acre-feet (usable storage is 3,740 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-68. Between January and September, median monthly storage approaches or exceeds maximum storage capacity. During most of the rest of the year, storage is between 3,230 and 3,721 acre-feet. At the 10 percent exceedance, storage during all months is at or above maximum storage capacity. The reservoir shoreline is 2.4 miles long. The drainage area into Faucherie Lake is 9.29 square miles, with the majority of inflows regulated by local accretion and releases from French Lake. Faucherie Lake is operated to capture and store spring runoff, and regulate discharges to Canyon Creek. There are no major tributaries contributing inflow to the reservoir. Water is normally released from Faucherie Lake to Sawmill Lake via the Faucherie Lake dam spillway and a low-level outlet tunnel to Canyon Creek.

Sawmill Lake

Sawmill Lake has a maximum surface area of 113 acres, is 0.8 mile long, and has a maximum and usable storage capacity of 3,030 acre-feet. Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-69. Between January and August, median monthly storage is at maximum capacity of Sawmill Lake; during most of the rest of the year, storage is between 2,727 and 2,860 acre-feet. At the 10 percent exceedance, storage during all months is at or above maximum storage capacity. The reservoir shoreline is 2.6 miles long. The drainage area into Sawmill Lake is 17.0 square miles, with the majority of inflows regulated by local accretion and releases from Faucherie Lake. South Fork is a major tributary contributing inflow to Sawmill Lake. The reservoir is operated to capture and store spring runoff, and to regulate discharges to Canyon Creek. Water is normally released from Sawmill Lake to Bowman Lake via the Sawmill Lake dam spillway and a low-level outlet tunnel to Canyon Creek.

Bowman Lake

Bowman Lake has a maximum surface area of 827 acres, is 2.6 miles long, and has maximum and usable storage capacity of 68,363 acre-feet. Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-70. Peak monthly median storage occurs in June and July (60,500 to 64,300 acre-feet); from January to March, median storage is at about half of maximum capacity. At the 10 percent exceedance, storage during May through July is at or above maximum storage capacity. The reservoir shoreline is 7.6 miles long. The drainage area into Bowman Lake is 28.5 square miles, with the majority of inflows regulated by local accretion, releases from Sawmill Lake and Jackson Lake, and flow diverted through the Milton-Bowman diversion conduit. Bowman Lake is also the confluence point of two small unnamed streams in Poison Canyon on the southern side of the lake. Water is normally released from Bowman Lake to the Bowman-Spaulding

conduit diversion impoundment, through Bowman powerhouse on Canyon Creek via the Bowman North dam low-level outlet and penstock. Minimum, mean, and maximum recorded daily flows through Bowman powerhouse are 0, 179.5, and 350 cfs, respectively. The Bowman-Spaulding conduit diversion impoundment diverts the majority of water released from Bowman Lake through the Bowman-Spaulding conduit to Lake Spaulding; however, the current license requires a minimum flow in Canyon Creek downstream of Bowman-Spaulding conduit diversion dam of 3 cfs from April 1 to October 31 and a minimum flow of 2 cfs from November 1 to March 31 in all water years.

*Dutch Flat No. 2 Development*

Dutch Flat no. 2 forebay has a maximum surface area of 8 acres, is 0.2 mile long, and has a maximum storage capacity of 177.9 acre-feet (usable storage is 160 acre-feet). PG&E did not present a storage frequency analysis for Dutch Flat no. 2 forebay. The reservoir shoreline is 0.5 mile long. The drainage area into Dutch Flat no. 2 forebay is 0.1 square mile. Inflows to Dutch Flat no. 2 forebay are highly regulated by releases from Drum afterbay. The forebay is operated as a run-of-river reservoir, regulating flow into Dutch Flat no. 2 powerhouse penstock. Water is normally released from Dutch Flat no. 2 forebay to Dutch Flat afterbay, through Dutch Flat no. 2 powerhouse via Dutch Flat no. 2 forebay dam spillway, low-level outlet, and penstock. Minimum, mean, and maximum recorded daily flows through Dutch Flat no. 2 powerhouse are 0, 197.5, and 610 cfs, respectively.

*Chicago Park Development*

Dutch Flat Afterbay

Dutch Flat afterbay has a maximum surface area of 38 acres, is 0.9 mile long, and has a maximum and usable storage capacity of 1,359.2 acre-feet. Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-71. The median storage (1,570 to 1,970 acre-feet) is in excess of the maximum storage capacity all year according to the PG&E analysis. The reservoir shoreline is 1.9 miles long. The drainage area into Dutch Flat afterbay is 21.2 square miles. Dutch Flat afterbay is operated as a re-regulating reservoir, regulating inflows from Drum afterbay, Dutch Flat no. 2 forebay, and Alta forebay. The majority of water is normally released from Dutch Flat afterbay to Chicago Park forebay via the Chicago Park flume, and the remainder is released to Rollins reservoir on the Bear River via the Dutch Flat afterbay dam spillway and low-level outlet.

Chicago Park Forebay

Chicago Park forebay has a maximum surface area of 7 acres, is 0.3 mile long, and has a maximum and usable storage capacity of 103 acre-feet. PG&E did not present a storage frequency analysis for the Chicago Park forebay. The reservoir shoreline is 0.7 mile long. Inflows to Chicago Park forebay are highly regulated by releases from Dutch Flat afterbay. The reservoir is operated as a run-of-river reservoir, regulating flow into the Chicago Park powerhouse penstock. Water is normally released from Chicago Park forebay to Rollins reservoir on the Bear River via the Chicago Park forebay dam spillway, low-level outlet, and penstock. Minimum, mean, and maximum recorded daily flows through Chicago Park powerhouse are 0, 498.7, and 1,100 cfs, respectively (YB-258).

*Rollins Development*

Rollins reservoir has a maximum surface area of 788 acres, is 3.3 miles long, and has a maximum storage capacity of 58,682 acre-feet (usable storage is 54,453 acre-feet). Historical monthly storage for the period of record is summarized at the 10, 50 (median), and 90 percent exceedance values in table 3-72. Between March and May, median monthly storage approaches or exceeds maximum storage

capacity. During most of the rest of the year, storage is between 36,000 and 58,400 acre-feet. At the 10 percent exceedance, storage during November through July is at or above maximum storage capacity. The reservoir shoreline is 19 miles long. The drainage area into Rollins reservoir is 104 square miles, with the majority of inflows highly regulated by releases from Dutch Flat afterbay and Chicago Park forebay. The reservoir is operated as a storage reservoir for irrigation, recreation, and power demands. Water is normally released from Rollins reservoir to the Bear River via the penstock to the Rollins powerhouse, the Rollins dam spillway, and low-level outlet, penstock, and the Bear River canal. Minimum, mean, and maximum recorded daily flow through Rollins powerhouse are 0, 545, 837.9 cfs, respectively (USGS gage 11421900/YB-279). The Bear River canal diversion dam diverts the majority of water released from Rollins reservoir through the Bear River canal to Halsey forebay; however, the current license requires a minimum flow in the Bear River downstream of Rollins dam of 75 cfs from May 1 to October 31 and 20 cfs from November 1 to April 30 in a normal year, and a minimum flow of 40 cfs from May 1 to October 31 and 15 cfs from November 1 to April 30 in a dry year.

**Project-affected Stream Reaches**

*Bowman Development*

Middle Yuba River – below Jackson Meadows Dam

Jackson Meadows dam reach is a 1.6-mile-long section of the Middle Yuba River that extends from the base of Jackson Meadows dam (El., 6,000 feet msl at RM, 47.1) to the normal maximum water surface elevation of Milton diversion dam impoundment (El. 5,690 feet msl at RM 45.5). The reach has a gradient of 3.9 percent. There are no storage or diversion dams upstream of Jackson Meadows reservoir. NID uses the reach primarily to transport water stored in Jackson Meadows reservoir to the Milton-Bowman diversion, where the water is diverted to Bowman Lake on Canyon Creek. Under the existing license, the minimum streamflow in this reach released from Jackson Meadows dam is 5 cfs year round. The historical range and seasonality of flows in this reach of Middle Yuba below Jackson Meadows dam are summarized in table 3-73 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows peak in September and October (144 to 146 cfs); lowest median flows occur from November to February (9 to 11 cfs). Median flows are relatively high (70 to 106 cfs) from March through August. Minimum monthly flows reflected by the 90 percent exceedance are 4.2 to 8.8 cfs throughout the year, with the lowest flows in December to February. Lowest monthly flow at the 10 percent exceedance occurs in January (91.5 cfs). Unregulated peak median flow is about 356 cfs in May. Lowest unregulated monthly median flows would be less than 20 cfs (July through December). Minimum unregulated flows (90 percent exceedance) are 5 cfs or less from July through November. The lowest unregulated flows at the 10 percent exceedance are less than 20 cfs in August through October.

Middle Yuba River below Milton Diversion Dam

Milton diversion dam reach is a 32-mile-long section of the Middle Yuba River that extends from the base of Milton diversion dam impoundment (El. 5,653 feet msl at RM 44.8) to the normal maximum water surface elevation of YCWA's Our House diversion dam (El. 4,720 feet msl at RM 12.8). Channel gradient is 2.8 percent. NID uses the dam to divert water via the Milton-Bowman conduit to Bowman Lake on Canyon Creek. Water released from Milton diversion dam does not pass through any project powerhouses nor is it used to meet water deliveries by NID. Under the existing license, the minimum streamflow downstream of Milton diversion dam is 3 cfs year round. The historical range and seasonality of flows in this reach of Middle Yuba River below Milton diversion dam are summarized in table 3-74 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are 3.6 to 4.0 cfs year round, with the minimum flow (3.6 cfs) in January. Minimum monthly flows reflected by the 90 percent exceedance are

2.0 to 3.4 cfs throughout the year, with the lowest flows in April and May. Relatively low monthly flows at the 10 percent exceedance occur in July through March (4.2 to 6.0 cfs). Estimated unregulated peak median flows are about 378 cfs in May. Lowest unregulated monthly median flows would be less than 10 cfs (August through November). The lowest unregulated flows at the 10 percent exceedance are less than 20 cfs in August through October. Minimum unregulated flows (90 percent exceedance) are less than 4 cfs from August through November.

Wilson Creek below Wilson Creek Diversion Dam

Wilson Creek diversion dam reach extends from Wilson Creek diversion dam located on Wilson Creek (El. 5,690 feet msl at RM 0.3) to the confluence of Wilson Creek with the Middle Yuba River (El. 5,665 feet msl at RM 0.0). The gradient in the reach is 3.6 percent. Wilson Creek diversion dam was constructed in the mid-1980s and has no storage capability. Wilson Creek is an ephemeral creek with no upstream storage or diversion facilities. During spring, NID diverts water from the creek into the Milton-Bowman conduit. No minimum flow is required in this reach under the existing license. NID did not present a historical flow frequency analysis for Wilson Creek. Estimated unregulated median flows are 0.2 cfs or less from July through November (table 3-75). Minimum unregulated flows (90 percent exceedance) are 0 cfs from July through October. The lowest unregulated flows at the 10 percent exceedance are less than 6 cfs in July through February. Peak flows at the 10 percent exceedance are 11.3 to 22.0 cfs in March through June.

Jackson Creek below Jackson Lake Dam

Jackson Lake dam reach is a 3.0-mile-long section of Jackson Creek that extends from the base of Jackson dam (El. 6,568 feet msl at RM 3.0) to the normal maximum water surface elevation of Bowman Lake (El. 5,562 feet msl at RM 0.0). The reach has a gradient of 6.9 percent. There are no upstream storage or diversion facilities. NID releases water from Jackson Lake into Bowman Lake. The minimum streamflow in this reach is 0.75 cfs year round under the existing license. The historical range and seasonality of flows in this reach of the Jackson Creek are summarized in table 3-76 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are 1.2 to 1.6 cfs year round in this reach of Jackson Creek. Minimum monthly flows reflected by the 90 percent exceedance are 0.9 to 1.0 cfs throughout the year. Monthly flows at the 10 percent exceedance are 1.7 to 2.0 cfs year round. Estimated unregulated median flows are 1 cfs or less from July through January and 1.4 to 9.7 cfs from February through June. The lowest unregulated flows at the 10 percent exceedance are less than 10 cfs in year round. Minimum unregulated flows (90 percent exceedance) are 0 cfs from July through November.

Canyon Creek below French Lake Dam

French Lake dam reach is a 1.4-mile-long section of Canyon Creek that extends from the base of French dam (El. 6,590 feet msl at RM 18.4) to the normal maximum water surface elevation of Faucherie Lake (El. 6,123 feet msl at RM 17.0). The reach has a gradient of 7.3 percent. NID releases water from French Lake into Faucherie Lake. The minimum flow in this reach of Canyon Creek is 2.5 cfs year round under the existing license. The historical range and seasonality of flows in this reach of the Canyon Creek are summarized in table 3-77 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are 2.9 to 3.2 cfs year round in this reach of Canyon Creek. Minimum monthly flows reflected by the 90 percent exceedance are 2.7 to 2.9 cfs throughout the year. Monthly flows at the 10 percent exceedance are 3.1 to 3.2 cfs year round. Estimated unregulated median flows are less than 2 cfs from July through November. Minimum unregulated flows (90 percent exceedance) are less than 1 cfs from July through December. The lowest unregulated flows at the 10 percent exceedance are less than 2.5 cfs in August through October.

Canyon Creek below Faucherie Lake Dam

Faucherie Lake dam reach is a 1.8-mile-long section of Canyon Creek that extends from the base of Faucherie Lake dam (El. 6,058 feet msl at RM 16.5) to the normal maximum water surface elevation of Sawmill Lake (El. 5,860 feet msl at RM 14.7). The reach has a gradient of 3.3 percent. NID releases water from Faucherie Lake into Sawmill Lake. The minimum flow in this reach of Canyon Creek is 2.5 cfs year round under the existing license. The historical range and seasonality of flows in this reach of the Canyon Creek are summarized in table 3-78 in terms of median (50$^{th}$ percentile) and upper and lower 10$^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are 2.9 to 3.0 cfs year round in this reach of Canyon Creek. Minimum monthly flows reflected by the 90 percent exceedance are 2.7 to 2.9 cfs throughout the year except for 1.3 cfs in September. Monthly flows at the 10 percent exceedance are 3.1 to 3.3 cfs year round. Estimated unregulated median flows are less than 2.5 cfs from July through November. Minimum unregulated flows (90 percent exceedance) are less than 1 cfs from July through November. The lowest unregulated flows at the 10 percent exceedance are less than 5 cfs in August through October.

Canyon Creek below Sawmill Lake Dam

Sawmill Lake dam reach is a 0.8-mile-long section of Canyon Creek that extends from the base of Sawmill Lake dam (El. 5,800 feet msl at RM 14.0) to the normal maximum water surface elevation of Bowman Lake (El. 5,562 feet msl at RM 13.2). The reach has a gradient of 6.9 percent. NID releases water from Sawmill Lake into Bowman Lake. The minimum flow in this reach of Canyon Creek is 2.5 cfs year round under the existing license. The historical range and seasonality of flows in this reach of Canyon Creek are summarized in table 3-79 in terms of median (50$^{th}$ percentile) and upper and lower 10$^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are 3.5 to 4.2 cfs year round in this reach of Canyon Creek. Minimum monthly flows reflected by the 90 percent exceedance are 2.8 to 3.0 cfs throughout the year. Monthly flows at the 10 percent exceedance are 6.1 to 9.5 cfs in February through July; flows from August to December are 29 to 57 cfs, except for 6.5 cfs in October. Estimated unregulated median flows are less than 3.0 cfs or less from July through October. Minimum unregulated flows (90 percent exceedance) are less than 1 cfs from July through October. The lowest unregulated flows at the 10 percent exceedance are 4 to 5 cfs in August and September.

Canyon Creek below Bowman Dam

Bowman dam and powerhouse (El. 5,569 feet msl at RM 10.4) release directly into the Bowman-Spaulding diversion dam impoundment, which is only a few hundred feet long. No minimum streamflow is required under the existing license. NID did not present a flow frequency analysis for the releases to the Bowman-Spaulding diversion impoundment.

*Dutch Flat No. 2 Development*

Canyon Creek below Bowman-Spaulding Diversion Dam

Bowman-Spaulding diversion dam reach is a 10.5-mile-long section of Canyon Creek that extends from the base of Bowman-Spaulding diversion dam (El. 5,379 feet msl at RM 10.5) to the South Yuba River confluence (El. 2,840 feet msl at RM 0.0). The reach has a gradient of 4.2 percent. The existing license requires a minimum streamflow of 3 cfs between April 1 and October 31 and 2 cfs between November 1 and March 31. The historical range and seasonality of flows in this reach of the Canyon Creek are summarized in table 3-80 in terms of median (50$^{th}$ percentile) and upper and lower 10$^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows are 4.1 cfs (November) to 6.3 cfs (March) in this reach of Canyon Creek. Minimum

monthly flows reflected by the 90 percent exceedance are 2.1 to 3.3 cfs throughout the year. Monthly flows at the 10 percent exceedance are 10 cfs or less from July through December. Estimated unregulated median flows are less than 10 cfs from July through November. Minimum unregulated flows (90 percent exceedance) are less than 10 cfs from June through January. The lowest unregulated flows at the 10 percent exceedance are less than 10 cfs in August to September.

Texas Creek below Texas Creek Diversion Dam

Texas Creek diversion dam reach is a 0.6-mile-long section of Texas Creek that extends from the base of Texas Creek diversion dam (El. 5,365 feet msl at RM 0.6) to the Texas Creek confluence with Canyon Creek (El. 4,640 feet msl at RM 0.0). Texas Creek diversion dam has no appreciable storage. The reach has a gradient of 24.2 percent. PG&E's Drum-Spaulding Project's Upper Rock, Lower Rock, Culbertson, Upper Lindsey, Middle Lindsey, and Lower Lindsey Lakes are upstream of the Texas Creek diversion dam. NID diverts water from Texas Creek into the Bowman-Spaulding conduit. No minimum streamflow is required for this reach of Texas Creek under the existing license. NID did not present a frequency analysis for historical flows in this reach of Texas Creek. The range and seasonality of estimated unregulated flows in this reach of the Texas Creek are summarized in table 3-81 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Unregulated median flows are less than 10 cfs from July through January. Minimum unregulated flows (90 percent exceedance) are less than 5 cfs from June through January. The lowest unregulated flows at the 10 percent exceedance are less than 3 cfs in August through October.

Clear Creek below Bowman-Spaulding Conduit

Clear Creek below Bowman-Spaulding conduit reach is a 0.9-mile-long section of Clear Creek that extends from the Bowman-Spaulding conduit (El. 5,360 feet msl at RM 0.9) to the Clear Creek confluence with Fall Creek (El. 5,200 feet msl at RM 0.0). The reach has a gradient of 3.7 percent. The Clear Creek Basin upstream of Bowman-Spaulding conduit does not have any reservoirs, diversions, or inflows from man-made facilities, and the creek is dry each year during summer-fall. Water from upstream in Clear Creek flows into the Bowman-Spaulding conduit, and excess water is released back into Clear Creek at a conduit dump gate. No minimum streamflow is required for the downstream reach of Clear Creek under the existing license. NID did not present a frequency analysis for historical flows in this reach. The range and seasonality of estimated unregulated flows in this reach are summarized in table 3-82 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Estimated unregulated median flows are less than 8 cfs from June through March. Minimum unregulated flows (90 percent exceedance) are less than 5 cfs year round except in April (5.8 cfs). The lowest unregulated flows at the 10 percent exceedance are less than 6 cfs in July through November.

Fall Creek below Fall Creek Diversion Dam

Fall Creek diversion dam reach is a 1.3-mile-long section of Fall Creek that extends from the base of Fall Creek diversion dam (El. 5,363 feet msl at RM 2.0) to the Fall Creek confluence with the South Yuba River (El. 3,200 feet msl at RM 0.0). Fall Creek diversion dam has no appreciable storage. The reach has a gradient of 20.9 percent. PG&E's Drum-Spaulding Project's Feeley and Carr Lakes are upstream of the Fall Creek diversion dam. NID diverts water from Fall Creek into the Bowman-Spaulding conduit. No minimum streamflow is required for this reach under the existing license. The historical range and seasonality of flows in this reach of the Canyon Creek are summarized in table 3-83 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows range from 0.4 cfs (January and February) to 2.2 cfs (November) in this reach of Fall Creek. Minimum monthly flows reflected by the 90 percent exceedance are 0.3 to 0.7 cfs throughout the year. Monthly flows at the 10 percent

exceedance are 5 cfs or less from June through March, with peak flow of 294 to 415 cfs in April and May. Estimated unregulated median flows are less than 1 cfs from July through January with no flow from August through November. Minimum unregulated flows (90 percent exceedance) are 2 cfs or less, year round. The lowest unregulated flows at the 10 percent exceedance are less than 2 cfs in July through November.

Trap Creek below Bowman-Spaulding Conduit

Trap Creek below Bowman-Spaulding conduit is a 1.2-mile-long reach of Trap Creek that extends from the Bowman-Spaulding conduit (El. 5,360 feet msl at RM 1.2) to the Trap Creek confluence with Fall Creek (El. 3,600 feet msl at RM 0.0). The reach has a gradient of 27.6 percent. The Trap Creek Basin upstream of Bowman-Spaulding conduit does not have any reservoirs, diversions, or inflows from man-made facilities, and the creek runs dry each year. Water in Trap Creek flows into the Bowman-Spaulding conduit, and excess water is released back into Trap Creek at a conduit dump gate. No minimum streamflow is required for this reach under the existing license. NID did not present a frequency analysis for historical flows in this reach. The range and seasonality of estimated unregulated flows in this reach are summarized in table 3-84 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Estimated unregulated median flows are less than 2 cfs from June through February. Minimum unregulated flows (90 percent exceedance) are less than 2 cfs year round except in April (2.3 cfs). The lowest unregulated flows at the 10 percent exceedance are less than 6 cfs in July through February.

Rucker Creek below Bowman-Spaulding Conduit

Rucker Creek below Bowman-Spaulding conduit is a 1.2-mile-long reach of Rucker Creek that extends from the Bowman-Spaulding conduit (El. 5,360 feet msl at RM 1.2) to the confluence of Rucker Creek with the South Yuba River (about El. 3,630 feet msl at RM 0.0). The reach has a gradient of 26.1 percent. PG&E's Drum-Spaulding Project's Blue and Rucker Lakes are upstream of the Bowman-Spaulding conduit. Water in Rucker Creek flows into the Bowman-Spaulding conduit, and excess water is released into Rucker Creek at an upstream conduit dump gate. No minimum streamflow is required for this reach under the existing license. NID did not present historical monthly streamflow in this reach. Estimated unregulated data in table 3-85 indicate that the median monthly would be 0.2 cfs or less between July and October, with the peak median flow in April and May (15.7 to 20.9 cfs). Peak monthly unregulated flows at the 10 percent exceedance are generally two to six times the median flows.

*Chicago Park Development*

Steephollow Creek

Emergency spills from the Chicago Park conduit into Steephollow Creek to evacuate the conduit during outages occur infrequently, but can produce elevated flows in Steephollow Creek for short periods. The existing license does not have flow requirements for Steephollow Creek, and no information on historical or unregulated flow frequency is available.

Bear River below Dutch Flat Afterbay Dam

Dutch Flat afterbay dam reach is a 5.4-mile-long section of Bear River that extends from the base of Dutch Flat afterbay dam (El. 2,590 feet msl at RM 21.3) to the Chicago Park powerhouse tailrace (El. 2,240 feet msl at RM 15.9). Dutch Flat afterbay dam was constructed from 1964 through 1965 and has a usable storage of 1,359.2 acre-feet. The reach has a gradient of 1.3 percent. PG&E's Drum-Spaulding Project's Drum afterbay is upstream. NID diverts water from the Dutch Flat afterbay to Chicago Park powerhouse via the Chicago Park conduit. Under existing conditions, minimum flows in

the Bear River below Dutch Flat afterbay are 10 cfs between May 1 and October 31 and 5 cfs between November 1 and April 30. The historical range and seasonality of flows in this reach of the Canyon Creek are summarized in table 3-86 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Historical median monthly flows range from 6.5 to 7.1 cfs (November through April) to 11 to 12 cfs (May through October) in this reach of Bear River. Minimum monthly flows reflected by the 90 percent exceedance are 5.2 to 6.3 cfs from November through July and 9.7 to 10 cfs from August through October. Monthly flows at the 10 percent exceedance are 16 cfs or less from October through February and in May and June with peak flow of 71 to 128 cfs in March and April. Estimated unregulated median flows are less than 20 cfs from July through December. Minimum unregulated flows (90 percent exceedance) are 10 cfs from June through December. The unregulated flows at the 10 percent exceedance are greater than 150 cfs from January through May and less than 20 cfs in August through October.

Bear River – below Chicago Park Powerhouse

Chicago Park powerhouse reach is a 1.5-mile-long section of the Bear River from the Chicago Park powerhouse tailrace (El. 2,240 feet msl at RM 15.9) to the normal maximum water surface elevation of Rollins reservoir (El. 2,171 feet msl at RM 14.4). Chicago Park powerhouse is the project's only peaking facility. Releases and spills at Dutch Flat afterbay dam, as well as accretion in a 5.4-mile-long section of the Bear River upstream of the powerhouse, flow unimpeded past the powerhouse. This section of stream has been severely disturbed by historic hydraulic mining activity. The reach is a low gradient, braided channel due to high sediment supply from hydraulic mining. The original valley is filled with cobble and gravel materials excavated during hydraulic mining. Subsurface flow is common and deep pools are infrequent. Deposition is further enhanced in the lower 0.5 mile due to backwater effect from Rollins reservoir, where sinuosity and anastomosing (connection of streams) is increased, and sands and silts are deposited. No minimum flow is specified for this reach in the existing license. NID did not present a separate flow frequency analysis for this reach.

*Rollins Development*

Bear River below Rollins Dam

Rollins dam and powerhouse (El. 1,960 feet msl at RM 10.5) release water directly into the PG&E Drum-Spaulding Project's Bear River canal diversion dam impoundment, which is only a few hundred feet long. Water that passes the Bear River canal diversion dam (approximate El. 1,960 feet msl at RM 10.4) flows downstream 10.4 miles to NID's Lake Combie (approximate El. 1,600 feet msl at RM 0.0), a non-project facility. Two sets of minimum flow requirements under the existing license are specified: normal or wet years; and dry years. From May 1 through October 31, the minimum streamflow is 75 cfs in normal or wet years and 40 cfs in dry years. From November 1 through April 30, the minimum flow is 20 cfs in normal or wet years and 15 cfs in dry years. The historical range and seasonality of flows in this reach of the Bear River are summarized in table 3-87 in terms of median ($50^{th}$ percentile) and upper and lower $10^{th}$ percentile range of flows for the period of record under the existing license. Highest historical median monthly flows occur from January through June (234 to 585 cfs) in this reach of the Bear River; flows from September through December are 100 cfs or less. Lowest minimum monthly flows reflected by the 90 percent exceedance occur from November through April (19 to 24 cfs); flows are greater than 65 cfs from May through October. Monthly flows at the 10 percent exceedance are greater than 1,200 cfs from January through April and greater than 290 cfs the rest of the year. Estimated unregulated median flows are less than 60 cfs from July through November. Minimum unregulated flows (90 percent exceedance) are less than about 21 cfs from July through October and are highest in March and April (129 to 134 cfs). The unregulated flows at the 10 percent exceedance are about 1,000 cfs in March and less than 70 cfs in August through October.

**Water Rights and Other Water Uses**

Historically, one of the primary purposes/uses of many of the Drum-Spaulding and Yuba-Bear Projects has been for diversion and delivery of water across sub-watersheds for uses other than hydropower generation; e.g., municipal and domestic water supply, agriculture and irrigation, mineral extraction, and other industrial uses. NID and PCWA are the principal non-hydropower purveyors of water used and distributed through the project facilities. NID points out in responding to comments on the amended final license application (docket filing 20120914-5152) that:

> *Whether or not the Project is operated for hydropower production, NID's water rights entitle NID to continue to direct the water in a manner identical to that proposed for licensing… the Commission's issuance of a new license for the Project – or its denial – will not change NID's water operations in this basin, which give consumptive demands a higher priority than hydropower production.*

The Water Commission Act of 1914, a predecessor to today's California Water Code provisions governing water appropriation, created the State Water Rights Board, which evolved into the California Water Board, which has the authority to administer permits and licenses for surface water use. An appropriative water right is a legal entitlement authorizing water to be diverted from a specified source and put to beneficial, non-wasteful use. The holder of an appropriative water right does not own the water but simply holds the right to use it. NID and PG&E hold a combination of pre- and post-1914 appropriative rights related to these two projects for various beneficial uses, including domestic, irrigation, industrial, municipal, hydroelectric power, recreation, and mining (tables 3-88 and 3-89, respectively). The majority of these appropriative rights are for multiple uses in addition to power generation. NID holds post-1914 water rights for project storage of more than 603,000 acre-feet seasonally and diversion of 4,269 cfs distributed among various conduits and canals. PG&E holds pre- and post-1914 water rights for storage of more than 171,800 acre-feet seasonally and diversion of 2,627 cfs distributed among various conduits and canals. Many of these rights are exercised through within-basin (e.g., Dutch Flat no. 2 flume and Chicago Park flume on the Bear River) and out-of-basin (e.g., Milton-Bowman diversion conduit from the Middle Yuba River, Lake Valley canal from the North Fork of the North Fork American River, and Bear River canal from the Bear River) water transfers.

#### 3.3.2.1.2 Water Quality

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) defines water quality criteria for the Sacramento River and its tributaries and formally designates existing and potential beneficial uses and water quality objectives. The designated beneficial uses for the project areas consist of municipal and domestic water supply; agricultural supply; hydropower generation; water contact and non-contact recreation; cold freshwater habitat; warm freshwater habitat; wildlife habitat; and migration, spawning, reproduction, and/or early development of aquatic organisms. Water quality objectives are listed in the Central Valley Water Board's *Fourth Edition of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* (Basin Plan). They include: bacteria, biostimulatory substances, chemical constituents, dissolved oxygen (DO), floating material, oil and grease, pH, sediment and settleables, tastes and odors, temperature, toxicity, turbidity, color, and pesticides.[8]

[8] Resource agencies did not request that PG&E or NID measure color or pesticides during relicensing studies. PG&E and NID are unaware of any instances where the color of the water in the *(continued ...)*

Because most water quality objectives provided in the Basin Plan are narrative, to assess the consistency of applicant-derived analytical data with beneficial uses, PG&E and NID identified numeric standards, criteria, and benchmarks that could be correlated with each beneficial use (PG&E and NID, 2010a). Provided in table 3-90, the selected values were primarily from the California Toxics Rule (EPA, 2000, as cited in PG&E and NID, 2010a) and the numeric water quality objectives of the Basin Plan (Central Valley Water Board, 1998), which incorporates the title 22 drinking water standards by reference.[9] When an analyte did not have a corresponding standard or criterion in either the California Toxics Rule or the Basin Plan, benchmarks were excerpted from *A Compilation of Water Quality Goals* (Marshack, 2003, as cited in PG&E, 2011a, and NID, 2011a), *Water Quality Standards for Recreational Waters* (EPA, 2003, as cited in PG&E, 2011a and NID, 2011a), and other sources as noted in table 3-90.

Mormon Ravine (Newcastle Development) and Auburn Ravine (Wise and Wise No. 2 Developments) reaches affected by the existing Drum-Spaulding Project are not listed under section 303(d) of the Clean Water Act as impaired water bodies. However, portions of the Middle Yuba River, South Yuba River, Bear River, North Fork of the North Fork American River, and Deer Creek are listed under section 303(d) of the Clean Water Act as impaired water bodies as a result of mercury concentrations, with resource extraction not associated with operation of these projects as the probable sources of impairment. The South Yuba River below Lake Spaulding (Spaulding No. 1 and No. 2 Development of the Drum-Spaulding Project) to Englebright reservoir has been assigned a beneficial use designation in the Central Valley Regional Water Quality Control Board's Basin Plan for the Sacramento and San Joaquin river basins as cold freshwater habitat; i.e., uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. Based on this beneficial use designation this reach of the South Yuba River is listed as impaired for temperature under section 303(d), although no specific source of impairment is identified. South Yuba River Citizens League (2009) cites the legacy effects of mining on channel and riparian habitat and diversion of water at Spaulding dam as the primary factors affecting temperature impairment. EPA accepted this designation in October 2011 and completion of a Total Maximum Daily Limit (TMDL) is required by 2021.

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vicinity of the projects has been reported as a potential problem. Similarly, significant pesticide use does not occur within the study area or in association with project operations and maintenance.

[9] The U.S. Environmental Protection Agency (EPA) has established National Primary Drinking Water Regulations that set mandatory water quality standards for drinking water contaminants. These are enforceable standards called "maximum contaminant levels" or "MCLs," which are established to protect the public against consumption of drinking water contaminants that present a risk to human health. An MCL is the maximum allowable amount of a contaminant in drinking water that is delivered to the consumer (i.e., at the tap). In addition, EPA has established National Secondary Drinking Water Regulations that set non-mandatory water quality standards for 15 contaminants. EPA does not enforce these "secondary maximum contaminant levels" or "SMCLs." They are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor (U.S. EPA, 2012).

### Water Quality Standards[10]

Water quality in the project areas was determined to be high and in accordance with the following seven basin plan objectives: biostimulatory substances; chemical constituents; color; pesticides; floating material; oil and grease; and sediment and settable solids. However, a few inconsistencies were observed for the seven remaining Basin Plan objectives. Monitoring results and observed exceedances are summarized below.

#### Bacteria

The state water quality criteria for the protection of waters used for water contact recreation are based on the collection of a minimum of 5 fecal coliform samples within a 30-day period. All of the 2008 samples from the 20 recreation sites sampled had fecal coliform counts below the Basin Plan objective, but the following 5 recreation sites had total coliform counts above the benchmark: the north shore campsites at Carr Lake (Upper Drum-Spaulding Project, Spaulding No. 3 Development); the informal campground boat launch at Lower Lindsey Lake (Upper Drum-Spaulding Project, Spaulding No. 3 Development); and Long Ravine, Orchard Springs, and Greenhorn campgrounds at Rollins reservoir (Yuba-Bear Project, Rollins Development). These findings were confirmed in the 2009 study.

#### Dissolved Oxygen

Generally, measured DO levels in project-affected waters remained above the 7 milligrams per liter (mg/L) Basin Plan standard for cold water fisheries in all but 16 of the more than 100 samples. The 16 samples were collected from 10 separate locations. DO was less than the Basin Plan standard in the following study and project-affected stream reaches: the reach below Lake Sterling dam (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development) in both spring and summer 2008; the reach below Lake Spaulding (Upper Drum-Spaulding Project; Spaulding No. 1 and No. 2 Development) in fall 2009; the reach below Rock Creek reservoir (Lower Drum Project, Wise and Wise No. 2 Developments) in summer 2009; and Greenhorn Creek, a non-project-affected reach above Rollins reservoir in spring 2008. DO levels were less than 7 mg/L in the following project reservoirs: hypolimnion of Jackson Meadows reservoir (Yuba-Bear Project, Bowman Development) in summer 2008 and fall 2009; Sawmill Lake (Yuba-Bear Project, Bowman Development) in July 2008; Bowman Lake (Yuba-Bear Project, Bowman Development) in August 2008, and August and September 2009; Rollins reservoir (Yuba-Bear Project, Rollins Development) in summer and fall 2009; Blue Lake (Upper Drum-Spaulding Project, Spaulding No. 3 Development) in summer 2009; and Lake Spaulding (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development) in summer and fall 2009.

#### pH

Measured pH values were within the Basin Plan criterion of 6.5 to 8.5 standard units in all but 6 of the more than 100 samples collected. Four of the samples from project-affected stream reaches were between 6.0 and 6.4 standard units. In spring 2008, measured pH levels were less than the Basin Plan standard in the following study and project-affected stream reaches: Fordyce dam reach below Fordyce

[10] With the separation of the existing Drum-Spaulding Project into the three projects, the following developments are part of the Upper Drum-Spaulding Project: (1) Spaulding No. 3; (2) Spaulding No. 1 and No. 2; (3) Drum No. 1 and No. 2; (4) Alta; and (5) Dutch Flat No. 1; the following developments are part of the Lower Drum Project: (1) Halsey; (2) Wise; (3) Wise No. 2; and (4) Newcastle; and the Deer Creek Development is part of the Deer Creek Project.

Lake (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development); Greenhorn Creek above Rollins reservoir; Chicago Park reach above Rollins reservoir (Yuba-Bear Project, Chicago Park Development); and Bowman-Spaulding conduit below Fuller Lake (Upper Drum-Spaulding Project, Spaulding No. 3 Development). Within project reservoirs, pH levels were less than 6.5 standard units in one sample from the hypolimnion of Blue Lake (Upper Drum-Spaulding Project, Spaulding No. 3 Development) in summer 2008 and above 8.5 standard units near the bottom of Lake Spaulding (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development) in fall 2009.

**Tastes and Odors**

Iron concentrations were below the Basin Plan criterion of 0.3 mg/L in all but 6 of the more than 100 samples. Iron concentrations were above the Basin Plan criterion in the following project-affected stream reaches: Mormon Ravine reach (Lower Drum Project, Newcastle Development) in spring 2008; South Yuba River below Spaulding dam reach (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development) in summer and fall 2008; Rock Creek below Rock Creek reservoir (Lower Drum Project, Wise and Wise No. 2 Developments) in spring and summer 2009; and Bear River canal diversion dam reach below Rollins reservoir (Yuba-Bear Project, Rollins Development) in fall 2008.

**Toxicity**

Water quality objectives for aquatic toxicity are not included in the Basin Plan for the Bear and Yuba Rivers. Therefore, aquatic toxicity criteria from the EPA's California Toxics Rule (U.S. EPA, 2000) were used to evaluate aquatic toxicity in the project area. When a California Toxics Rule criterion was not available for a specific analyte, an aquatic life protective benchmark was selected from Marshack (2003), *A Compilation of Water Quality Goals* and other sources. Each sample was analyzed for 12 metals, including mercury and methylmercury, for both the total and dissolved fractions. Aluminum was found above the aquatic benchmark of 0.087 mg/L in 5 of the more than 100 samples. Four of the samples were taken from Halsey afterbay (Drum-Spaulding Project, Wise and Wise No. 2 Development) dam reach in spring 2008; Mormon Ravine (Lower Drum Project, Newcastle Development) reach in spring and fall 2008; and Bear River canal diversion dam reach below Rollins reservoir (Yuba-Bear Project, Rollins Development) in fall 2008. Aluminum concentrations were above the benchmark in the hypolimnion of Jackson Meadows reservoir (Yuba-Bear Project, Bowman Development) in spring 2008.

Water hardness in the project area ranged from 4.8 to 26.6 mg/L in the spring, 1.6 to 32 mg/L in summer and 3.2 to 80 mg/L in fall. Bioavailability of some metals increases at lower hardness levels; therefore, PG&E and NID calculated California Toxics Rule criteria for specific samples for cadmium, chromium, copper, lead, nickel, silver, and zinc to compare to laboratory results. Dissolved copper was found to be the only metal with concentrations greater than the sample-specific California Toxics Rule criterion. Only 4 of the 49 spring 2008 samples exhibited dissolved copper concentration above the California Toxics Rule criterion, and 20 of the 49 summer 2008 samples exhibited dissolved copper concentrations above the criterion. Only 10 samples were analyzed in fall 2008, of which only 1 exhibited copper concentrations above the California Toxics Rule criterion.

**Stream Reach Temperatures**

The water temperature in the majority of project-affected streams is generally cold, with mean daily water temperatures of less than 20°C. Therefore, the majority of project-affected streams support a coldwater trout fishery. However, lower elevation reaches of the Middle Yuba River, South Yuba River, and Bear River are transitional between cold and warm water habitat with summer water temperatures that are warmer than upstream reaches in closer proximity to project reservoir release points. Under existing license conditions the following five stream reaches had mean daily water temperatures that exceeded 20°C (generally considered to be near the upper limit of the optimum temperature range for

trout) or instantaneous maximum temperatures exceeding 25°C (the approximate lethal thermal threshold of rainbow trout for a limited exposure time).

*Milton Diversion Dam Reach; Yuba-Bear Project, Bowman Development (Middle Yuba River below Wolf Creek)*

Three monitoring sites were located within this reach: Middle Yuba River above Kanaka Creek confluence; Kanaka Creek above Middle Yuba River confluence; and Middle Yuba River above Our House diversion impoundment (non-project, FERC project no. 2246). Of the 277 total days monitored in 2008 and 2009 in the Middle Yuba River above the Kanaka Creek confluence, 124 days had a mean daily temperature above 20°C, and 19 days had an instantaneous maximum temperature above 25°C. Of the 312 total days monitored in 2008 and 2009 in Kanaka Creek above the Middle Yuba River confluence, 58 days had a mean daily water temperature above 20°C, but the instantaneous maximum temperature was always below 25°C. Of the 313 days monitored in the Middle Yuba River above Our House diversion impoundment, 149 days had a mean daily temperature above 20°C, and about 73 days had an instantaneous maximum temperature higher than 25°C.

*Rucker Creek below Blue and Rucker Lakes (Upper Drum-Spaulding Project, Spaulding No. 3 Development)*

Two monitoring sites were located within this reach of Rucker Creek: Rucker Creek above Rucker Lake and Rucker Creek between the Yuba-Bear Project's Bowman-Spaulding conduit and Rucker Lake. Of the 276 total days monitored in 2008 and 2009 at Rucker Creek above Rucker Lake, 66 days had a mean daily water temperature above 20°C. Of the 207 total days monitored in Rucker Creek above Bowman-Spaulding conduit, only 4 days had a mean daily water temperature above 20°C. There were no days during the monitoring efforts when instantaneous maximum water temperature exceeded 25°C in either reach. Water temperatures downstream appear to benefit from regulation in Rucker Lake and cold storage releases, which result in a reduced frequency of higher temperatures in Rucker Creek below Rucker Lake.

*Spaulding Dam Reach of South Yuba River above Canyon Creek Confluence (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development and Spaulding No. 3 Development)*

Mean daily water temperatures were greater than 20°C in the South Yuba River immediately above the confluence with Canyon Creek in June through September 2008 and 2009. Of the 348 total days monitored at this location, 128 days had a mean daily water temperature greater than 20°C, and only 6 days had an instantaneous maximum water temperature above 25°C.

*Canyon Creek between South Yuba River and Texas Creek Confluence (Upper Drum-Spaulding Project, Spaulding No. 3 Development; Yuba-Bear Project, Bowman Development)*

From July through August in both the 2008 and 2009 monitoring efforts, Canyon Creek 0.1 mile upstream of the South Yuba River had mean daily water temperatures that exceeded 20°C. Of the 350 total days monitored at this location, 60 days had a mean daily water temperature greater than 20°C, but there were no days with an instantaneous maximum water temperature that exceeded 25°C.

*Bear River between Dutch Flat Afterbay and Chicago Park Powerhouse (Yuba-Bear Project, Chicago Park Development)*

Three monitoring sites were located within this reach of the Bear River: Bear River below Dutch Flat afterbay; Bear River above Chicago Park powerhouse inflow; and Steephollow Creek above Bear River confluence. Of the 170 total days monitored at the Bear River station below Dutch Flat afterbay,

there were no days with mean daily water temperatures above 20°C. Farther downstream, however, in the Bear River above the Chicago Park powerhouse discharge, 39 of the 300 monitored days had mean daily water temperature above 20°C. The Steephollow Creek station recorded a mean daily water temperature above 20°C on 14 of the 249 monitored days in 2008 and 2009. There were no days at any of these stations with instantaneous maximum water temperatures greater than 25°C.

**Reservoir Temperatures**

The Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects together have 40 reservoirs or impoundments. Twenty-four of the reservoirs are small diversion impoundments with less than 1,000 acre-feet of storage, and 27 of the reservoirs are located at elevations above 5,000 feet (see table 3-5). During the winter, nearly all of these waterbodies ice over except Jackson Meadows reservoir (Yuba-Bear Project), Bowman Lake (Yuba-Bear Project), Drum afterbay (Upper Drum-Spaulding Project), Dutch Flat afterbay (Yuba-Bear Project), Rollins reservoir (Yuba-Bear Project), Halsey afterbay (Lower Drum Project), Rock Creek reservoir (Lower Drum Project), and all project forebays. From June through August 2008 and 2009, the applicants collected vertical water temperature profiles in eight of the larger reservoirs (listed by sub-basin from north to south): Jackson Meadows reservoir (Yuba-Bear Project, Bowman Development); Sawmill Lake (Yuba-Bear Project, Bowman Development); Bowman Lake (Yuba-Bear Project, Bowman Development); Meadow Lake (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development); Fordyce Lake (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development); Lake Spaulding (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development); Lake Valley reservoir (Upper Drum-Spaulding Project, Drum No. 1 and No. 2 Development); and Rollins reservoir (Yuba-Bear Project, Rollins Development). Reservoir water temperatures were collected at four additional stations in Dutch Flat afterbay (Yuba-Bear Project, Chicago Park Development), Chicago Park forebay (Yuba-Bear Project, Chicago Park Development), Rock Creek reservoir (Lower Drum Project, Wise and Wise No. 2 Developments), and Wise forebay (Lower Drum Project, Wise and Wise No. 2 Developments). In order to determine temperature compliance within project reservoirs, the applicants used the same 20°C criterion used for streams, with the assumption that reservoir temperatures at low-level outlets and powerhouse intakes are most relevant to conformance with the 20°C threshold for downstream stream reaches. The following seven project reservoirs had water temperatures greater than 20°C.

*Jackson Meadows Reservoir (Yuba-Bear Project, Bowman Development)*

Water quality conditions, including temperatures, in Jackson Meadows reservoir support a coldwater trout-dominated fishery. Although project operations influence seasonal water quality conditions in Jackson Meadows reservoir, and water temperatures in the Middle Yuba River are affected by releases from Jackson Meadows reservoir, the majority of water temperature measurements taken during the 2009 monitoring effort was well within the optimum temperature range of salmonids and generally met Basin Plan criteria. Surface water temperatures in Jackson Meadows reservoir ranged from 12.5°C in October to 20.2°C in July, and bottom temperatures ranged from 4.8°C to 5.4°C during this timeframe.

The stratification period in Jackson Meadows reservoir typically extends from July to September. Reservoir temperature profiles in July, August, and September 2009 were characterized by a 25- to 30-foot epilimnion, a 20- to 25-foot thermocline (metalimnion) characterized by sharply reduced temperatures with depth, and a 60- to 80-foot thermally stable hypolimnion. A coldwater pool, operationally defined as all depths exhibiting water temperatures less than 10°C, ranged in volume from 4,855 acre-feet in October to 29,628 acre-feet in July 2009.

Minimum flow releases from Jackson Meadows dam to the Middle Yuba River are withdrawn from a low-level outlet near the bottom of the reservoir. Water temperatures at the outlet elevation

throughout the 2009 monitoring effort ranged from about 5°C in July to 10°C in October. The majority of water released from Jackson Meadows reservoir is diverted into the Milton-Bowman diversion conduit.

*Sawmill Lake Reservoir (Yuba-Bear Project, Bowman Development)*

Water quality conditions in Sawmill Lake, including temperatures, support a coldwater fishery. Project operations influence seasonal water quality conditions in Sawmill Lake, and water temperatures in the downstream reach of Canyon Creek are affected by releases from the reservoir. Water temperature measurements ranged from 21.2°C at the surface to 17.2°C at the bottom in July 2008 and from 21.7°C at the surface to 13.2°C at the bottom in July 2009. Surface temperatures slightly exceed the optimum temperature range of salmonids and the Basin Plan criteria but deeper water temperatures are consistent with the Basin Plan.

Reservoir temperature profiles in July 2008 and 2009 were characterized by a 20- to 25-foot epilimnion, a 10-foot thermocline, and a 15-foot thermally stable hypolimnion. It is unknown how this stratification changes through the summer season into fall, because only one temperature profile was taken during the 2008 and 2009 monitoring efforts.

Minimum flow releases from Sawmill Lake dam to Canyon Creek are withdrawn from a low-level outlet near the bottom of the reservoir. Water temperatures at the outlet elevation were about 16.1°C and 13°C in July 2008 and July 2009, respectively. Releases from Sawmill Lake are routed via Canyon Creek to Bowman Lake.

*Fordyce Lake (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development)*

Water quality conditions in Fordyce Lake, including temperatures, support a predominantly rainbow and brown trout coldwater fishery. Although project operations influence seasonal water quality conditions in Fordyce Lake, and water temperatures in downstream reaches of Fordyce Creek are affected by releases from Fordyce Lake, the water temperature measurements taken in 2008 and 2009 were well within the optimum temperature range of rainbow and brown trout and met Basin Plan criteria. In 2008, surface water temperatures in Fordyce Lake ranged from 13.6°C in October to 18.9°C in July, and bottom temperatures ranged from 6.3°C in July to 7.8°C in October. In 2009, surface water temperatures ranged from 9.1°C in October to 20.2°C in July, and bottom temperatures ranged from 7.5°C in July to 11.2°C in August.

The reservoir temperature profiles in July, September, and October 2008 were characterized by a moderately deep 20- to 55-foot epilimnion, a 5- to 20-foot thermocline characterized by sharply reduced temperatures with depth, and a 10- to 55-foot thermally stable hypolimnion. Reservoir temperature profiles in July through October 2009 were characterized by a 15- to 30-foot epilimnion, a 10- to 25-foot thermocline, and a 10- to 30-foot hypolimnion. A coldwater pool, operationally defined as all depths exhibiting water temperatures less than 10°C, ranged in volume in 2008 from 1,400 acre-feet in October to 20,600 acre-feet in July, and in 2009 from 1,600 acre-feet in September to 12,300 acre-feet in July 2009.

Minimum flow releases from Fordyce Lake dam to Fordyce Creek are withdrawn from a low-level outlet near the bottom of the reservoir. Water temperature at the outlet elevation throughout the 2008 and 2009 monitoring efforts ranged from 6.3°C in October 2008 to 11.2°C in August 2009. Releases from Fordyce Lake are routed via Fordyce Creek to Lake Spaulding.

*Lake Spaulding (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development)*

Water quality conditions in Lake Spaulding, including temperatures, support a predominantly rainbow and brown trout coldwater fishery. Although project operations influence seasonal water quality conditions in Lake Spaulding, and water temperatures in the South Yuba River, South Yuba canal, Drum canal, and Bear River are affected by releases from Lake Spaulding, most of the water temperature measurements taken in 2008 and 2009 were well within the optimum temperature range of rainbow and brown trout and generally met Basin Plan criteria. Water temperatures in Lake Spaulding exceeded 20°C only in July 2009, and exceedances were limited to the top 10 feet of the reservoir, with a maximum water temperature of 21.5°C.

Reservoir temperature profiles near Lake Spaulding dam from July through September 2008 and July through October 2009 varied significantly. Both July 2008 and 2009 temperature profiles were characterized by a 15- to 20-foot upper epilimnion that rapidly decreased in temperature with depth, an approximately 50- to 125-foot lower epilimnion characterized by gradually decreasing temperatures with depth, an approximately 10- to 20-foot thermocline characterized by rapidly decreasing temperatures with depth, and a 25- to 45-foot hypolimnion. However, water temperatures in Lake Spaulding in September 2008 and September and October 2009 were characterized by a 90- to 140-foot epilimnion, a 5- to 10-foot thermocline characterized by sharply reduced temperatures, and a 30- to 70-foot hypolimnion. Minimum flow releases from Lake Spaulding dam to the South Yuba River are withdrawn from a low-level outlet near the bottom of the reservoir. The water temperature at the outlet elevation in 2008 and 2009 was about 7°C in July through October. Releases from Lake Spaulding are mostly diverted to South Yuba canal and Drum canal to supply flow for the Spaulding no. 1 and no. 2 powerhouses. The powerhouses both have upper and lower intake tunnels that are controlled by butterfly valves. Current operations use both the upper and lower intake butterfly valves in order to release water with mixed temperature to South Yuba (Deer Creek Project) and Drum canals.

To determine the effect of existing mixed operations on in-lake and downstream temperatures, in late August to early September 2009, PG&E conducted a variable operations analysis of in-lake and downstream temperatures during mixed usage while solely operating the upper or lower intakes. Throughout the monitoring period, temperature profiles were collected near the powerhouse intakes and temperature measurements were taken downstream at the head of South Yuba and Drum canals. The variable operations analysis determined that mixed releases from the upper and lower intakes maintain a relatively stable temperature in South Yuba and Drum canals. Operating either the upper or lower intake valves independently, however, affects reservoir stratification and downstream canal temperatures. Using only the upper intake valve increased the depth and volume of the coldwater hypolimnion because water was not being withdrawn from the bottom of the reservoir, with the exception of a small volume through the low-level outlet to the South Yuba River. In contrast, using the lower intake valve decreased the depth and volume of the hypolimnion. Additionally, using the lower intake resulted in canal temperatures that were roughly 1°C cooler than what would have been expected under operation of both intakes. Using the upper intake resulted in canal temperatures that were 1°C warmer than would have been expected under operation of both intakes.

*Lake Valley Reservoir (Upper Drum-Spaulding Project, Drum No. 1 and No. 2 Development)*

Water quality conditions in Lake Valley reservoir, including temperatures, support a coldwater fishery. Although project operations influence seasonal water quality conditions in Lake Valley reservoir, and water temperatures in the North Fork of the North Fork American River are affected by releases from Lake Valley reservoir, most of the water temperature measurements taken in 2008 and 2009 were well within the optimum temperature range of salmonids and generally met Basin Plan criteria. The surface water temperature in Lake Valley reservoir in June 2008 and 2009 was about 15°C, and bottom

temperatures ranged from 8.4°C to 10.7°C. Water temperatures in August 2008 and 2009 were higher, ranging from 21.1°C to 21.5°C near the surface and 10.9°C to 12.8°C near the bottom.

The reservoir temperature profile in June 2008 was characterized by a weakly stratified water column with a near linear decrease in temperature from the surface to the bottom. In contrast, the June 2009 temperature profile was characterized by a 15-foot epilimnion, an equivalently deep thermocline characterized by sharply reduced temperatures with depth, and a 25-foot thermally stable hypolimnion. Reservoir temperature profiles in August 2008 and 2009 were characterized by a 25- to 30-foot epilimnion, a 10-foot thermocline, and a 5- to 15-foot, gradual, thermally decreasing hypolimnion.

Minimum flow releases from Lake Valley dam to the North Fork of the North Fork American River are withdrawn from a low-level outlet near the bottom of the reservoir. Water temperature at the outlet elevation in 2008 and 2009 ranged from 8.4°C in June to 12.8°C in August. About 30 percent of flow released from Lake Valley reservoir is diverted to Lake Valley canal.

*Chicago Park Forebay (Yuba-Bear Project, Chicago Park Development)*

Water quality conditions in Chicago Park forebay, including temperatures, support a coldwater trout-dominated fishery. Although project operations influence seasonal water quality conditions in Chicago Park forebay, and water temperatures in the Bear River are affected by releases from Chicago Park forebay, most of the water temperature measurements taken in 2008 and 2009 were well within the optimum temperature range of salmonids and generally met Basin Plan criteria. Water temperatures in Chicago Park forebay exceeded 20°C in October 2008, with a maximum water temperature of 20.7°C.

Chicago Park forebay exhibits weak and intermittent stratification because of the lack of storage and frequent fluctuations in reservoir levels. No temperature profiles were taken at this reservoir, and the temperature at the outlet elevation is unknown. Releases from Chicago Park forebay through the Chicago Park powerhouse are routed via the Bear River to Rollins reservoir.

*Rollins Reservoir (Yuba-Bear Project, Rollins Development)*

Water quality conditions in Rollins reservoir, including temperatures, support a coldwater fishery. Project operations influence seasonal water quality conditions in Rollins reservoir, and water temperatures in the downstream reach of Bear River are affected by releases from Rollins reservoir and the Bear River canal diversion dam. Water temperatures in 2008 and 2009 increased from May through September. In 2008, surface water temperatures in Rollins reservoir ranged from 16.3°C in October to 23°C in August, and bottom temperatures ranged from 8.3°C in May, July, and August to 9.3°C in June. In 2009, surface water temperatures in Rollins reservoir ranged from 13.5°C in May to 24.8°C in July, and bottom temperatures ranged from 7.6°C in June to 17.6°C in October. These surface temperatures seasonally exceed the optimum temperature range of salmonids and the Basin Plan criteria.

The reservoir temperature profiles assessed in 2008 and 2009 exhibited stratification that became stronger from May through September. The May temperature profile was characterized by a weakly stratified water column, with a shallow (0- to 10-foot) epilimnion characterized by rapidly decreasing temperature with depth, no thermocline, and a deep (30- to 40-foot) hypolimnion characterized by gradually decreasing temperature with depth. From June through September, the water column became increasingly stratified with a deep (0- to 30-foot) epilimnion, a 5- to 10-foot thermocline characterized by a rapid decrease in temperature, a deep (100- to 120-foot) thermally stable hypolimnion, and a bottom characterized by sharply reduced temperatures with depth. In October, water column stratification was disrupted and characterized by a single thermally stable layer, which was most likely the result of fall turnover. Usable storage of the coldwater pool in Rollins reservoir ranged from 0 acre-feet in October to 1,500 acre-feet in July.

Minimum flow releases from Rollins dam to the Bear River are withdrawn from a low-level outlet near the bottom of the reservoir. Water temperature at the outlet elevation in 2008 and 2009 ranged from 7.6°C to 8.3°C in June. The majority of releases from Rollins reservoir are diverted to the Bear River canal.

**Sediment Transport and Supply**

The Basin Plan water quality criteria require that "increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: where natural turbidity is 0 to 5 nephelometric turbidity units (NTU), increases shall not exceed 1 NTU; and where natural turbidity is between 5 to 50 NTUs, increases shall not exceed 20 percent." Among other factors, turbidity can be affected by suspended sediment sources as well as phytoplankton densities. In order to determine if turbidity increased in project-affected streams and reservoirs, PG&E and NID compared upstream, reservoir, and downstream turbidity values.

Comparing upstream to downstream turbidity values from the spring, summer, and fall sampling periods suggests that the stream reaches downstream of Rollins reservoir (Yuba-Bear Project) may not comply with the Basin Plan objectives during the spring and fall. In spring samples, turbidity upstream of Rollins reservoir (Yuba-Bear Project-affected reach) at all sites was less than or equal to 2.1 NTU. Greenhorn Creek, a tributary to Rollins reservoir, had a turbidity of 5.5 NTU.

During spring, the Bear River downstream of Rollins reservoir, Dry Creek below Halsey afterbay dam (Lower Drum Project, Halsey Development), and Mormon Ravine (Lower Drum Project, Newcastle Development) had turbidities of 20, 27.2, and 23.6 NTU, respectively. The elevated turbidity in Mormon Ravine was observed upstream of the Newcastle powerhouse tailrace. Turbidity in all summer samples from these reaches was less than or equal to 2.6 NTU. Turbidity values of the fall 2008 samples were generally higher, ranging from 4.6 to 22.3 NTU in these reaches.

#### 3.3.2.1.3 Aquatic Biota[11]

Streams and reservoirs in the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project areas support fisheries for rainbow trout, brown trout, and a transitional warmwater fish assemblage in the lower elevation portions of the project areas. Prior to the introduction of non-native fish species, the Sierra Nevada native fish populations in accessible lakes and streams of the Sacramento-San Joaquin drainage included 22 taxa, including 3 anadromous fish: Chinook salmon, steelhead, and Pacific lamprey (NID, 2008). The abundance and distribution of native fish species in Sierra Nevada streams, rivers, and lakes has dramatically changed as a result of several factors, including the introduction of non-native species, construction of dams and diversions, alteration of aquatic habitat, and watershed disturbance (Moyle et al., 1997). In this section, we describe the aquatic habitats and aquatic biota within project-area waters. Table 3-91 lists the 34 fish species that are known to occur in the project areas or are likely to occur downstream of the projects.

[11] With the separation of the existing Drum-Spaulding Project into the three projects, the following developments are part of the Upper Drum-Spaulding Project: (1) Spaulding No. 3; (2) Spaulding No. 1 and No. 2; (3) Drum No. 1 and No. 2; (4) Alta; and (5) Dutch Flat No. 1; the following developments are part of the Lower Drum Project: (1) Halsey; (2) Wise; (3) Wise No. 2; and (4) Newcastle; and the Deer Creek Development is part of the Deer Creek Project.

### Important and Special-status Fish Species

One special-status fish species, hardhead (*Mylophardon conocephalus*), is known to occur in the vicinity of the projects and is considered both a California Species of Concern and a Forest Service Sensitive Species. Hardhead is a large, native minnow that is generally found in undisturbed areas of larger low- to middle-elevation streams (between 30 and 4,760 feet msl in the Sacramento and San Joaquin watersheds). Its range extends from the Kern River in the south to the Pit River in the north. Hardhead inhabits areas that have clear, deep pools with sandy, gravel/boulder substrates, and slow water velocities (less than 0.05 feet per second). Hardhead co-occurs with Sacramento pikeminnow and usually with Sacramento suckers, and it tends to be absent from streams where introduced species, especially centrarchids, predominate. Hardhead could occur in lower elevation project-affected stream reaches of the Middle and South Yuba Rivers and the Lower Auburn Ravine; however, hardhead was not documented in any of the stream reaches or reservoirs in the project areas during recent fish surveys. Federally listed fish species are discussed in section 3.3.4, *Threatened and Endangered Species*.

Both rainbow trout and brown trout support recreational fisheries in the area of the four projects. Rainbow trout is native to most west-side Sierra Nevada watersheds below an elevation of 4,900 feet msl, but has been introduced to higher elevation waters including much of the project areas. Rainbow trout spawn in the spring, although the specific spawning period is influenced by factors such as the genetic strain of the fish, water temperature, and duration of daylight. Spawning usually occurs in gravel riffles or gravel pockets of small streams. Females excavate a nest, or "redd," in the gravel and cover the eggs with gravel after spawning. After hatching, the fry remain in the gravel until their yolk sacs are absorbed. The fry then venture into open water, feeding on plankton and aquatic macroinvertebrates. As they mature, trout begin to feed on aquatic and terrestrial insects; larger individuals also feed on fish and crayfish.

Brown trout occurs mainly in low- to mid-elevation ranges and can be found in tributaries, rivers, lakes, and reservoirs. Adults generally remain near the bottom of pools, while juveniles can be found in riffles and pools. Brown trout spawn in the fall, although the specific spawning time is influenced by factors such as the genetic strain of the fish, water temperature, and duration of daylight. Spawning usually occurs in gravel riffles or gravel pockets of small streams. Despite differences in timing, the spawning and rearing characteristics of brown trout are similar to rainbow trout.

Prior to construction of the Englebright dam for control of mining debris in 1941, the Yuba River supported anadromous populations of spring-run Chinook salmon, fall-run Chinook salmon, and steelhead. Currently operated by the U.S. Army Corps of Engineers (Corps), Englebright dam defines the upstream limit of salmon and steelhead migration, and none of these species is present in the existing Upper Drum-Spaulding and Yuba-Bear Project-affected reaches.

### Reservoir Fish Populations

The Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects include 40 reservoirs of various sizes and elevations (section 2.1.1, *Existing Project Facilities*). Twenty-four of the project reservoirs are small diversion impoundments (<1,000 acre-feet), and 28 of the project reservoirs are located at elevations greater than 5,000 feet msl. Most of the reservoirs freeze over during winter months. The existing fish populations in project reservoirs and impoundments are the result of recruitment from connected stream and reservoir populations, stocking efforts by California Fish and Wildlife, and self-sustaining populations (NID, 2008). In addition, a wide variety of exotic game, non-game, and forage fish have been introduced into several of the project reservoirs as a result of authorized fishery planting programs, unauthorized intentional plantings, or inadvertent bait bucket releases (Moyle et al., 1997). Historical reports and recent fish surveys indicate 27 species of fish have occurred or occur in project reservoirs (tables 3-92 and 3-93); however, only 9 of these species are native to California.

Most of the larger reservoirs within the projects are managed by California Fish and Wildlife as put-and-grow and catchable fisheries for rainbow and brown trout, with the exception of Milton diversion impoundment, which is managed as a self-sustaining fishery for rainbow trout. California Fish and Wildlife classifies most of the other smaller reservoirs of the projects as unmanaged fisheries. Stocking records from California Fish and Wildlife indicate that 16 project reservoirs were planted with fish between 2002 and 2009 (table 3-94). During this period, California Fish and Wildlife stocked various combinations of five salmonid species and one subspecies in project reservoirs: rainbow trout, brown trout, brook trout, Eagle Lake rainbow trout, kokanee, and Chinook salmon (PG&E, 2011a and NID, 2011a).

To document fish populations in project reservoirs, PG&E and NID conducted fish sampling in 2009 at multiple sites in the five largest reservoirs at the Yuba-Bear Project (Jackson Meadows reservoir, Bowman Lake, and Rollins reservoir) and the Upper Drum-Spaulding Project (Fordyce Lake and Lake Spaulding). Other project reservoirs were not sampled in 2009, because they represent a collection of relatively small, moderate to high elevation lakes dominated primarily by salmonids. Tables 3-92 and 3-93 present results from historical reports and reservoir surveys conducted in 2009. In the five project reservoirs sampled in 2009, PG&E and NID performed fish surveys using electrofishing and gillnetting surveys at all reservoirs except Fordyce Lake, where hydroacoustic and gillnetting surveys were performed. The number and species composition of fish collected during 2009 in each sampled project reservoir are provided in table 3-95.

The dominant fish species collected during the 2009 surveys varied between reservoirs. The forage fish species, Lahontan redside, was numerically dominant in fish collections from both Jackson Meadows reservoir and Bowman Lake, comprising about 84 and 62 percent of the total fish abundance, respectively. Fish collections in Rollins reservoir, the lowest elevation reservoir sampled in 2009, were dominated by smallmouth bass. In Lake Spaulding, Sacramento pikeminnow was numerically dominant and represented about 59 percent of the total fish collected. Rainbow trout, brown trout, and tui chub were the dominant fish species collected at Fordyce Lake, the highest elevation reservoir sampled in 2009.

The composition and abundance of salmonids also varied among the reservoirs sampled in the projects. Both rainbow trout and brown trout were captured in each of the project reservoirs sampled in 2009. Although rainbow trout dominated fish collections in Fordyce Lake, three other trout species were collected in lower abundance: Lahontan cutthroat; brown trout; and brook trout. Combined, these four salmonid species represented about 74 percent of the total fish collected in 2009 in Fordyce Lake. The same four salmonid species were also collected in Jackson Meadows reservoir, but only represented about 11 percent of the total fish abundance. Three salmonid species were collected in Bowman Lake (rainbow trout, kokanee, and brown trout), representing about 29 percent of the total fish collected; however, brown trout was the dominant salmonid species, comprising about 22 percent of the total fish collected. Four species of salmonids, rainbow trout, Chinook salmon, brown trout, and brook trout, were collected in Lake Spaulding in 2009, comprising about 15 percent of the total fish collected. In Rollins reservoir, salmonids collected in 2009 were represented by rainbow trout and brown trout and comprised only about 9 percent of the total fish abundance.

Other fish collected in each of the reservoirs in 2009 were primarily forage species. In Fordyce Lake, the forage fish species, tui chub, was the only non-salmonid species collected. In Jackson Meadows reservoir, forage fish species represented by tui chub, speckled dace, and Lahontan redside comprised about 89 percent of the total fish collected and indicated an abundant forage base in the reservoir. With the exception of Lahontan redside, other fish collected in lower abundance in Bowman Lake included speckled dace. In Rollins reservoir, the fish community was primarily comprised of warmwater fish species, including bluegill, green sunfish, redear sunfish, black crappie, largemouth bass,

channel catfish, white catfish, and brown bullhead. Forage species collected in lower abundance in Rollins reservoir included pond smelt, golden shiner, Sacramento pikeminnow, and Sacramento sucker. In Lake Spaulding, forage species collected included pond smelt, Sacramento pikeminnow, Lahontan redside, and Sacramento sucker. Smallmouth bass was also collected in low abundance in Lake Spaulding.

**Stream Fish Populations**

The Upper Drum-Spaulding Project has the potential to affect stream fish populations located in the South Yuba River, Bear River, North Fork of the North Fork American River. Deer Creek has the potential to affect fish populations in the South Yuba River, Deer Creek, and Bear River. Lower Drum Project has the potential to affect fish populations in Bear River, American River, and Sacramento River drainage basins. The Yuba-Bear Project has the potential to affect stream fish populations located in the Middle Yuba River, Canyon Creek, South Yuba River, and Bear River Basins. The South Yuba River and Middle Yuba River sub-basins drain into the Yuba River, a tributary of the Feather River. The Bear River sub-basin drains to the Feather River, downstream of the Yuba River confluence. The North Fork of the North Fork American River sub-basin drains into the American River, a tributary of the Sacramento River. Data from historical and recent fish studies indicate 32 species of fish have occurred or occur in project streams (table 3-96). In 2008 and 2009, PG&E and NID conducted fish surveys (electrofishing and snorkel observations) in 51 project-affected stream reaches within these drainage basins (PG&E and NID, 2010d). PG&E and NID collected or observed 15 species of fish during these surveys. The overall species composition from the relicensing surveys was dominated by rainbow trout and brown trout.

*Middle Yuba River Sub-Basin (Yuba-Bear Project)*

The project-affected reaches of the Middle Yuba River sub-basin consist of the Middle Yuba River, extending from the outlet at Jackson Meadow reservoir downstream to YCWA's impoundment at Our House dam (non-project, FERC project no. 2246), and Wilson Creek, a tributary to the Middle Yuba River. Yuba-Bear Project facilities in the Middle Yuba River sub-basin include Jackson Meadows reservoir and dam, Milton diversion impoundment and dam, and Milton Bowman tunnel inlet on the Middle Yuba River, and Wilson Creek diversion dam on Wilson Creek; all of these waters are associated with the Yuba-Bear Project Bowman Development. Fish species historically known to be present in the Middle Yuba River sub-basin include rainbow trout, brook trout, brown trout, cutthroat trout, Lahontan cutthroat trout, Sacramento sucker, Sacramento pikeminnow, hardhead, and smallmouth bass. In 2008 and 2009, PG&E and NID collected a total of five fish species from the Middle Yuba River: rainbow trout, brown trout, Sacramento sucker, Sacramento pikeminnow, and Lahontan redside. Lahontan redside had not been previously documented in the sub-basin; however, it was abundant during 2009 fish surveys in Jackson Meadows reservoir. Overall, the species composition and relative fish abundance was dominated by rainbow trout and brown trout. The estimated density of rainbow trout collected from sample locations in the Middle Yuba River sub-basin ranged from 39 to 243 fish per 100 meters (328 feet). No fish were collected from Wilson Creek, because the creek is ephemeral and was dry at the time of sampling. Rainbow trout, brown trout, and Lahontan redside were collected in the upper portion of the Middle Yuba River sub-basin, and rainbow trout, Sacramento sucker, and Sacramento pikeminnow were collected in the lower portion of the sub-basin.

*Deer Creek Sub-Basin (Deer Creek Project)*

The project-affected reach of the Deer Creek Development consists of 0.1 mile on South Fork Deer Creek extending from the Deer Creek powerhouse tailrace (Deer Creek Project) downstream to the Cascade diversion dam (non-project). The only project facility in the Deer Creek sub-basin is the Deer Creek powerhouse. Historical information on fish populations is limited for the Deer Creek sub-basin.

Past surveys and observations indicate that rainbow trout, brown trout, and Sacramento sucker may occur in this reach; however, PG&E and NID did not collect or observe any fish species in the 2008 and 2009 surveys.

*Canyon Creek and Texas Creek Sub-Basins (Upper Drum-Spaulding and Yuba-Bear Projects)*

The project-affected stream reaches in the Canyon Creek sub-basin consist of Canyon Creek, from French dam downstream to the confluence with the South Yuba River, and tributaries of Canyon Creek, including Jackson Creek, Texas Creek, Lindsey Creek, and an unnamed stream reach below Culbertson Lake. Project facilities in the Canyon Creek sub-basin include Upper Rock Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 3 Development), Lower Rock Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 3 Development), Upper Lindsey Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 3 Development), Middle Lindsey Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 3 Development), Lower Lindsey Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 3 Development), Culbertson Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 3 Development), Jackson Lake reservoir and dam (Yuba-Bear Project, Bowman Development), Bowman Lake reservoir and dam (Yuba-Bear Project, Bowman Development), French Lake reservoir and dam (Yuba-Bear Project, Bowman Development), Faucherie Lake reservoir and dam (Yuba-Bear Project, Bowman Development), Sawmill Lake reservoir and dam (Yuba-Bear Project, Bowman Development), Bowman powerhouse (Yuba-Bear Project, Bowman Development), and Bowman-Spaulding conduit (Yuba-Bear Project, Bowman Development). Historical information on the fish community inhabiting project-affected reaches in the Canyon Creek sub-basin is limited; however, based on an analysis of fish populations in local impoundments, the watershed could support rainbow trout, brook trout, brown trout, Lahontan redside, and brown bullhead. Fifteen project-affected reaches of the Canyon Creek sub-basin were sampled for fish in 2008 and 2009. Three fish species were collected during these studies: rainbow trout, brook trout, and brown trout. Brown trout was collected at most sample sites; however, rainbow trout was collected in the highest relative abundance. Brook trout was only collected at one sample site during one of the two sample years (2008). The estimated total density of rainbow trout and brown trout combined from sample sites in the Canyon Creek sub-basin ranged from 127 to 194 fish per 100 meters (328 feet).

*Fall Creek Sub-Basin (Upper Drum-Spaulding Project)*

The project-affected stream reaches in the Fall Creek sub-basin, within the South Yuba River Basin, consist of Fall Creek from the confluence with the South Yuba River upstream to its headwaters and its tributaries. Project facilities in the Fall Creek sub-basin consist of Feeley Lake reservoir and dam (Spaulding No. 3 Development) and Carr Lake reservoir and dam (Spaulding No. 3 Development). The 2008 and 2009 fish surveys were conducted in Fall Creek, within Carr Lake dam reach no. 2; in Fall Creek diversion dam reach (RM 1.9); in Clear Creek diversion gate reach; in Lake Creek, within Feeley Lake dam reach; in Carr Lake dam reach no. 1; in Fall Creek, within Carr Lake dam reach no. 2 and Fall Creek diversion dam reach; and in Trap Creek, within Trap Creek diversion gate reach. At all sites surveyed in the Fall Creek sub-basin, rainbow and brown trout were the only fish species collected. Rainbow trout dominated fish collections at all sampled reaches. No fish were collected in Feeley Lake dam reach, and Trap Creek diversion gate reach was dry at the time of sampling. Combined rainbow trout and brown trout densities at quantitative sample sites ranged from 26 to 147 fish per 100 meters (328 feet).

*Rucker Creek Sub-Basin (Upper Drum-Spaulding and Yuba-Bear Projects)*

The project-affected stream reach in the Rucker Creek sub-basin, within the South Yuba River Basin, consists of Rucker Creek from the confluence with the South Yuba River upstream to its headwaters. Project facilities in this sub-basin include Blue Lake reservoir and dam (Upper Drum-

Spaulding Project, Spaulding No. 3 Development) and Rucker Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 3 Development) on Rucker Creek above the Bowman-Spaulding conduit (Yuba-Bear Project, Bowman Development) and Rucker Creek below Rucker Creek diversion gate (Yuba-Bear Project, Bowman Development).

Historic information on fish populations inhabiting Rucker Creek indicated the presence of rainbow trout, largemouth bass, smallmouth bass, and green sunfish. PG&E and NID collected three fish species from Rucker Lake dam reach in 2008 and 2009: rainbow trout, brown trout, and green sunfish. No fish were collected from Blue Lake dam reach or Rucker Creek diversion gate reach. Brown trout was the only fish species collected in both years of sampling, although rainbow trout was the dominant species. In 2009, the combined density for rainbow trout and brown trout was relatively low at 22 fish per 100 meters (328 feet). Individuals representing multiple age classes of both trout species were collected, indicating regular recruitment in the Rucker Creek sub-basin.

*South Yuba River Sub-Basin (Upper Drum-Spaulding and Yuba-Bear Projects)*

Three large sub-watersheds comprise the South Yuba River sub-basin: Fordyce Creek, the South Yuba River above Lake Spaulding, and the South Yuba River below Lake Spaulding. The project-affected stream reaches in the South Yuba River sub-basin consist of the mainstem of the South Yuba River above Englebright reservoir to its headwaters above Lake Spaulding. Project facilities in this sub-basin include Meadow Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development), White Rock Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development), Kidd Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development), Upper Peak Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development), Fordyce Lake reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development), Lake Spaulding reservoir and dam (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development), the downstream portion of the Bowman-Spaulding conduit (Yuba-Bear Project, Bowman Development), and Spaulding no. 1, no. 2, and no. 3 powerhouses (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 and No. 3 Developments). Additionally, the South Yuba River downstream of Lake Spaulding is also affected by diversion of water from tributaries of the South Yuba River, regulation of flows in Canyon Creek, and water deliveries through Lake Spaulding.

Historical data on fish populations in the South Yuba River sub-basin documented the presence of rainbow trout, brook trout, brown trout, and Sacramento sucker in the Fordyce Creek watershed. Other species, including cutthroat trout, Lahontan redside, and brown bullhead, have been documented in reservoirs within the sub-basin. Additionally, hardhead has been historically documented as occurring in the South Yuba River sub-basin below Lake Spaulding. In 2008 and 2009, as part of relicensing studies, fish surveys were conducted at 18 sites in the South Yuba River sub-basin. During these surveys, PG&E and NID collected or observed a total of 11 fish species including rainbow trout, brook trout, brown trout, Sacramento sucker, Sacramento pikeminnow, California roach, Lahontan redside, speckled dace, brown bullhead, smallmouth bass, and green sunfish. Generally, the fish communities in the upper reaches of the South Yuba River were only comprised of trout, and lower reaches of the sub-basin were dominated by warmwater fish species. At quantitative sample sites, the estimated density of rainbow trout ranged from 23 to 86 fish per 100 meters (328 feet) at electrofishing sites and from 0 to 262 fish per 100 meters (328 feet) at snorkeling sites. Estimated brown trout densities ranged from 0 to 345 fish per 100 meters (328 feet) at electrofishing sites and 0 to 549 fish per 100 meters (328 feet) at snorkeling sites.

*Bear River Sub-Basin (Upper Drum-Spaulding, Lower Drum, and Yuba-Bear Projects)*

The project-affected reaches within the Bear River sub-basin consist of the Bear River and its tributaries from Lake Combie (non-project water supply reservoir) upstream to the headwaters near Lake

Spaulding. Project facilities in the sub-basin include Drum forebay (Upper Drum-Spaulding Project, Drum No. 1 and No. 2 Development), Drum afterbay (Upper Drum-Spaulding Project, Dutch Flat No. 1 Development), Dutch Flat forebay (Yuba-Bear Project, Dutch Flat No. 2 Development), Dutch Flat afterbay (Yuba-Bear Project, Chicago Park Development), Rollins reservoir and dam (Yuba-Bear Project, Rollins Development), Rollins powerhouse (Yuba-Bear Project, Rollins Development), Drum no. 1 and no. 2 powerhouses (Upper Drum-Spaulding Project, Drum No. 1 and No. 2 Development), Dutch Flat no. 1 powerhouse (Upper Drum-Spaulding Project, Dutch Flat No. 1 Development), Dutch Flat no. 2 powerhouse (Yuba-Bear Project, Dutch Flat No. 2 Development), Chicago Park powerhouse (Yuba-Bear Project, Chicago Park Development), Bear River canal diversion dam (Lower Drum Project, Halsey Development), and Bear River canal (Lower Drum Project, Halsey Development).

Historical fish surveys documented only rainbow trout and brown trout in streams of the Bear River sub-basin; however, brook trout, Sacramento pikeminnow, golden shiner, largemouth bass, smallmouth bass, and green sunfish have been documented more recently in Bear River sub-basin reservoirs. As part of the relicensing studies, fish surveys were conducted at 13 sites within the Bear River sub-basin. PG&E and NID collected or observed a total of seven fish species that included rainbow trout, brown trout, Sacramento sucker, Sacramento pikeminnow, speckled dace, smallmouth bass, and green sunfish. Generally, rainbow trout and brown trout were dominant at upper sites in the sub-basin, whereas warmwater fish species were dominant at sites in the lower reaches of the sub-basin. The fish community in Bear River downstream of the project between Rollins dam and Lake Combie is dominated by rainbow and brown trout, Sacramento sucker, and Sacramento pike minnow, the relative abundance varying between sampling locations and years.

*North Fork American River Sub-Basin (Upper Drum-Spaulding Project)*

Project-affected reaches in the North Fork American River sub-basin consist of the North Fork of the North Fork American River and its tributaries and Canyon Creek. Project facilities in the North Fork American River sub-basin include Lake Valley reservoir and dam (Drum No. 1 and No. 2 Development), Kelly Lake reservoir and dam (Drum No. 1 and No. 2 Development), Towle diversion (Alta Development), and Towle canal diversion dam (Alta Development).

Historically, the only fish species documented in the project-affected stream reaches of the North Fork America River sub-basin included rainbow trout, brown trout, and green sunfish. Relicensing studies in 2008 and 2009 documented five species of fish that included rainbow trout, brown trout, Sacramento sucker, California roach, and green sunfish. Additionally, two fish species, golden shiner and brown bullhead, were collected during entrainment monitoring in the Lake Valley canal diversion dam reach in 2009. Overall, rainbow trout and brown trout dominated the fish collections. At quantitative sample sites, the estimated density of rainbow trout and brown trout ranged from 67 to127 fish per 100 meters (328 feet).

*Mormon Ravine Sub-Basin (Lower Drum Project)*

The Mormon Ravine sub-basin is located within the American River Basin and includes Mormon Ravine from Folsom Lake (non-project managed by Reclamation) up to the headwaters near the town of Newcastle. No project facilities exist in Mormon Ravine; however, the Newcastle powerhouse header box (Newcastle Development) delivers a minimum instream flow, as well as periodic spills, from the South canal (Newcastle Development) into Mormon Ravine. The project-affected reach consists of about 0.3 mile of Mormon Ravine from Folsom Lake to the spill channel from the Newcastle powerhouse header box.

No historical fish information was available for the Mormon Ravine sub-basin; however, fish surveys in 2008 collected two species, rainbow trout and riffle sculpin (*Cottus gulosus*). Rainbow trout dominated collections, representing 79 percent of the total abundance.

*Coon Creek Sub-Basin (Lower Drum Project)*

The project-affected reaches within the Coon Creek sub-basin are the tributaries Dry Creek and Rock Creek. Project facilities in these tributaries include Halsey afterbay (Wise and Wise No. 2 Developments), Halsey powerhouse (Halsey Development), and Rock Creek reservoir and dam (Wise and Wise No. 2 Developments).

No historical data on fish populations were available for Dry Creek and Rock Creek. In 2008 and 2009, fish surveys in the project-affected tributaries documented rainbow trout, brown trout, golden shiner, mosquitofish, green sunfish, pumpkinseed, and bluegill. Overall, rainbow trout or brown trout dominated fish collections in each of the two tributaries.

*Auburn Ravine Sub-Basin (Lower Drum Project)*

The project-affected reach within the Auburn Ravine sub-basin is situated within the Sacramento River Basin and consists of Auburn Ravine from South canal to PCWA's Auburn tunnel outlet (non-project water delivery). Project facilities in the Auburn Ravine sub-basin include Wise powerhouse (Wise and Wise No. 2 Developments), Wise no. 2 powerhouse (Wise and Wise No. 2 Developments), and South canal (Newcastle Development).

During fish surveys conducted primarily in the Lower Auburn Ravine in 2004, PG&E and NID identified brown trout, steelhead, Chinook salmon, Sacramento sucker, Sacramento pikeminnow, California roach, golden shiner, speckled dace, hardhead, mosquitofish, hitch (species not specified), largemouth bass, green sunfish, pumpkinseed, bluegill, red shiner, redear sunfish, spotted bass, bigscale logperch, common carp, and black bullhead; the bass, logperch, and bullhead were collected upstream of the project-affected reach. In addition, an unidentified sculpin and lamprey were also collected. During the fish surveys in 2008, PG&E and NID collected rainbow trout, speckled dace, and riffle sculpin.

**Aquatic Macroinvertebrates**

In order to characterize aquatic macroinvertebrate communities in project-affected reaches of the existing Drum-Spaulding and Yuba-Bear Projects, the applicants conducted surveys in the vicinity of the projects during 2009. Within the Middle Yuba River, Canyon Creek, South Yuba River, Bear River, North Fork of the North Fork American River, Coon Creek, Auburn Ravine, Fordyce Creek, and North Yuba River sub-basins, 26 stream reaches were sampled following protocols adopted from the Surface Water Ambient Monitoring Plan. The sampled stream reaches included two reference reaches in the North Yuba River not affected by the project. PG&E and NID (2010e) collected 12,111 organisms, representing 224 distinct taxa. In general, the most common taxa collected included midges (Chironomidae), blackflies (Simulidae), and mayflies (*Baetis tricaudatus*).

Using benthic community structure metrics, two indices, the multi-metric index (MMI) and the index of biotic integrity (IBI), were calculated for samples from each stream reach. Both indices were used to assess biological conditions affected by hydropower operations. In general, the IBI and MMI scores provided similar relative rankings among sites within watersheds. MMI and IBI scores were typically higher at higher elevation sites (montane ecozone) than scores at lower elevation sites (foothill ecozone). The highest MMI and IBI scores occurred at the Middle Yuba River, Milton diversion dam reach (Yuba-Bear Project, Bowman Development) and the lowest scores occurred at South Yuba River reach no. 1 (Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development) (table 3-97).

Upper Milton diversion dam reach (Middle Yuba River, RM 43.6, Yuba-Bear Project, Bowman Development), South Yuba River (South Yuba River RM 39.5, Upper Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development), Bear River diversion dam upper reach (Bear River RM 8, Yuba-Bear Project, Rollins Development and Lower Drum Project, Halsey Development), and Halsey afterbay dam reach (Dry Creek RM 4.1, Lower Drum Project, Wise and Wise No. 2 Developments) were categorized as having "poor" biological conditions for at least one of the indices; the Middle Yuba and South Yuba River sites both have high gradients, bedrock and boulder substrate, and minimal development of riparian vegetation that provide poor benthic macroinvertebrate habitat. Technical Memorandum 3-10 reported that disruption of the streamflow regime at Bear River canal diversion dam may affect the benthic macroinvertebrate community composition in the downstream reach of the Bear River. Dry Creek below Halsey afterbay is dominated by fine sediments that may adversely affect the benthic macroinvertebrate community in that reach. All other sampled reaches were categorized as having "fair" to "good" biological conditions for both indices. The MMI scores, developed to assess hydropower project effects on west slope Sierra Nevada streams, did not indicate a consistent trend of increasing scores with distance downstream from reservoirs or diversion dams.

**Aquatic Mollusks**

During the applicants' consultation with the Forest Service, seven species of special-status aquatic mollusks were identified as potentially occurring in project-affected stream reaches of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects. One species, the Great Basin rams-horn, is known to occur in Trinity National Forest but has not been documented in project-affected reaches. Another species, California floater, although once widespread throughout California, is now believed to be extirpated from the Sacramento River Basin downstream of Shasta dam.

In 2008 and 2009, the applicants conducted surveys for special-status mollusks in seven project-affected stream reaches located on NFS land. Surveys were conducted on the Middle Yuba River, Canyon Creek, North Fork of the North Fork American River, Fordyce Creek, and South Yuba River. No special-status mollusks were collected during any of the surveys. The 2008 survey documented one gastropod species, *Juga (oreobasis*), in the Middle Yuba River downstream of the Milton diversion dam (Yuba-Bear Project, Bowman Development). The 2009 survey documented only two relic shells in the South Yuba River, one belonging to the gastropod *Juga* and one belonging to a bivalve from the Sphaeriidae family.

### 3.3.2.2 Environmental Effects

#### 3.3.2.2.1 Water Year Type

PG&E and NID propose monthly minimum streamflow regimes for project-affected stream reaches that are dependent on water year type. Six water year types (extreme critically dry, critically dry, dry, below normal, above normal, wet) were identified (table 3-98[12]) as a result of a distribution analysis of annual runoff (acre-feet) for the period of record. Determination of water year type for a given month would be based on the California Department of Water Resources water year forecast of unimpaired runoff (acre-feet) in the Yuba River at Smartville as reported in California DWR Bulletin 120, *Water Year Conditions in California*. California Department of Water Resource's forecast, which is published in February, March, and April, would apply from the 15th day of the publication month to the 14th day of

[12] The tables referenced in section 3.3.2.2, *Aquatic Resources, Environmental Effects*, are provided in appendix A-2.

the next month. From May 15 through October 14, the water year type would be based on California Department of Water Resources' forecast published in May. From October 15 through February 14 of the following year, the water year type would be based on the sum of California Department of Water Resources' monthly full natural flow for the full water year ending September 30 for the Yuba River.

**Upper Drum-Spaulding Project**

For certain stream reaches, Forest Service condition 26 for the Upper Drum-Spaulding Project recommends that extreme critically dry water year type flows be implemented in the second year of two sequential critically dry (or drier) years (i.e., during extended drought conditions that affect the ability to meet water delivery commitments). These conditions and recommendations for flows during back to back critically dry water years do not specify particular stream reaches of the Upper Drum-Spaulding Project. However, only three stream reaches which have specified minimum streamflows that are lower during extreme critically dry years than during critically dry years would be affected by this condition: (1) South Yuba River below Lake Spaulding dam (Spaulding No. 1 and No. 2 Development); (2) North Fork of the North Fork American River below Lake Valley reservoir dam (Drum No. 1 and No. 2 Development); and (3) North Fork of the North Fork American River below Lake Valley canal diversion dam (Drum No. 1 and No. 2 Development).
The effects on aquatic habitat from this modification to minimum streamflows for back-to-back critically dry water years three stream reaches are discussed by Forest Service in their rationale document (August 29, 2012). PG&E agreed to the modification for back to back critically dry water years when they filed alternatives to the Forest Service conditions.

**Our Analysis**

Inter-annual variability in precipitation and runoff is an important natural condition to which aquatic communities are adapted and which can affect community resilience and diversity. This measure establishes six water year types that would trigger various conditions (e.g., minimum flow releases) in the new licenses for the Upper Drum-Spaulding Project. PG&E proposes a categorization of water year types based on the historical distribution of annual runoff. PG&E proposes that minimum streamflows for selected stream reaches (section 3.3.2.2.2) would vary depending on predicted monthly trends in estimated natural, unregulated runoff in the Yuba River Basin. Forest Service and California Fish and Wildlife agree with the method proposed by PG&E for determining water year for the Upper Drum-Spaulding Project from the WDR Bulletin 120 forecast for Yuba River at Smartville.

During extended drought conditions represented by back to back critically dry (or drier) water years the hydrologic system is likely to be highly stressed with reduced water tables, snowpack, and minimal residual storage available in lakes and reservoirs going into the second year. In addition, subsequent recovery of the ecosystem from multiple drought years can be an extended process. PCWA points out that, although sequential critically dry (or drier) water years have occurred only twice since 1901 (1976 – 1977, 1987 – 1988), these hydrological conditions result in very difficult consumptive water supply shortage situations. Reservoir storage is greatly diminished in the first critically dry (or drier) year, and typically, there would be water delivery shortages. In the second critically dry (or drier) year, the delivery shortages are typically greatly increased and nearly all reservoir storage is exhausted. PCWA indicates that implementation of the modification to treat the second of two sequential critically dry years as an extreme critically dry year would reduce the potential effects of meeting proposed higher minimum streamflows on water delivery requirements in the region.

Forest Service's rationale for the back-to-back critically dry water year condition for the Upper Drum-Spaulding Project points out that extreme critically dry year minimum streamflows for the South Yuba River below Lake Spaulding dam are 2-5 times the current minimum streamflow. Proposed

minimum streamflows are predicted to provide 35-53 percent of maximum WUA during trout spawning months (April-June) in extreme critically dry years compared to 64-71 percent in critically dry years (California Fish and Wildlife recommendations, July 30, 2012). During the rest of the year, WUA for adult trout would be about 40-48 percent during both extreme critically dry and critically dry years. There are no minimum streamflows for the North Fork of the North Fork American River under the existing license. The extreme critically dry year minimum streamflows for North Fork of the North Fork American River are the same as the minimum streamflows for critically dry water year types in October-March providing 64 percent of maximum WUA: 2 cfs below Lake Valley reservoir dam and 2.2 cfs below Lake Valley canal diversion dam. During the second year of critically dry conditions, the same flows would apply April-September, eliminating the higher spring and summer flows proposed for wetter years. During spawning season (April-June), the proposed minimum streamflows would provide about 22 percent of maximum WUA in extreme critically dry years and 41-57 percent in critically dry years (California Fish and Wildlife recommendations, July 30, 2012).

The Forest Service condition to adjust minimum streamflows by water year type would help mimic some of the natural variability in flow observed among years in the historical data for many project-affected stream reaches. This measure could enhance aquatic resources even during drought conditions compared to existing operating conditions, as well as conserve water resources for water delivery and power generation. The back to back critically dry or drier water year modification for selected project-affected stream reaches would provide enhanced aquatic conditions relative to the existing license while balancing the consumptive water delivery needs of the region during unusual drought conditions. As indicated by PCWA's comments, the historical frequency of back-to-back critically dry or drier years has been rare, occurring only twice since 1901. The implementation of this condition in the project-affected reaches of the South Yuba River and North Fork of the North Fork American River would appear to be an appropriate measure to balance the competing resources needs during extreme and infrequent drought conditions. Monitoring surveys for resident fish populations, foothill yellow-legged frogs, aquatic benthic macroinvertebrates, and water temperature and stage in these reaches would provide information to assess the effects of implementing the back-to-back critically dry water year measure on these resources and aquatic habitat during extreme drought.

**Lower Drum Project**

Inter-annual variability in precipitation and runoff is an important natural condition to which aquatic communities are adapted and which can affect community resilience and diversity. This measure establishes six water year types that would trigger various conditions (e.g., minimum flow releases) in the new licenses for the Lower Drum Project. PG&E proposes a categorization of water year types based on the historical distribution of annual runoff. PG&E proposes that minimum streamflows for selected stream reaches (section 3.3.2.2.2) would vary depending on predicted monthly trends in estimated natural, unregulated runoff in the Yuba River Basin. Forest Service and California Fish and Wildlife recommendations agree with the method proposed by PG&E for determining water year for the Lower Drum Project from the WDR Bulletin 120 forecast for Yuba River at Smartville.

Depending on time of year, Reclamation recommended (recommendation 1.a) the use of two different indexes for determination of water year type (table 3-99) for minimum streamflow releases to Mormon Ravine upstream of Folsom Lake (Newcastle Development). Determination of water year type for January would use the Sacramento River Unimpaired Flow Index at the 75 percent exceedance forecast. For February through May the Yuba River Unimpaired Forecast at the 90 percent exceedance from DWR Bulletin 120 would be used. Reclamation did not comment on our recommendation in the draft EIS to use the Yuba River Unimpaired Forecast at the 90 percent exceedance from DWR Bulletin 120 during all months to determine minimum instream flows to Mormon Ravine.

**Our Analysis**

Inter-annual variability in precipitation and runoff is an important natural condition to which aquatic communities are adapted and which can affect community resilience and diversity. This measure establishes six water year types that would trigger various conditions (e.g., minimum flow releases) in the new licenses for the Lower Drum Project. PG&E proposes a categorization of water year types based on the historical distribution of annual runoff. PG&E proposes that minimum streamflows for selected stream reaches (section 3.3.2.2.2) would vary depending on predicted monthly trends in estimated natural, unregulated runoff in the Yuba River Basin.

The two indexes recommended by Reclamation for determining water year are not consistent with the 10(a) recommendations from Forest Service and BLM; although the source of all water discharged from the Newcastle Development to Mormon Ravine is the Yuba and Bear River watersheds on which the DWR Bulletin Yuba River Index is based. For consistency with all other project-affected stream reaches and to other stakeholder's recommendations, method for water year determination based on DWR Bulletin 120 unimpaired forecast for Yuba River at Smartville, proposed by PG&E and the other licensing stakeholders is most appropriate for use at all project-affected reaches.

**Yuba-Bear Project**

For certain stream reaches, BLM condition 3 specifies and Forest Service recommendation 1 for the Yuba-Bear Project recommends that extreme critically dry water year type flows be implemented in the second year of two sequential critically dry (or drier) years (i.e., during extended drought conditions that affect the ability to meet water delivery commitments). Forest Service does not include a similar back to back critically dry water year condition for designation of minimum streamflows for the Yuba-Bear Project. The Bear River below Rollins dam is the only Yuba-Bear Project-affected reach to which BLM condition 3 would apply. NID proposed an alternative (May 20, 2014) that the following footnote be added to the water year table in Forest Service condition 26 to expand the condition to Middle Yuba River and Canyon Creek (Bowman Development) in order to protect water storage and delivery during extended drought conditions: *For minimum streamflows in the Middle Yuba River downstream of Milton diversion dam and in Canyon Creek downstream of Bowman-Spaulding diversion dam, a critically dry water year that follows an extreme critically dry water year or a critically dry water year shall be considered an extreme critically dry water year*.

**Our Analysis**

Inter-annual variability in precipitation and runoff is an important natural condition to which aquatic communities are adapted and which can affect community resilience and diversity. This measure establishes six water year types that would trigger various conditions (e.g., minimum flow releases) in the new licenses for the Yuba-Bear Project. NID proposes a categorization of water year types based on the historical distribution of annual runoff. NID proposes that minimum streamflows for selected stream reaches (section 3.3.2.2.2) would vary depending on predicted monthly trends in estimated natural, unregulated runoff in the Yuba River Basin. This proposal for determination of water year type is consistent with Forest Service condition 26 and BLM condition 3.

Forest Service's rationale for the back-to-back critically dry water year condition for the Yuba-Bear Project points out that extreme critically dry year minimum streamflows in Bear River below Rollins dam are the same as the current minimum streamflows November-March. The extreme critical streamflows are higher than the current minimum streamflows in April, an important spawning month, but are less than the current minimum streamflows during summer and early fall. During spawning season (March-May) extreme critically dry year minimum streamflows are estimated to provide 37-45 percent on maximum WUA compared to 45-67 percent during critically dry years in Bear River below

Rollins dam (California Fish and Wildlife recommendations, July 30, 2012). During summer extreme critically dry and critically dry water year minimum streamflows are predicted to provide 35 percent and 73 percent of maximum WUA, respectively, in this stream reach. Although these summer flows in extreme critically dry years do not result in optimal rainbow trout WUA, Forest Service indicates that other proposed conditions for this reach are expected to improve habitat conditions for rainbow trout, other native fish, foothill yellow-legged frogs, and western pond turtles. These measures include, the Rollins reservoir flow fluctuation measure, LWD monitoring and management, and monitoring of aquatic resources.

NID's alternative condition proposes to also apply this condition to Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam, for the same rationale described for Bear River below Rollins dam and the three stream reaches affected by the Upper Drum-Spaulding Project. In the rationale filed by the Forest Service with their conditions and recommendations for the Yuba-Bear Project, Forest Service states that the implementation of a back-to-back critically dry water year alternative condition would cause more water years to be categorized as extreme critically dry causing lower flows in the Middle Yuba River below Milton diversion dam over the course of the new license. Furthermore, Forest Service believes that implementation of the back-to-back critically dry water year alternative condition would be less protective for rainbow trout and other coldwater species in the Middle Yuba River below Milton diversion dam. However, PCWA indicates that back to back critically dry (or drier) water years occurs very rarely, only twice in the past 110 years.

NID estimates that the proposed alternative for Middle Yuba River and Canyon Creek would save about 6,000 acre-feet for water delivery by applying extreme critically dry minimum streamflows during the second of back-to-back critically dry years. In Middle Yuba River below Milton diversion dam, where NID proposes to also implement the back-to-back critically dry water year provision, minimum streamflows under the existing license are 3 cfs year round compared to 4 cfs proposed for July-March in extreme critically dry years and 6 cfs for April-June. Proposed minimum streamflows from April through June during extreme critically dry years would be 30-60 percent of those proposed for critically dry years. The proposed flows during extreme critically dry years would provide an estimated 35 percent of maximum WUA for trout spawning compared to 46-69 percent of maximum WUA during critically dry years (California Fish and Wildlife recommendations, July 30, 2012). During the rest of the year, the percent of maximum WUA provided would be 39 and 48 percent during extreme critically dry and critically dry years, respectively. In Canyon Creek below Bowman-Spaulding diversion dam, proposed minimum streamflows during spawning season in extreme critically dry and critically cry water years would provide 39 percent and 68-75 percent of maximum WUA, respectively. The estimated percent of maximum WUA available for spawning (April-June) during extreme critically dry water years in Yuba-Bear Project affected reaches of Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam would be 35-39 percent, within the 22-57 percent range estimated for the other four reaches in the Upper Drum-Spaulding and Yuba-Bear Projects for which Forest Service and BLM have proposed the back-to-back critically dry water year condition.

The results from modeling the relationship between aquatic habitat and flow do not indicate that implementation of a back-to-back critically dry water year condition in Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam proposed by NID would be any less protective of aquatic resources in those reaches than implementation of the same Forest Service and BLM conditions in the Upper Drum-Spaulding Project-affected reaches of South Yuba River and North Fork of the North Fork American River and Yuba-Bear Project-affected reach of the Bear River below Rollins dam. As indicated by PCWA's comments, the historical frequency of back-to-back critically dry or drier years has been rare, occurring only twice since 1901. The implementation of this condition in the project-affected reaches of the Middle Yuba River and Canyon Creek would appear to be an appropriate measure to balance the competing resources needs during extreme and infrequent drought

conditions. Monitoring surveys for resident fish populations, foothill yellow-legged frog, aquatic benthic macroinvertebrates, and water temperature and stage in these reaches would provide information to assess the effects of implementing the back-to-back critically dry water year measure on these resources and aquatic habitat during extreme drought.

#### 3.3.2.2.2 Instream Flows

Altered hydrologic conditions (timing and magnitude) associated with hydroelectric project facilities and operations (e.g., diversion, pulse flows, and ramping rates) can affect aquatic and riparian habitat of reservoirs and downstream stream reaches. Reduced flow, less seasonal variation, and more rapid fluctuations in flow that result from operation of project reservoirs and diversions can affect aquatic biota and habitat, as well as other users (e.g., recreational visitors addressed in section 3.3.5, *Recreation Resources*, and section 3.3.7, *Land Use and Aesthetic Resources*; native American culture addressed in section 3.3.6, *Cultural Resources*; and power generation, addressed in section 4, *Developmental Analysis*). Optimal flow conditions, however, can differ significantly among these various resources and users, requiring a balanced evaluation of the effects of proposed project operations to each user. Generally, the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project facilities are operated to capture and store snowmelt runoff in project reservoirs during spring and early summer for distribution and delivery to agricultural, municipal, domestic, and commercial users throughout the year. These projects divert water in the Middle Yuba River, Canyon Creek, South Yuba River, Bear River, and North Fork of the North Fork American River Basins.

The proposed flow regimes for each stream reach were collaboratively developed by PG&E, NID, and relicensing stakeholders using several modeling approaches to evaluate the relationship between flow and physical habitat, in order to optimize habitat for selected resident species, primarily various life stages and habitat uses of rainbow trout, the most widely distributed and abundant fish species throughout the project-affected stream reaches. The habitat-flow relationship was also evaluated for foothill yellow-legged frog in stream reaches where this species has been found.

PG&E, NID, and the relicensing stakeholders developed an extensive, detailed rationale for minimum streamflow schedules to benefit aquatic resources for each project-affected reach. The minimum streamflows were developed with the objective of balancing ecological resource needs, recreational opportunities, water supply demands, and hydroelectric generation, to the extent possible. Ecologically related considerations included, among other things, estimated unregulated flows, historical regulated flows under the existing license and proposed action, upstream reservoir storage capacities, water temperature data, weighted usable area (WUA) for adult and spawning life stages of resident rainbow trout, habitat for foothill yellow-legged frog in applicable stream reaches, and general enhancement of stream habitat. Historical streamflows under the existing license and estimated unregulated streamflow information is summarized in section 3.3.2.1.1, *Affected Environment, Water Quantity*.

During relicensing studies, PG&E and NID conducted instream flow studies (technical memorandum 3-2, Instream Flow) to determine how streamflow affects habitat for aquatic organisms in selected project-affected stream reaches. These studies generated estimates of various indexes including WUA and wetted perimeter breakpoint, of available aquatic habitat as a function of flow or stage. Determining an optimum flow regime frequently requires balancing the seasonal requirements of various species and life stages, because flow conditions that create optimal habitat are often not consistent among species and life stages. The results of these studies were used by PG&E, NID, and the relicensing stakeholder to inform decisions related to minimum streamflows. In general, the goal of these discussions was to agree on a minimum flow schedule that would accommodate a balance of optimal habitat

conditions for various target species and life stages, as well as other resources and users while still assuring the economic viability of the projects and the capacity to satisfy water delivery commitments.

The PHABSIM is a relatively sophisticated model that uses water velocity and depth, substrate and cover and other potential factors to evaluate the relationship between flows and quality of available aquatic habitat (WUA). Where WUA indexes were estimated, the goal of PG&E, NID, and the relicensing stakeholders was to develop a flow schedule that would generally provide about 80 percent of the maximum WUA under ideal flows for each species over time, particularly during critical life stages (e.g., spawning, fry emergence). Variable meteorological conditions affect available water in a stream reach under both regulated and unregulated flow conditions: (1) during extreme critically dry and critically dry years, some smaller project-affected stream reaches could be dry for a portion of the year; and (2) during wet years, unusually high flows may exist. The natural, inter-annual variability in flow and associated habitat conditions influences the diversity, dynamics, and resilience of aquatic communities. Consequently, the goal of 80 percent of maximum WUA was used flexibly, with stakeholders accepting lower percentages during extreme critically dry and critically dry years in some stream reaches while expecting higher percentages during above normal and wet years.

Because WUA is a static relationship between habitat suitability and flow magnitude, it does not represent flow-habitat relations over time; that is, how frequently do specific habitat conditions exist. To evaluate the effects of alternative flow regimes on habitat over time, a time series of instream hydrologic data is integrated with WUA to generate a "habitat time series." Habitat Exceedance Analysis (HEA) was developed as part of the relicensing Instream Flow Study to assess the flow-habitat relationships over time. The HEA uses mean daily instream hydrology coupled with the WUA-flow relationship to calculate the frequency of WUA conditions for target species and life stages over the hydrologic period of record (water years 1976-2008) used for relicensing studies. For each of the project-affected stream sub-reaches for which PHABSIM modeling was used to estimate WUA, HEA was calculated at two or more hydrologic nodes. At each hydrologic mid-point node for each modeled stream sub-reach, the HEA takes into account "reach-averaged" accretion of water through the stream sub-reach. At each node and for each day in the period of record, regardless of water year type, available habitat was calculated, expressed as a percentage of the maximum static WUA, as depicted on the static WUA-flow curves. This was done for every day in the period of record and resulted in a series of percentages relative to maximum WUA (i.e., one percentage value for each day in the period of record). Monthly exceedance curves were plotted from these data. HEA analysis is used to compare the duration that habitat would be available, as a percentage of maximum WUA, under the no-action (existing license), proposed action, or other alternative minimum streamflows.

The PHABSIM model is not an appropriate analytical tool for many of the small, low-flow, higher elevation headwater stream reaches affected by the project. For these stream reaches, other methods including channel flow response (CFR) and demonstration flow analysis (DFA) were used to develop indexes of aquatic habitat that could inform the negotiation process. Physical measurements of transect characteristics were made under multiple flow conditions and used to interpolate and extrapolate estimates of wetted perimeter, wetted width, and average depth as indexes of available habitat. Percent change in wetted perimeter with increasing flow was evaluated to identify breakpoints in the curve as a target range for selecting minimum summer flows for the stream reach.

PG&E, NID, and the relicensing stakeholders considered available information on species compositions and length frequency in the study stream reaches, and seasonal use and distribution of species/life stages in each stream reach. The typical evaluation steps included: (1) plotting seasonal occurrence/utilization of the stream reach by rainbow trout and foothill yellow-legged frog, where appropriate, against estimated unregulated flows and existing license conditions; (2) examining length frequency and age structure of resident rainbow trout; (3) modeling WUA habitat response to flow;

(4) determining maximum WUA and preliminary minimum streamflows that would ensure availability of at least 80 percent of maximum WUA; and (5) using the operations model to assess the effects of the 80 percent WUA flows on power generation and water delivery and then adjusting the preliminary minimum flow schedule by month and water year type to provide a range of minimum flow/WUA that PG&E, NID, and the relicensing stakeholders agreed would balance the needs of aquatic resources, water delivery, and power generation.

**Upper Drum-Spaulding Project**

Flow in a stream reach affects the quality and quantity of habitat available to aquatic organisms through its effect on a range of aquatic habitat features including, but not limited to, water depth, inundation, wetted perimeter, cover, and velocity. In stream reaches where flow is diverted for power generation, water supply, or other uses, the quantity of water and natural seasonal and inter-annual variability within the stream reach are typically reduced. To improve habitat conditions for resident aquatic organisms, PG&E proposes minimum streamflows (DS-AQR1, Part 1, *Water Year Type*; Part 2, *Minimum Streamflows*) for nine stream reaches affected by the Upper Drum-Spaulding Project, which are generally consistent with minimum streamflows specified in final Forest Service condition 26, 27, and 28 and California Fish and Wildlife recommendation 2.2 for the respective stream reaches. Compliance at these nine stream reaches would be demonstrated through continuous monitoring. PG&E and the relicensing stakeholders proposed and recommended minimum streamflows for 16 additional project-affected reaches controlled by remotely located dam headworks. Compliance in these remote stream reaches would be met by periodically resetting the low-level outlet at each of these dams. PG&E and the relicensing stakeholders anticipate that the proposed minimum streamflows would preserve or enhance aquatic habitat for resident rainbow trout and foothill yellow-legged frog compared to conditions with minimum streamflows (where they have been specified) under the existing license (table 3-100). Compared to estimated unregulated flow conditions, the proposed flows would frequently provide more habitat for a greater percentage of the time during summer and fall, when unregulated flows in many high elevation headwater stream reaches would otherwise be less than proposed flows; proposed flows would provide similar or less habitat than unregulated conditions during winter and spring, when natural unregulated runoff would be higher than the proposed flows.

The proposed minimum streamflows and estimated aquatic habitat changes for stream reaches affected by the Upper Drum-Spaulding Project are discussed below by development in general upstream to downstream order.

**Spaulding No. 3 Development**

All lakes and stream reaches affected by the Spaulding No. 3 Development are located in higher elevation portions of the project, and the hydrology of these waters is strongly influenced by natural patterns of winter precipitation and snowmelt during late spring and early summer. Most of these stream reaches receive flow releases from small headwater reservoirs. The small storage capacities and small drainage areas of these reservoirs restrict the instream flow that can be released to a narrow range without depleting storage that would otherwise support downstream instream flow needs later in the season. Establishing minimum streamflows for these stream reaches is based, to some extent, on the operational flexibility at each facility. Many of these project-affected stream reaches would be dry during late summer and fall in many years under unregulated conditions.

PG&E used channel flow response model (CFR model) to evaluate the response of aquatic habitat to flow in these low flow stream reaches. Wetted perimeter and average depth calculated for each stream reach-specific proposed minimum flow are summarized in table 3-101. Within the operational capacity of these facilities, PG&E proposes minimum streamflows similar to natural unregulated flows, but generally higher minimum streamflows during late summer. PG&E also proposes a measure for

intermittent flow setting at these remote locations for compliance with minimum streamflows (section 3.3.2.2.5, *Monitoring Compliance with Instream Flows*), particularly during winter months when access can be very difficult and unsafe.

*Texas Creek below Upper Rock Lake Dam*

PG&E proposes to provide minimum streamflows of 0.1 cfs or 0.25 cfs, depending on water year type, in Texas Creek between Upper and Lower Rock Lake (table 3-102). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

This reach of Texas Creek is extremely short (0.1 mile). PG&E and the relicensing stakeholders did not perform a habitat-flow assessment for this stream reach, but proposes the same minimum flows as proposed for the next downstream reach below Lower Rock Lake. The existing license includes minimum streamflows of 0.1 cfs (with a target flow of 0.25 cfs) during July to September. Proposed minimum flows were based on a rule curve analysis for Upper Rock Lake to determine the operationally feasible minimum flows. Except during March through May, the period of high natural flows, the minimum flows that PG&E proposes are higher in all water years than the lower end of the historical flow range (90 percent exceedance) for this stream reach. Under the existing license, during critical summer periods (June through November), this reach of Texas Creek is typically dry at historical median flow conditions; under estimated unregulated conditions, the downstream reach below Lower Rock Lake at median flows would be dry between July and October. The proposed flows would ensure minimum flows of at least 0.1 cfs throughout the year even in extreme critically dry years, which is higher than estimated for unregulated conditions in summer and fall. During the high spring flow season (March through May), PG&E's proposed flows are significantly less than historical median flows. These historical flows are representative of conditions with the same minimum flow requirement for this stream reach from July through September under the existing license; it is likely that elevated spring runoff conditions would be similar to those observed historically, which would result in similar higher seasonal releases/spills.

The proposed year round minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, the same minimum flow requirement applies from July through September, and this stream reach generally does not go dry. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods.

*Texas Creek below Lower Rock Lake Dam*

PG&E proposes to provide minimum streamflows of 0.1 cfs or 0.25 cfs, depending on water year type, in Texas Creek downstream from Lower Rock Lake (table 3-103). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at two study sites in this reach of Texas Creek. The average wetted width at the upstream study sites was less than 12 feet, and average depth was less than 0.75 foot; at the downstream study sites, average wetted width was less than 15 feet and depth was less than 1 foot. Because the range of study flows (1.08 to 5.77 cfs) and associated model

flow range (0.43 to 14.5 cfs) were above the proposed minimum streamflows, the results do not provide useful information to evaluate the available aquatic habitat under the proposed flows.

The existing license includes minimum streamflows of 0.1 cfs (with a target flow of 0.25 cfs) during July to September. Median historical flows in this stream reach under the existing license are higher than the proposed minimum streamflows. Under estimated unregulated conditions, the reach of Texas Creek below Lower Rock Lake would be dry 50 percent of the time during the months of July through October. The proposed flows would ensure minimum flows of at least 0.1 cfs throughout the year even in extreme critically dry years, which is higher than estimated for unregulated conditions in summer and fall. During the high spring flow season (March through May), PG&E's proposed flows are significantly less than historical median flows. These historical flows are representative of conditions with the same minimum flow requirement for this stream reach under the existing license; it is likely that elevated spring runoff conditions would be similar to those observed historically, which would result in similar seasonal higher releases/spills as under the existing license.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, the same minimum flow requirement applies from July through September, and this stream reach generally does not go dry. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods.

*Unnamed Tributary below Culbertson Lake Dam*

PG&E proposes to provide minimum streamflows from 0.3 cfs to 1.5 cfs, depending on water year type, and month in the unnamed tributary to Texas Creek downstream from Culbertson Lake (table 3-104). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in this stream reach below Culbertson Lake. The average wetted width was less than 8 feet, and average depth was less than 0.75 foot. PG&E's proposed minimum streamflows range from 0.3 cfs to 1.5 cfs, depending on month and water year type; the CFR model for this stream reach is appropriate over a range of 0.75 to 8.2 cfs. Proposed minimum streamflows for extreme critically dry and critically dry years are below the modeled range of flow. The effect of flow on habitat (wetted perimeter) is greater for changes at low flows than at higher flows. Wetted perimeter as an index of habitat increases sharply with flow up to a breakpoint at about 1.5 cfs (figure 3-17[13]), the minimum flow proposed for above normal and wet years. Wetted perimeter increases by about 20 percent as flow increases from 0.5 cfs to 1.5 cfs. Because of the channel profile (relatively steep sided) in this stream reach, at these minimum flows the wetted perimeter and width change relatively little compared to depth.

Median historical flows (0.7 to 0.9 cfs) in this stream reach under the existing license are higher than the proposed minimum streamflows during extreme critically dry, critically dry, dry, and below

[13] The figures referenced in section 3.3.2.2, *Aquatic Resources, Environmental Effects*, are provided in appendix B-2.

normal years. Under estimated unregulated conditions in the stream reach below Culbertson Lake, the median flow would be less than PG&E's proposed flows during the months of July through November. The proposed flows would ensure minimum flows of at least 0.3 cfs throughout the year even in extreme critically dry and critically dry years, which is higher than estimated for unregulated conditions in summer and fall. During the high spring flow season (March through May), the proposed flows are slightly less than historical median flows, except during above normal and wet years. These historical flows are representative of conditions with a minimum flow requirement of 0.3 cfs throughout the year in all years, but with a target of 0.75 cfs whenever possible under the existing license; it is likely that elevated spring runoff conditions would be similar to those observed historically, which would result in similar seasonal higher releases/spills.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, this stream reach does not go dry. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods.

*Lindsey Creek below Middle Lindsey Lake Dam*

PG&E proposes to provide minimum streamflows of 0.1 cfs or 0.2 cfs, depending on water year type, in Lindsey Creek, a tributary of Texas Creek, downstream from Middle Lindsey Lake (table 3-105). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in this stream reach of Lindsey Creek. The average wetted width at the study site was less than 7 feet, and average depth was less than 0.6 foot. Because the range of study flows (0.51 to 1.59 cfs) and associated model flow range (0.25 to 3.98 cfs) were above the proposed minimum streamflows (0.1 to 0.2 cfs), the results do not provide particularly useful information to evaluate the available aquatic habitat under the proposed flows. However, between 0.25 cfs and 0.5 cfs (upper limit of proposed minimum streamflows), the wetted perimeter increases by about 20 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-18), the stakeholders' target for summer flows.

Median historical flows in this stream reach are higher under the existing license than the proposed minimum streamflows, except in November and December when the historical median is 0 cfs. Under estimated unregulated conditions, the reach of Lindsey Creek below Middle Lindsey Lake would be below the proposed minimum flow 50 percent of the time during the months of July through November. The proposed flows would ensure minimum flows of at least 0.1 cfs throughout the year even in extreme critically dry years, which is higher than estimated for unregulated conditions in summer and fall. The historical flows for this stream reach under the existing license are representative of conditions with minimum flow requirements similar to the proposed minimum streamflows, 0.1 cfs minimum with a target of 0.25 cfs whenever possible.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, similar minimum flow requirements apply, although they can be adjusted downward to account for evaporation during particularly dry periods. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum

streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods, and would provide higher flows (0.2 cfs) during below normal, above normal, and wet years.

*Lindsey Creek below Lower Lindsey Lake Dam*

PG&E proposes to provide minimum streamflows of 0.2 cfs or 0.7 cfs, depending on water year type, in Lindsey Creek, a tributary of Texas Creek, downstream from Lower Lindsey Lake (table 3-106). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in this stream reach of Lindsey Creek. The average wetted width at the study site was less than 15 feet, and average depth was less than 0.75 foot. Because the range of study flows (1.03 to 2.45 cfs) and associated model flow range (0.5 to 6.13 cfs) do not capture the full range of proposed minimum streamflows (0.2 to 0.7 cfs), the results do not provide particularly useful information to evaluate the available aquatic habitat under the proposed flows for extreme critically dry and critically dry years. However, between 0.5 cfs and 1 cfs (upper limit of proposed minimum streamflows), the wetted perimeter increases by about 20 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-19), the stakeholders' target for summer flows.

The existing license includes minimum streamflows of 0.2 cfs (with a target flow of 0.5 cfs) year round in all years. Median historical flows in this stream reach are higher under the existing license than the proposed minimum streamflows, except in April and May when the historical median is 0.6 cfs (no data were provided for February and March). Under estimated unregulated conditions, the reach of Lindsey Creek below Lower Lindsey Lake dam would be at or below the proposed minimum flow 50 percent of the time during the months of July through November. The proposed flows would ensure minimum flows of at least 0.2 cfs throughout the year even in extreme critically dry years, which is higher than estimated for unregulated conditions in summer and fall. Proposed minimum streamflows are significantly less than unregulated peak median flows during spring (March to May).

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, minimum flow requirements are similar to PG&E's proposed flows for extreme critically dry, critically dry, and dry years. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods, and would provide higher flows (0.7 cfs) during below normal, above normal, and wet years than are specified under the existing license.

*Lake Creek below Feeley Lake Dam*

PG&E proposes to provide minimum streamflows of 0.2 cfs to 1.0 cfs, depending on water year type, in Lake Creek downstream from Feeley Lake (table 3-107). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders did not evaluate the relationship between flow and aquatic habitat in this very short (0.1 mile) reach of Lake Creek. Under estimated unregulated conditions, the reach of Lake Creek below Feeley Lake dam would be at or below the proposed minimum flow (0.2 to 1.0 cfs) 50 percent of the time during the months of July through November. The minimum streamflow requirement in this stream reach under the existing license is 0.2 cfs, with a target flow of 0.5 cfs year round. The proposed flows would ensure minimum flows of at least 0.2 cfs throughout the year even in extreme critically dry years, which is higher than estimated for unregulated conditions in summer and fall. During below normal, above normal, and wet years, proposed minimum streamflows would be higher than median flows under the existing license throughout the year.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, minimum flow requirements are similar to PG&E's proposed flows for extreme critically dry, critically dry, and dry years. The range of flows in this stream reach is likely to be slightly higher than existing conditions. The proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods, and would provide higher flows (1.0 cfs) during below normal, above normal, and wet years than are specified under the existing license.

*Lake Creek below Carr Lake Dam*

PG&E proposes to provide minimum streamflows of 0.2 cfs to 1.0 cfs, depending on water year type, in Lake Creek downstream from Carr Lake (table 3-108). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at two study sites in this reach of Lake Creek. The average wetted width at the study sites was less than 8 feet, and average depth was less than 0.8 foot. The range of study flows (0.58 to 2.82 cfs) and associated model flow range (0.5 to 7.05 cfs) do not capture the full range of proposed minimum streamflows (0.2 to 1.0 cfs) necessary to evaluate the available aquatic habitat under the proposed flows for extreme critically dry and critically dry years. However, between about 0.3 cfs and 1 cfs (upper limit of proposed minimum streamflows), the wetted perimeter increases by about 18 to 35 percent to a breakpoint in the percent wetted perimeter/flow curves (the relicensing stakeholders' target for summer minimum streamflows) for the two study stream reaches in this part of Lake Creek (figures 3-20 and 3-21).

The existing license includes minimum streamflows of 0.2 cfs (with a target flow of 0.5 cfs) year round in all years. Median historical flows in this stream reach under the existing license are higher than the proposed minimum streamflows. Under estimated unregulated conditions, the reach of Lake Creek below Carr Lake would be at or below the proposed minimum flow 50 percent of the time during the months of July through November. The proposed flows would ensure minimum flows of at least 0.2 cfs throughout the year even in extreme critically dry years, which is higher than estimated for unregulated conditions in summer and fall. Proposed minimum streamflows are significantly less than peak median flows under the existing license during spring (March to May).

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, minimum flow requirements are similar to PG&E's

proposed flows for extreme critically dry, critically dry, and dry years. The range of flows under the proposed alternative in this stream reach is likely to remain similar to existing license conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods, and would provide higher flows (1 cfs) during below normal, above normal, and wet years than are specified under the existing license.

*Rucker Creek below Blue Lake Dam*

PG&E proposes to provide minimum streamflows of 0.2 cfs to 0.5 cfs, depending on water year type, in Rucker Creek downstream from Blue Lake (table 3-109). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in this reach of Rucker Creek;. The average wetted width at the study site was less than 10 feet, and average depth was less than 0.75 foot. Because the range of study flows (0.59 to 2.07 cfs) and associated model flow range (0.5 to 5.18 cfs) do not capture the range of proposed minimum streamflows (0.2 to 0.5 cfs), the results do not provide adequate information to fully evaluate the available aquatic habitat under the proposed flows for extreme critically dry and critically dry years. However, between 0.3 cfs and 1 cfs, the wetted perimeter increases by about 20 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-22), the stakeholders' target for summer minimum streamflows.

The existing license includes minimum streamflows of 0.2 cfs (with a target flow of 0.5 cfs) year round in all years. Under estimated unregulated conditions, the reach of Rucker Creek below Blue Lake would be less than the proposed minimum flow 50 percent of the time during the months of July through November. The proposed flows would ensure minimum flows of at least 0.2 cfs throughout the year even in extreme critically dry years, which is higher than estimated for unregulated conditions in summer and fall. Proposed minimum streamflows are significantly less than peak median unregulated flows (1.2 to 2.9 cfs) during spring (March to May). PG&E did not present historical flow frequency data for comparison to proposed minimum flow conditions.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, minimum flow requirements are similar to the proposed flows. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods, and would provide higher minimum streamflows (0.5 cfs) during below normal, above normal, and wet years than are specified under the existing license.

*Rucker Creek below Rucker Lake Dam*

PG&E proposes to provide minimum streamflows of 0.2 cfs to 1.5 cfs, depending on water year type, in Rucker Creek downstream from Rucker Lake (table 3-110). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in this stream reach of Rucker Creek. The average wetted width at the study site was less than 15 feet, and average depth was less than 0.9 foot. The range of study flows (0.56 to 4.63 cfs) and associated model flow range (0.22 to 11.58 cfs) capture the range of proposed minimum streamflows (0.2 to 1.5 cfs). Between 0.2 cfs and 2 cfs, the wetted perimeter increases by about 22 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-23), the stakeholders' target for summer minimum streamflows.

Under estimated unregulated conditions, the stream reach of Rucker Creek below Rucker Lake dam would be at or below the proposed minimum flow 50 percent of the time during the months of July through October in critically dry and extreme critically dry years, and during the months of July through November in below normal, above normal, and wet years. The proposed flows would ensure minimum flows of at least 0.2 cfs throughout the year even in extreme critically dry years, which is higher than estimated for unregulated conditions in summer and fall. Proposed minimum streamflows are significantly less than peak median flows under existing conditions during spring (March to May). PG&E did not present historical flow frequency data for comparison to proposed minimum flow conditions.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, minimum flow requirements are similar to proposed flows for extreme critically dry, critically dry, and dry years. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods and would provide higher minimum streamflows (0.75 to 1.5 cfs) during below normal, above normal, and wet years than are specified under the existing license (0.2 to 0.5 cfs).

*Unnamed Tributary below Fuller Lake Dam*

PG&E proposes to provide minimum streamflows of 0.25 cfs year round in all years in the unnamed tributary to Jordan Creek downstream from Fuller Lake (table 3-111). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in this stream reach below Fuller Lake dam. The average wetted width at the study site was less than 9 feet, and average depth was less than 1.0 foot. Because the range of study flows (0.82 to 3.67 cfs) and associated model flow range (0.33 to 9.18 cfs) do not include the proposed minimum streamflows (0.25 cfs), the results do not provide adequate information to evaluate fully the available aquatic habitat under the proposed flows for all years. However, between 0.3 cfs and 1 cfs the wetted perimeter increases by about 10 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-24), the stakeholders' target for summer minimum streamflows.

Under estimated unregulated conditions, flow in the stream reach below Fuller Lake dam would be less than the proposed minimum flow 50 percent of the time during the months of July through November. The proposed flows would ensure minimum flows of at least 0.25 cfs throughout the year under all years, which is higher than estimated for unregulated conditions in summer and fall. Proposed

minimum streamflows are significantly less than peak median unregulated flows (2.9 to 6.1 cfs) during spring (March to May). PG&E did not present historical flow frequency data for comparison to proposed minimum flow conditions.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. Under the existing license, there are no minimum flow requirements. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods.

**Spaulding No. 1 and No. 2 Development**

All lakes and stream reaches affected by the Spaulding No. 1 and No. 2 Development upstream of Lake Spaulding are located in higher elevation portions of the project; the hydrology of these waters is strongly influenced by natural patterns of winter precipitation and snowmelt during late spring and early summer. Most of these stream reaches receive releases from small headwater reservoirs. The small storage capacities and small drainage areas of these reservoirs restrict the instream flow that can be released to a narrow range without depleting storage that would otherwise support downstream instream flow needs later in the season. Establishing minimum streamflows for these stream reaches are based, to some extent, on the operational flexibility at each facility. Many of these project-affected stream reaches would be dry in many years under unregulated conditions. Within the operational capacity of these facilities, PG&E proposes minimum streamflows similar to natural unregulated flows and generally higher during late summer. PG&E also proposes a measure for intermittent flow setting at these remote locations for compliance with minimum streamflows (section 3.3.2.2.5, *Monitoring Compliance with Instream Flow Measures*), particularly during winter when access can be very difficult and unsafe.

*Unnamed Tributary below Meadow Lake Dam*

PG&E proposes to provide minimum streamflows of 1 cfs to 11 cfs, depending on month, in all years in the unnamed tributary to Fordyce Lake downstream from Meadow Lake (table 3-112). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR method to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in the stream reach below Meadow Lake dam. The average wetted width at the study site was less than 15 feet, and average depth was less than 1.1 feet. The range of study flows (1.42 to 11.33 cfs) and associated model flow range (0.57 to 28.33 cfs) capture the range of proposed minimum streamflows (1 to 11 cfs). Between 1 cfs and 11 cfs, the wetted perimeter increases by about 35 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-25), the stakeholders' target for summer minimum flow.

PG&E did not present a frequency analysis for historical flows. Under estimated unregulated conditions, median flows in the stream reach below Meadow Lake dam would be less than the proposed minimum flow during the months of July through December. No minimum streamflows are required for this stream reach under the existing license. The proposed flows would ensure minimum flows of at least 1 cfs throughout the year in all years, which is higher than estimated for unregulated conditions in summer and fall. Proposed minimum streamflows increase from 1 cfs up to 11 cfs and back to 1 cfs during July in all years.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would frequently be dry under natural unregulated conditions. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods.

*White Rock Creek below White Rock Diversion Dam*

PG&E proposes to provide minimum streamflows of 0.5 cfs to 1 cfs, depending on water year type, in White Rock Creek, a tributary to North Creek (which flows into Fordyce Lake) downstream from White Rock Lake dam (table 3-113). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR method to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in the stream reach below Meadow Lake. The average wetted width at the study site was less than 10 feet, and average depth was less than 1 foot. The range of study flows (0.45 to 1.81 cfs) and associated model flow range (0.18 to 4.53 cfs) capture the range of proposed minimum streamflows (0.5 to 1cfs). Between 0.5 cfs and 1 cfs, the wetted perimeter increases by about 5 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-26), the stakeholders' target for summer minimum flow.

PG&E did not present a frequency analysis for historical flows under the existing license for White Rock Creek. Under the existing license, there are no minimum streamflows for this stream reach. Under estimated unregulated conditions, median flows in the reach of White Rock Creek below White Rock Lake dam would be at or less than the proposed minimum flow during the months of July through November. The proposed flows would ensure minimum flows of at least 0.5 cfs throughout the year in extreme critically dry to below normal years, which is higher than estimated for unregulated conditions in summer and fall.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods and would provide higher flows (1 cfs) during above normal and wet years.

*Bloody Creek below Lake Sterling Dam*

PG&E proposes to provide minimum streamflows of 0.5 cfs to 1.5 cfs, depending on month and water year type, in Bloody Creek, a tributary to Fordyce Lake downstream from Lake Sterling dam (table 3-114). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

Under the existing license, there are no requirements for minimum streamflows in the stream reach below Lake Sterling dam. PG&E did not present a frequency analysis of historical flows for this stream reach and did not analyze the relationship between flow and aquatic habitat in the stream reach below Lake Sterling dam.

Estimated unregulated median flows in the steam reach below Lake Sterling dam would be less than the proposed minimum streamflows during the months of July through October. Under the existing license, there are no minimum streamflows for this stream reach. The proposed flows would ensure minimum flows of at least 0.5 cfs throughout the year in extreme critically dry to below normal years, which is higher than estimated for unregulated conditions in summer and fall.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. The proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods and would provide higher flows (1 to 1.5 cfs) during above normal and wet years.

*Fordyce Creek below Fordyce Lake Dam*

Streamflows in Fordyce Creek downstream from Fordyce Lake dam would be affected by two proposed measures: (1) *Minimum Streamflows*; and (2) *Fordyce Lake Drawdown*. PG&E proposes to provide minimum streamflows of 15 cfs to 45 cfs, depending on month and water year type, in Fordyce Creek downstream from Fordyce Lake dam (table 3-115). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

In addition to minimum streamflows for the Fordyce Lake dam stream reach, PG&E proposes (DS-AQR1, Part 5, *Fordyce Lake Drawdown*) to release higher flows to Fordyce Creek from Fordyce Lake dam during spring to early summer, which is consistent with Forest Service condition 30 and California Fish and Wildlife recommendation 2.2. Each year when spills cease at both Fordyce Lake dam and Lake Spaulding dam and at such time that the Fordyce Lake dam can be safely accessed, PG&E would release "high target flows" at Fordyce Lake dam in the range of 250 to 475 cfs as long as the release would not result in continued spill at Lake Spaulding. These high target flows would be provided primarily to accommodate whitewater recreational boating (section 3.3.5.2, *Recreation Resources*) during spring and summer and are similar to estimated median unregulated flows during April to May. This measure would also move more cold water into Lake Spaulding earlier in the year, supporting the proposed Supplemental Flow releases to the South Yuba River below Spaulding Lake dam (section 3.3.2.2.7, *Flow Augmentation for Water Temperature Management*). The Fordyce Lake release would continue at this rate until available storage in Fordyce Lake is reduced to 29,000 acre-feet. The next 19,000 to 21,500 acre-feet of storage would be apportioned and released evenly through the end of the water year (October), leaving about 7,500 to 10,000 acre-feet of target holdover storage to meet minimum streamflow requirements through the winter. Apportioning releases from water storage in Fordyce Lake would provide the monthly specified minimum streamflow for Fordyce Creek (table 3-115).

For a 10-day period beginning the third week of August, PG&E proposes to hold flow in Fordyce Creek below Fordyce Lake at 50 cfs to accommodate creek crossing by four-wheel recreational vehicles during the Sierra Trek event (section 3.3.5.2, *Recreation Resources*); depending on water year type, minimum streamflows during this period would otherwise be 10 to 40 cfs.

Our Analysis

The PG&E proposed minimum streamflows of 15 to 45 cfs would be 3 to 9 times higher than under the existing license (5 cfs). Under estimated unregulated conditions, Fordyce Creek median flows are less than historical median flows under the existing license and would be less than proposed minimum streamflows during the months of June through November. Highest median monthly flows (128 to 265 cfs) historically occur from June through August. These flows are similar to peak median unregulated flows (100 to 455 cfs), which would occur in March to June. Less frequent peak monthly

flows, represented by the 10 percent exceedance, exhibit the same shift to later in the year in the historical data under the existing license compared to estimated unregulated conditions. These historical flows are representative of conditions with a minimum flow requirement of 5 cfs throughout the year and in all years under the existing license. Minimum historical monthly flows, represented by the 90 percent exceedance flow, range from about 5 to 9 cfs in September through March and 12 to 37 cfs in May through August, and were consistently higher than the required 5 cfs minimum flow in the existing license. It is likely that elevated spring runoff conditions under the new license would be similar to those observed historically under the existing, which would result in similar seasonally higher releases/spills. The highest proposed minimum streamflows would occur in May and June similar to the peak period for estimated unregulated flows. The proposed flows would ensure minimum flows of at least 15 cfs from late fall through mid-spring in extreme critically dry to dry years and would increase to 20 to 25 cfs in wetter years. From May through September, proposed minimum flows would range from 20 to 45 cfs, depending on month and water year type. During the high spring flow season (March through May), proposed flows are slightly less than historical median flows except during above normal and wet years.

The seasonal use of this stream reach by various life stages of resident rainbow trout is depicted relative to historical flows under the existing license and estimated unregulated flows in figure 3-27. Habitat-flow simulations for spawning and fry, juvenile, and adult life stages (figure 3-28) demonstrate that maximum WUA for spawning, fry, and juveniles is associated with flows of 50 cfs or less. Proposed minimum streamflows are 15 to 45 cfs for much of the period of occurrence of these lifestages and uses (April to August). Under the proposed minimum streamflows, available habitat (as percent of maximum available WUA) is 87 percent or higher throughout the year in all years for juvenile rainbow trout (table 3-116). Available habitat for spawning is 94 percent or higher in May and June of all years, 66 percent in April of extreme critically dry, critically dry, and dry years, and 79 to 88 percent in below normal to wet years (table 3-116). Proposed minimum streamflows are predicted to provide 78 to 97 percent of maximum WUA for adult trout during critical low flow summer periods (May to October) and, during winter and early spring, 69 percent of maximum in extreme critically dry to dry years, and greater than 78 percent in below normal to wet years (table 3-116). The available habitat for these life stages would be consistently higher for the proposed minimum streamflows than that provided under the existing license; proposed flows generally enhance conditions compared to median historical flows under the existing license and estimated unregulated flow conditions.

In general, the HEA analysis indicates that available habitat (WUA) for adults is closer to maximum more frequently at the proposed minimum streamflows than at historical flows under the existing license or estimated unregulated flows during the critical low flow period from July through November (figure 3-29 provides an example for August and September). From December through March, the frequency curves are more similar, and the relative relationship of the three flow scenarios (proposed, historic existing license, estimated unregulated) varies from month to month. In April and May, habitat frequency curves for historical and proposed flows are higher than for unregulated flows; higher habitat availability at historical flows would be slightly more frequent than for proposed flows. The differences observed in April and May increase in June. During the early spawning season (March and April), available spawning habitat is closer to maximum more frequently under proposed and historical flows than under estimated unregulated flows (figure 3-30). In the mid- to late spawning season (May and June), proposed flows provide more than 90 percent of maximum habitat.

PG&E does not provide an analysis of percent of maximum WUA or HEA for rainbow trout fry. Maximum habitat for fry (about 13,000 WUA) occurs near the low end of modeled flows, about 20 cfs; declines sharply to less than 5,000 WUA as flows increase to about 75 cfs; and is relatively constant (about 3,000 to 4,000 WUA) above 200 cfs (figure 3-28). The high flows proposed during the Fordyce Lake drawdown (250 to 475 cfs) that support recreational boating and the August recreational vehicle

Sierra Trek event (50 cfs) (section 3.3.5.2, *Recreation Resources*) could result in a reduction in available fry habitat (20 to 30 percent of maximum WUA).

The Fordyce Lake drawdown is proposed to provide additional recreational boating opportunities in Fordyce Creek (section 3.3.5.2, *Recreation Resources*) and secondarily to supplement coldwater storage downstream in Lake Spaulding to support the proposed South Yuba River supplemental flow measure below Lake Spaulding (section 3.3.2.2.7). The Fordyce Lake drawdown measure would result in lower water levels in Fordyce Lake earlier in the summer than under the existing license; however, by the end of each water year (October), water level in Fordyce Lake would be similar under both the proposed condition and the existing license (table 3-117).

The minimum streamflows proposed by PG&E and the relicensing stakeholders for Fordyce Creek between Fordyce Lake and Lake Spaulding would enhance existing habitat conditions for resident rainbow trout, generally providing habitat in excess of 80 percent of the maximum WUA.

*Unnamed Tributary below Kidd Lake Dam*

PG&E proposes to provide minimum streamflows of 0.5 cfs to 1.0 cfs, depending on month and water year type, to the unnamed tributary to upper South Yuba River downstream from Kidd Lake dam (table 3-118). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR method to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in the stream reach below Kidd Lake. The average wetted width at the study site was less than 7 feet, and average depth was less than 0.5 feet. The range of study flows (0.17 to 4.04 cfs) and associated model flow range (0.7 to 10.10 cfs) capture the range of proposed minimum streamflows (0.5 to 1cfs). Between 0.5 cfs and 1 cfs, the wetted perimeter increases by about 20 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-31), the stakeholders' target summer flow.

PG&E did not present a frequency analysis for historical flows under the existing license for the stream reach below Kidd Lake. Under the existing license, there are no minimum streamflows for this stream reach. Under estimated unregulated conditions, median flows in the stream reach below Kidd Lake dam would be at or less than the proposed minimum flow during the months of July through December. The proposed flows would ensure minimum flows of at least 0.5 cfs throughout the year in extreme critically dry to dry years, which is higher than estimated for unregulated conditions in summer and fall. During below normal to wet years, proposed minimum streamflows in June would increase to 0.75 to 1.0 cfs, slightly less than the estimated unregulated median flow in this stream reach during June.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods, and would provide higher flows (1 cfs) during June in below normal to wet years.

*Cascade Creek below Lower Peak Lake Dam*

PG&E proposes to provide minimum streamflows of 0.5 cfs to 1.0 cfs, depending on month and water year type, to Cascade Creek (a tributary to upper South Yuba River) downstream from Lower Peak

Lake dam (table 3-119). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR method to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in Cascade Creek below Lower Peak Lake dam. The average wetted width at the study site was less than 15 feet, and average depth was less than 1 foot. The range of study flows (3.47 to 8.18 cfs) and associated model flow range (1.39 to 20.45 cfs) do not capture the range of proposed minimum streamflows (0.5 to 1 cfs); the percent change in wetted perimeter versus flow curve generated from this model does not provide adequate information to evaluate the relationship between habitat and flow for this stream reach.

PG&E did not present a frequency analysis for historical flows under the existing license for this reach of Cascade Creek. Under the existing license, there are no minimum streamflows for this stream reach. Under estimated unregulated conditions, median flows in this reach of Cascade Creek would be at or less than the proposed minimum flow during the months of July through November. The proposed flows would ensure minimum flows of at least 0.5 cfs throughout the year in extreme critically dry to dry years, which is higher than estimated for unregulated conditions in summer and fall. During below normal to wet years, proposed minimum streamflows in June would increase to 0.75 to 1.0 cfs, slightly less than the estimated unregulated median flow in this stream reach during June.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated conditions. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach remains inundated throughout the year even during the driest periods and would provide higher flows (1 cfs) during June in below normal to wet years.

*South Yuba River below the Confluence of Unnamed Tributary below Kidd Lake and Cascade Creek*

PG&E proposes minimum streamflows (table 3-120) of 5 cfs year round during all water year types in the upper South Yuba River at Cisco. Flow at this location is the aggregate of releases from Kidd Lake and Lower Peak Lake, and upstream stream reaches of the upper South Yuba River. Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR method to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in upper South Yuba River downstream of the confluence of Cascade Creek and the tributary from Kidd Lake. The average wetted width at the study site was less than 4 feet, and average depth was less than 1.5 feet. The range of study flows (0.25 to 4.04 cfs) and associated model flow range (0.1 to 10.1 cfs) captures the proposed minimum streamflows (5 cfs year round). Over a flow range of 0.1 to 1 cfs, the wetted perimeter increases a little more than 20 percent to a breakpoint in the percent wetted perimeter/flow curve (figure 3-32), the stakeholders' target summer flow.

Under the existing license, minimum flow for this stream reach is the same as the proposed action, 5 cfs. Historical median monthly flows in this stream reach of the upper South Yuba River are similar to estimated unregulated flow conditions in magnitude and seasonal timing except in September

and October, when unregulated median flows would be about a third of historical median flows under the existing license. Under estimated unregulated conditions, median flows in this reach of upper South Yuba River would be at or less than the proposed minimum flow during the months of August through October. The proposed flows would ensure minimum streamflows of at least 5 cfs throughout the year in all years, which is higher than estimated for unregulated conditions in late summer and early fall.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer and would be higher than under natural unregulated conditions. The range of flows in this stream reach is likely to remain similar to existing conditions.

*South Yuba River below Lake Spaulding Dam*

Streamflows in the South Yuba River downstream from Lake Spaulding dam would be influenced by three proposed flow measures: (1) *Minimum Streamflows*; (2) *Spill Cessation,* section 3.3.2.2.4; and (3) *Flow Augmentation for Temperature Management,* section 3.3.2.2.7. PG&E proposes to provide minimum streamflows of 10 to 90 cfs, depending on month and water year type, in South Yuba River downstream from Lake Spaulding dam (table 3-121). In the case where a critically dry year is preceded by a critically dry or extreme critically dry year, the Forest Service (condition 27) specifies and California Fish and Wildlife recommends the year be treated as an extreme critically dry year where minimum streamflow would be reduced from 20 to 10 cfs for the period from September 1 to June 14, but would be 20 cfs from June 15 to August 31. PG&E's proposed minimum streamflow under such extended drought conditions would be 10 cfs throughout the year, including the June 15 to August 31 period. In proposing alternatives to the Forest Service conditions, PG&E indicated that, although it prefers a minimum flow of 10 cfs during the summer period, it could operate effectively with minimum streamflows in the range of 10 to 20 cfs specified by the Forest Service and recommended by California Fish and Wildlife for this stream reach.

To support eventual reintroduction of spring-run Chinook salmon and winter Central Valley steelhead or winter steelhead alone, NMFS provided 10(j) flow recommendations for South Yuba River below Lake Spaulding dam (table 3-122) of 25-75 cfs depending on month. NMFS' flow recommendations are the same across all water year types; if adequate water storage is not available in extreme critically dry years to meet the NMFS recommended flows, PG&E would be required to confer with the Commission, NMFS, NID, the U.S. Army Corps of Engineers, and other entities involved in the restoration.

Our Analysis

PG&E's proposed minimum streamflows (10 to 90 cfs) would be 2 to 18 times higher than under the existing license. Under the existing license there are two minimum streamflow requirements in this stream reach: (1) 1 cfs below Lake Spaulding dam at YB-116; and (2) 5 cfs at Lang's crossing (YB-29) downstream of the confluence of Jordan Creek. Proposed minimum streamflows require compliance at the more downstream location (YB-29); no minimum streamflow compliance is proposed at the more upstream location (YB-116).

The proposed 20-cfs minimum streamflow during summer would provide a considerable improvement in available aquatic habitat, particularly during exceptionally dry periods compared to the existing license. Under the existing license, historical median monthly flows in this stream reach are less than 10 cfs from June through December and between 12 and 24 cfs the rest of the year. Estimated unregulated median monthly flows from July through November would be 31 cfs or less; median monthly flows increase from December to the peak of 1,585 cfs in May. Lowest historical monthly flows, represented by the 90 percent exceedance flow, range from 5 to 7 cfs under the existing license; estimated unregulated flows at the 90 percent exceedance range from about 5 to 450 cfs, with flows of 400 to 450

cfs in April and May. Historical maximum monthly flows, represented by the 10 percent exceedance, range from 8 to 1,320 cfs under the existing license and 30 to 3,165 cfs for estimated unregulated conditions; the highest monthly flows occur in May through June under both the existing license and unregulated conditions. The highest proposed minimum streamflows would occur in April to June, similar to estimated peak unregulated flows, but would be one to two orders of magnitude lower than unregulated flows.

The seasonal use of this stream reach by various life stages of resident rainbow trout is depicted relative to historical flows under the existing license and estimated unregulated flows in figure 3-33. Habitat-flow simulations for spawning and fry, juvenile, and adult life stages the South Yuba River below Jordan Creek (figure 3-34) and below Canyon Creek (figure 3-35) demonstrate that 80 percent of maximum WUA for spawning, adult, and juvenile rainbow trout is associated with flows of about 58, 57, and 14 cfs, respectively. Proposed minimum streamflows are greater than 50 cfs in April to June (primary spawning period) in below normal to wet years and 30 to 60 cfs in critically dry and dry years. Under the proposed minimum streamflows, available habitat (as percent of maximum available WUA) is 90 percent or higher throughout the year in all years for juvenile rainbow trout (table 3-123). Available habitat for spawning is 77 percent or higher in May and June of below normal to wet years, 53 percent in April to June of extreme critically dry years, and 64 to 81 percent in critically dry to dry years (table 3-123). Proposed minimum streamflows are predicted to provide 40 to 55 percent of maximum WUA for adult trout from mid-September through January. Adult habitat is close to or exceeds 80 percent of maximum from April to June of below normal and wetter years (table 3-123). The available habitat for these life stages is consistently higher than minimum streamflows provided under the existing license, and generally enhances conditions compared to median flows under the existing license and estimated unregulated flow conditions.

In general, the HEA analysis indicates that available habitat (WUA) for adults is closer to maximum more frequently under the proposed minimum streamflows than at historical regulated flows under the existing license or estimated unregulated flows during the critical low flow period from July through November (figure 3-36 provides an example for August and September). From December through March, a higher percentage of habitat would be available more often with unregulated flows, and proposed minimum streamflows provide considerably more habitat than historical flows under the existing license. In April and May, habitat frequency curves for unregulated and proposed flows are similar and higher than with historical flows under the existing license. These differences increase in June and July. During the early spawning season (March and April), available spawning habitat is generally closer to maximum more frequently under proposed and unregulated flows than under historical flows (figure 3-37). In the mid- to late spawning season (May and June), proposed flows provide better than 90 percent of maximum habitat.

PG&E does not provide an analysis of percent of maximum WUA or HEA for rainbow trout fry. Maximum habitat for fry (about 20,000 WUA in the Jordan Creek reach and 15,000 in the Canyon Creek reach) occurs near the low end of modeled flows, about 20 cfs, and declines sharply to less than 10,000 WUA as flows increase to about 50 to 60 cfs. WUA is variable above 100 cfs in the Jordan Creek reach (about 8,000 to 11,000 WUA) (figure 3-34) and in the Canyon Creek reach (5,000 to 8,000 WUA). Fry emergence occurs between May and August (figure 3-33); proposed minimum streamflows during this period should provide near 80 percent of maximum WUA or better during extreme critically dry to dry years. Higher flows (90 cfs) in May through June of below normal or wetter years could reduce fry habitat as would unregulated flows during this time frame.

Lower flows in this stream reach provide more habitat for early life stages of foothill yellow-legged frog (table 3-124). Flows of 20 cfs during extreme critically dry years provide 98 percent of maximum habitat for the frog's eggs. Habitat for incubation of the frog's eggs generally exceeds

80 percent in below normal or drier years and declines to 74 percent in above normal and wet years. Habitat for tadpoles exceeds 86 percent in all years from July through September, ranging from 93 percent in extreme critically dry to 86 percent in wet years.

In conjunction with the proposed minimum streamflows, the spill cessation measure for Lake Spaulding (section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuation*) is intended to provide a more gradual reduction of flow, following spill events, to protect aquatic biota from entrapment and stranding as flows decrease and concentrate, and portions of the downstream channel dewater. This measure (discussed in more detail in section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuation*) would cause flows to remain higher for longer periods to mimic a more natural recession of peak flows following spills. The supplemental flow measure (discussed in more detail in section 3.3.2.2.7, *Flow Augmentation for Water Temperature Management*) would require release of additional water in excess of the minimum flow requirement from the Lake Spaulding low-level outlet during the summer, to maintain water temperatures at or below 20°C above the confluence of Canyon Creek to benefit resident rainbow trout and protect foothill yellow-legged frog.

NMFS recommended minimum streamflows are associated with a plan for reintroduction of spring-run Chinook salmon and Central Valley steelhead to the upper Yuba River upstream of Englebright dam, including South Yuba River below Lake Spaulding dam. NMFS expects these reintroduction efforts may occur sometime during the term of the new license for the Drum-Spaulding and Yuba-Bear Projects. The timing of the reintroduction is highly uncertain, but NMFS recommends these minimum streamflows for future implementation when reintroduction does occur. The NMFS recommended flows to support this reintroduction in South Yuba River below Lake Spaulding dam are generally higher than those proposed by PG&E, Forest Service 4(e) conditions, and recommended by California Fish and Wildlife; however, during below normal to wet years, PG&E's proposed flows are higher in January to March. PG&E's proposed flows are also higher in April to June during above normal and wet years. Given the uncertain schedule and progress toward reintroduction of anadromous salmonids in this watershed and ongoing studies in the watershed[14], it is premature to determine appropriate flows to support reintroduction of anadromous salmonids for future implementation as recommended by NMFS.

The minimum streamflows proposed by PG&E and the relicensing stakeholders for South Yuba River downstream of Lake Spaulding dam would enhance existing habitat conditions for resident rainbow trout and foothill yellow-legged frog, compared to the existing license and estimated unregulated flow conditions. Although adult rainbow trout habitat during extreme critically dry to dry years would be considerably less than maximum, habitat for early foothill yellow-legged frog during spring and summer would approach maximum during these same years.

**Drum No. 1 and No. 2 Development**

*North Fork of the North Fork American River below Lake Valley Reservoir Dam*

PG&E proposes to provide minimum streamflows of 2 cfs to 15 cfs, depending on month and water year type, in the North Fork of the North Fork American River downstream from Lake Valley reservoir dam (table 3-126). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

[14] Ongoing efforts by Lower Yuba Technical Work Group, Yuba Salmon Forum, and work completed by the Upper Yuba River Studies Program in cooperation with NMFS.

Our Analysis

Historical median monthly flows under the existing license for this reach of North Fork of the North Fork American River are 4.2 to 6.0 cfs in June through September and 10.0 to18.0 cfs the rest of the year. Minimum historical monthly flow (90 percent exceedance) is 0.3 to 3.2 cfs April through October and 3.5 to 10.1 cfs the rest of the year. Maximum flows (10 percent exceedance) range from 19.0 to 43.0 cfs. Under the existing license, there are no minimum streamflows for this stream reach, but by agreement with California Fish and Wildlife PG&E maintains a minimum streamflow of 1 cfs. Under estimated unregulated conditions, North Fork of the North Fork American River median flows would be less than proposed minimum streamflows during the months of July through November. In wetter years, proposed minimum streamflows would increase during April through June, but would still be less than the estimated unregulated median flows during that period. Highest unregulated median monthly flows (41 to 55 cfs) occur in April through May. Peak (10 percent exceedance flow) unregulated flows (63 to 112 cfs) occur in March through June. Minimum unregulated monthly flows, represented by the 90 percent exceedance flow, range from about 0.1 to 10 cfs in June through March and 14 to 18 cfs in April and May, and were consistently higher than the 1 cfs minimum flow in the existing license. The proposed flows would ensure minimum streamflows of at least 2 to 4 cfs from October to March, depending on water year type. From April through September, proposed minimum streamflows would be 2 cfs in extreme critically dry years, increasing to 6 to 15 cfs in wet years, with peak flows in May. From February through May, proposed flows would be considerably less than estimated unregulated median flows.

Habitat-flow simulations for spawning and rainbow trout fry, juvenile, and adult life stages (figure 3-38) demonstrate that maximum WUA for fry, juveniles, and adults is associated with flows of 10 cfs or less; proposed minimum streamflows are 2 to 15 cfs. Under the proposed minimum streamflows, available habitat (as percent of maximum available WUA) for adult rainbow trout is 64 to 100 percent throughout the year in all years (table 3-127). Percent of maximum WUA for adults exceeds 80 percent from April through September in dry, below normal, and above normal years, and throughout the year in wet years. Available habitat for juvenile rainbow trout ranges from 79 to 100 percent of maximum in all months and years. Peak spawning habitat occurs at flows of about 25 cfs (figure 3-38). Available habitat for spawning exceeds 80 percent in wet years during May and June, and in May of above normal years. During extreme critically dry years, available spawning habitat is 23 percent and ranges from 41 to 57 percent for most of the spawning period in critically dry, dry, and below normal years (table 3-127). The available habitat for these life stages is consistently higher than minimum streamflows provided under the existing license, and generally enhances conditions compared to median flows under estimated unregulated conditions.

In general, the HEA analysis indicates that available habitat (WUA) for adults is closer to maximum more frequently under the proposed minimum streamflows than for historical flows under the existing license or estimated unregulated flows during the critical low flow period from July through November (figure 3-39 provides an example for June and July). From December through May, the frequency curves for the existing license, proposed, and unregulated flows are very similar. In June, the habitat frequency curves for estimated unregulated conditions decline and diverge from the curves for the existing license and proposed conditions; that is, there would be less habitat available under unregulated conditions. From August through November, the frequency curves for the three alternative flow conditions (existing license historical flows, proposed flows, and estimated unregulated flows) remain relatively the same as July. Two study sites were measured in this stream reach, one close to the dam (node 0) and one near the mid-point of the stream reach (node 1); there appear to be distinct differences between these locations relative to spawning habitat. During the early spawning season (March and April), the habitat frequency curves for all three alternative flow conditions are very similar (figure 3-40). At the study location below Lake Valley reservoir dam, there is a sharp break in available habitat under

the existing license from near 100 percent of maximum about 35 to 40 percent of the time to 40 percent of maximum for about 60 to 65 percent of the time. Habitat under the proposed minimum streamflows exhibits a similar frequency shift in March, although available habitat frequency curve is not as high as under the existing license historical flows. In April, the proposed flows would result in a frequency distribution more similar to estimated unregulated conditions. Given the stepped character of the curves for the existing license and proposed flows, this may reflect a sharp change in the area inundated and available to spawning rainbow trout.

PG&E does not provide an analysis of percent of maximum WUA or HEA for rainbow trout fry. Maximum habitat for fry (about 9,800 WUA) occurs near the low end of modeled flows, about 3 cfs; declines sharply to less than 3,500 WUA as flows increase to about 25 cfs; and increases gradually to about 7,500 at the model's upper limit, 90 cfs (figure 3-38). The proposed minimum streamflows are likely to support greater than 80 percent of maximum habitat for rainbow trout fry.

The minimum streamflows proposed by PG&E and the relicensing stakeholders for this stream reach of the North Fork of the North Fork American River would enhance existing habitat conditions for resident rainbow trout. Although proposed minimum streamflows would not achieve the target of 80 percent of maximum WUA, they would provide considerably more habitat for a greater duration than under the existing license or estimated unregulated flow conditions.

*Sixmile Creek below Kelly Lake Dam*

PG&E proposes to provide minimum streamflows of 0.2 cfs to 0.5 cfs, depending on water year type, in Sixmile Creek downstream from Kelly Lake dam (table 3-128). Forest Service condition 28 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in Sixmile Creek below Kelly Lake dam. The average wetted width at the study site was less than 12 feet, and average depth was less than 0.9 foot. The range of study flows (0.33 to 1.06 cfs) and associated model flow range (0.13 to 2.65 cfs) capture the range of proposed minimum streamflows (0.2 to 0.5 cfs). Percent change in wetted perimeter as an index of change in available habitat (figure 3-41) indicates that a change in minimum flow from 0.2 to 0.5 cfs would result in a 20 percent increase in wetted perimeter, with a break point in the curve at about 0.5 cfs, the relicensing stakeholder's target for summer flows.

Historical median monthly flows under the existing license for this reach of Sixmile Creek are 0 cfs in July to September and January and February and 0.5 to 2.5 cfs the rest of the year. Minimum historical monthly flow (90 percent exceedance) is 0 cfs year round, and maximum flows (10 percent exceedance) range from 0.5 to 5.6 cfs. Under the existing license, there are no minimum streamflows for this stream reach. Under estimated unregulated conditions, median monthly flows in this reach of Sixmile Creek would be at or less than the proposed minimum flow during the months of July through November. The proposed flows would ensure minimum streamflows of at least 0.2 cfs throughout the year in extreme critically dry to dry years, which is higher than estimated for unregulated conditions in summer and fall.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer when the stream reach would otherwise be dry under natural unregulated flow conditions. The range of flows in this stream reach is likely to remain similar to flow conditions under the existing license, but the proposed minimum streamflows would ensure that the

stream reach remains inundated throughout the year even during the driest periods and would provide higher flows (0.5 cfs) during below normal to wet years.

*North Fork of the North Fork American River below Lake Valley Canal Diversion Dam*

PG&E proposes to provide minimum streamflows of 2.2 cfs to 15.5 cfs, depending on month and water year type, in the North Fork of the North Fork American River downstream from Lake Valley canal diversion dam (table 3-129). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

The minimum streamflow under the existing license by agreement with California Fish and Wildlife in the stream reach downstream from Lake Valley canal diversion dam is 1 cfs from October 1 to May 31 and 3 cfs from June 1 through September 30.

Historical median monthly flows under the existing license are at or less than proposed minimum streamflows from June through December in all years except extreme critically dry years; the highest median monthly flows occur in April and May (21 to 34 cfs). Minimum historical monthly flows (90 percent exceedance flow) are 3 cfs in June to September and near 1 cfs the rest of the year, which are the minimum streamflows specified in the existing license. Maximum historical monthly flows are less than 15 cfs from July through October, with peaks in December (118 cfs) and May (174 cfs).

Under estimated unregulated conditions, North Fork of the North Fork American River median monthly flows would be less than proposed minimum streamflows during the months of July through November in dry, below normal, above normal, and wet years, and July through October in extreme critically dry and critically dry years (table 3-129). In wetter years, proposed minimum streamflows would increase during April through June, creating a more typical seasonal hydrograph, but would still be less than the estimated unregulated median flows during that period. Highest unregulated median monthly flows (84 to 112 cfs) occur in April to May. Peak (10 percent exceedance flow) unregulated flows (133 to 230 cfs) occur in March to June. Minimum unregulated monthly flows, represented by the 90 percent exceedance flow, range from about 0.2 to 6.3 cfs in June through February and 21 to 36 cfs in March through May.

The proposed minimum streamflows would generally ensure flows higher than estimated unregulated conditions from July through November. Although the proposed minimum streamflows would introduce a component of seasonal variability, from December through June proposed flows would still be considerably less than estimated unregulated median flows.

Habitat-flow simulations for rainbow trout fry, juvenile, and adult life stages (figure 3-42) demonstrate a continuous increase in available habitat with flow to the upper limit of the model. PG&E identifies several channel conditions that may cause this idiosyncrasy in the habitat-flow curves and make it difficult to interpret the relationship between flow and habitat for this stream reach. Because maximum habitat (WUA) occurs at the upper limit of the flow model (275 cfs), the available habitat at the proposed minimum streamflows (2.2 to 15.5 cfs) is much lower than maximum (table 3-130) for rainbow trout adults, juveniles, and fry. Peak spawning habitat occurs at flows of about 50 to 60 cfs (figure 3-42), but is relatively flat across the range of model flows above 20 cfs. Available habitat for spawning is less than 50 percent in extreme critically dry to dry years during April to June. During below normal to wet years, available spawning habitat ranges from 49 to 80 percent (table 3-130). The available habitat for these life stages under the proposed minimum streamflows is consistently higher than the habitat provided by minimum streamflows under the existing license, and generally enhances conditions compared to median flows under estimated unregulated conditions.

In general, the HEA analysis indicates that available habitat (WUA) duration for adults is similar between the proposed minimum streamflows and historical flows under the existing license, but significantly greater than for estimated unregulated flows, particularly during critical low flow summer conditions (figure 3-43 provides an example for August and September). From December through June, the frequency curves for the existing license, proposed, and unregulated flows are very similar. In July, the habitat frequency curves for estimated unregulated conditions decline and diverge from the curves for the existing license and proposed flow conditions; that is, there would be less habitat available under unregulated conditions. From August through November, the frequency curves for the three alternative flow conditions (existing license, proposed minimum streamflows, and estimated unregulated flows) remain relatively the same as July. Two study sites were measured in this stream reach, one close to the diversion dam (node 0) and one near the mid-point of the stream reach (node 1); similar to the stream reach of the North Fork of the North Fork American River between the Lake Valley reservoir dam and the Lake Valley canal diversion dam, there appear to be distinct differences between the two study locations relative to spawning habitat. During the early spawning season (March and April), the habitat frequency curves for all three flow conditions are very similar (figure 3-44) at the mid-reach study location. At the study location below the Lake Valley canal diversion dam in March, there is a sharp break in available habitat frequency under the existing license flows from near 80 percent of maximum about 35 to 40 percent of the time to 20 percent of maximum for about 50 to 55 percent of the time. In April, the break from 90 to 20 percent of maximum habitat occurs at about 60 to 70 percent of the time. Habitat under the proposed minimum streamflows exhibits a similar frequency distribution in March, although the available habitat decreases to about 40 percent of maximum. In April, the proposed minimum streamflows would result in a frequency distribution closer to estimated unregulated conditions. Given the stepped character of the curves for the existing license and proposed flows, this may reflect a sharp change in the area inundated and available to spawning rainbow trout.

Habitat flow analysis indicates that proposed minimum streamflows would provide maximum habitat (WUA) for foothill yellow-legged frog eggs in May and June during dry to wet years; during extreme critically dry and critically dry years only 46 percent of maximum habitat would be available (table 3-131). For tadpoles, nearly 100 percent of habitat would be available under the proposed minimum streamflows during below normal to wet years, 77 percent of maximum in dry years, 67 percent in critically dry years, and 46 percent in extreme critically dry years (table 3-131).

The minimum streamflows proposed by PG&E and the relicensing stakeholders for this stream reach of the North Fork of the North Fork American River would enhance existing habitat conditions for resident rainbow trout. Although proposed minimum streamflows would not achieve the target of 80 percent of maximum WUA, they would provide considerably more habitat for a greater duration than the existing license or estimated unregulated conditions.

*Bear River below Drum Canal Spillway Gate*

PG&E proposes (DS-AQR, Part 6, *Flow Release to the Bear River below Drum Canal at YB-137*) to install two 1-cfs fixed-release devices at the Drum canal spillway (waste) gate above gage YB-137; this measure is consistent with Forest Service recommendation 6 and California Fish and Wildlife recommendation 2.7. These valves would be used to release 1 cfs during extreme critically dry and critically dry years and 2 cfs in all other years to supplement flows to the Bear River upstream of the Drum afterbay.

Our Analysis

PG&E proposes to release minimum streamflows of 1 to 2 cfs, depending on water year type, to the upper Bear River from new release structures at the Drum canal spillway gate to supplement natural, unregulated flows in this stream reach. No minimum streamflow is required under the existing license at

this location. PG&E does not divert water from this stream reach, but periodically releases flows from the Drum canal through the stream reach for delivery to Drum afterbay. The release point from the Drum canal to the Bear River is near the top of the Bear River watershed, and the estimated mean annual unregulated flow is about 2.2 cfs.

PG&E does not present a frequency analysis for historical flows in the Bear River above or immediately below the Drum canal spill channel. Under existing license conditions, median monthly discharge flows at this location (YB-137) are 0 cfs throughout the year except in May and June. Discharges at the Drum canal spillway gate have historically been restricted to February through July, with peak flows of 185 to 325 cfs during typical high flow spring period, March through June. Historical flows are generally 0 cfs from August through January.

Habitat-flow simulations for rainbow trout fry, juvenile, and adult life stages (figure 3-45) indicate that maximum habitat (WUA) occurs at about 2 cfs for fry, 5 cfs for juveniles, and 10 cfs for adults. California Fish and Wildlife (July 29, 2012) acknowledged that maximum habitat and the goal of 80 percent of maximum were inconsistent with the natural unregulated flow conditions that exist in this stream reach. The WUA curve for spawning habitat continues to increase to the upper limit of the model, 80 cfs (figure 3-45), but is relatively flat across the range of model flows above 40 cfs. Again, these estimated flows for optimum spawning are not consistent with the unregulated hydrology that exists in this stream reach. The available habitat for these life stages is consistently higher for proposed flows than the estimated unregulated flows that exist at the upper stream reaches of this watershed.

This analysis indicates that although the natural channel in this stream reach of the Bear River might appear to be capable of supporting a more robust population of rainbow trout, the low flows generated by natural runoff in this very small portion of the upper watershed of the Bear River do not support this potential. The minimum streamflows proposed at the Drum canal spillway would provide 59 percent of maximum WUA during extreme critically dry to dry years and 77 percent of maximum in below normal to wet years (table 3-132) for rainbow trout adults and would enhance conditions compared to natural unregulated conditions that exist in this stream reach.

The minimum streamflows proposed by PG&E and the relicensing stakeholders for this reach of the upper Bear River would enhance existing habitat conditions for resident rainbow trout above what is supported by the natural hydrology of the stream reach. There are no water diversions or withdrawals from this stream reach, and the existing resident rainbow trout population reflects the carrying capacity of the stream reach provided by the natural unregulated flows.

*Bear River at Highway 20 Crossing, Between South Yuba Canal Inflow at Gage YB-139 and Gage YB-198*

PG&E proposes to provide minimum streamflows of 5 cfs to 13 cfs in the Bear River at the Highway 20 crossing between the inflow from the South Yuba canal and gage YB-198 (table 3-133). Forest Service recommendation 1 and California Fish and Wildlife recommendation 2.2 recommend the same monthly minimum streamflows.

Our Analysis

Under estimated unregulated conditions in this stream reach of the Bear River, median monthly flows would be less than proposed minimum streamflows (table 3-133) except during March. Highest estimated unregulated median monthly flows (9 to 10 cfs) occur in April and May. Under the existing license, the required minimum streamflow in this stream reach is 5 cfs year round in all years. Historical median monthly flows under the existing license consistently exceed estimated unregulated flows by an order of magnitude. Minimum historical monthly flows (90 percent exceedance flow) and maximum

historical monthly flows (10 percent exceedance flow) are also typically an order of magnitude higher than estimated unregulated flows. Minimum historical flows under the existing license are higher than proposed minimum streamflows from October through March and lower than proposed minimum flow from April through September. The proposed flows would generally ensure minimum streamflows that would be higher than unregulated conditions, but are lower than the historical flows that have persisted in this stream reach under the existing license. It is likely that typical flow characteristics in this stream reach would be unchanged under the proposed minimum streamflows.

The study reach was divided into two stream sub-reaches: the upper meadow sub-reach and the lower Boardman sub-reach. Habitat-flow simulations for resident rainbow trout in the two stream sub-reaches (figure 3-46 and figure 3-47) indicate that maximum habitat occurs at about 10 cfs for juveniles and at about 15 cfs for adults. Maximum spawning habitat in the meadow stream reach occurs at about 25 to 30 cfs, but in the Boardman reach, spawning habitat is relatively constant from about 40 to 155 cfs. Given that estimated natural unregulated maximum flows during the spawning period do not exceed 21 cfs and historical median flows exceed 20 cfs only in May, this model prediction is probably not very indicative of actual habitat conditions. In the Meadow sub-reach, proposed minimum streamflows would provide greater than 80 percent of maximum habitat for spawning, juveniles, and adults, with maximum habitat available in July through September for juveniles and April through June for adults (table 3-134). In the Boardman sub-reach, proposed minimum streamflows would provide greater than 80 percent of maximum habitat for juveniles and adults, with 99 percent of maximum habitat available in April through September for juveniles and maximum habitat in April through June for adults (table 3-135).

In general, the HEA analysis indicates that available habitat (WUA) duration for adults is similar between the proposed minimum streamflows and historical flows under the existing license, but typically greater than for estimated unregulated flows, particularly during critical low flow summer and fall (June through January) conditions (figure 3-48 provides an example for August and September). Throughout the year, the frequency curves for existing license historical flows, proposed minimum flows, and estimated unregulated flows are very similar. During the early spawning season (March and April), the habitat frequency curves for all three alternative conditions are similar, but slightly lower for estimated unregulated conditions (figure 3-49) in the Boardman sub-reach. In the Meadow sub-reach, the proposed minimum streamflow and existing license flow frequency curves are stepped and cross under and over the estimated unregulated curve.

The minimum streamflows proposed by PG&E and the relicensing stakeholders for this stream reach of the Bear River upstream of Drum afterbay would enhance existing habitat conditions for resident rainbow trout, providing near maximum habitat for juveniles and adults throughout the year in all years. Spawning habitat would exceed the 80 percent target for the Meadow sub-reach. Results of habitat flow analysis for spawning habitat in the Boardman sub-reach suggests streamflows would produce WUAs that are generally higher than estimated unregulated flows could provide, but would appear to provide at least 50 percent of maximum habitat.

**Alta Development**

*Canyon Creek below Towle Canal Diversion Dam*

PG&E proposes to provide minimum streamflows of 1 to 3 cfs, depending on month and water year type, in Canyon Creek downstream of the Towle canal diversion dam (table 3-136). Forest Service recommendation 1 and California Fish and Wildlife recommendation 2.2 recommend the same monthly minimum streamflows.

Our Analysis

Under estimated unregulated conditions in this stream reach of Canyon Creek, median monthly flows would be less than proposed minimum streamflows (table 3-136) from July through November in all years and June through November in below normal to wet years. Highest estimated unregulated median monthly flows (about 6 cfs) occur in March and April. Under the existing license, the minimum required streamflow in this stream reach is 1 cfs year round in all years. Historical median monthly flows under the existing license are consistently less than estimated unregulated flows and generally less than or equal to proposed minimum streamflows. The proposed flows would generally ensure that minimum streamflows are higher than historical conditions.

Habitat-flow simulations for resident rainbow trout in the two stream sub-reaches (figure 3-50) indicate that maximum habitat occurs at about 8 cfs for juveniles, at about 10 cfs for adults, and at about 5 cfs for fry. Maximum spawning habitat in this stream reach occurs at about 15 cfs, but is relatively constant from about 8 to 28 cfs. Given that natural unregulated median flows during the spawning period do not exceed 6 cfs, this model prediction is probably not very indicative of the natural carrying capacity provided by estimated unregulated flows in this stream reach. Proposed minimum streamflows would provide 59 to 76 percent of maximum adult habitat in critically dry to above normal years and 85 percent during March to May in wet years (table 3-137). Proposed minimum streamflows would provide 73 to 86 percent of maximum juvenile habitat in extreme critically dry to above normal years and 92 percent during March to May in wet years (table 3-137).

In general, the HEA analysis indicates that available habitat (WUA) duration for adults is similar between the proposed minimum streamflows, historical flows under the existing license, and estimated unregulated flows, except in August and September when the frequency distribution for unregulated flows is considerably lower than under the existing license or proposed minimum streamflows (figure 3-51 provides an example for August and September). During the early spawning season (March and April), the habitat frequency curves for all three alternative flow conditions are similar.

Foothill yellow-legged frog was found twice in 2008 and once in 2009 at a site in the downstream portion of this stream reach. No evidence of foothill yellow-legged frog breeding was found. Canyon Creek is a relatively small stream, with moderate to high shading by the riparian canopy. Potential foothill yellow-legged frog breeding and rearing habitat is limited and associated with occasional shallow pools and edge water. PG&E developed a 1D foothill yellow-legged frog habitat versus flow relationship for this stream reach and found that WUA for both foothill yellow-legged frog egg mass and tadpole life stages was highest at the lowest modeled flow of 1 cfs. Available WUA for this stream reach under the proposed minimum streamflows exceeds 90 percent for foothill yellow-legged frog eggs and tadpoles from May through September (table 3-138).

The minimum streamflows proposed by PG&E and the relicensing stakeholders for this stream reach of Canyon Creek downstream of the Towle canal diversion dam would enhance existing habitat conditions for resident rainbow trout and foothill yellow-legged frog, providing near maximum habitat for juvenile and adult trout throughout the year in all years.

*Little Bear River below Alta Powerhouse Tailrace*

PG&E proposes to provide minimum streamflows of 0.5 cfs to 4 cfs, depending on month and water year type, in the Little Bear River downstream from Alta powerhouse tailrace (table 3-139). Forest Service recommendation 1 and California Fish and Wildlife recommendation 2.2 recommend the same monthly minimum streamflows.

Our Analysis

PG&E used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in Little Bear River downstream of Alta powerhouse tailrace. The average wetted width at the study sites was less than 8 feet, and average depth was less than 0.6 feet. The range of study flows (0.3 to 3.02 cfs) and associated model flow range (0.25 to 7.55 cfs) capture the range of proposed minimum streamflows (0.5 to 4 cfs). Between 0.2 cfs, 0.5 cfs, 1 cfs, and 4 cfs, the wetted perimeter increases by about 18, 7, and 20 percent (figure 3-52), respectively.

Under the existing license, the minimum streamflows for this stream reach is 1 cfs measured below the Upper Boardman canal diversion dam. Historical median monthly flow under the existing license is 0.2 cfs from June through November, with highest median monthly flows in February and March (6 to 7 cfs). Minimum historical monthly flows (90 percent exceedance) are less than 1 cfs all year except in March. Maximum historical flows (17 to 29 cfs) occur from January through May. Under estimated unregulated conditions, median flows in the stream reach of Little Bear River below Alta powerhouse would be at or less than the proposed minimum flow during the months of July through November except in extreme critically dry years when estimated unregulated median flows would be greater than proposed minimum streamflows. The proposed flows would ensure minimum streamflows of at least 0.5 cfs throughout the year in extreme critically dry years and 1 cfs in critically dry years. The specified minimum streamflows in dry to wet years introduces a progressively stronger seasonal peak between February and May.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach throughout the summer than under the existing license conditions, and the flows would introduce some seasonal and inter-annual variability, depending on water year type. The range of flows in this stream reach is likely to remain similar to existing conditions.

**Dutch Flat No. 1 Development**

*Bear River below Drum Afterbay Dam*

PG&E proposes to provide minimum streamflows of 10 to 16 cfs in the Bear River downstream of the Drum afterbay dam, depending on month and water year type (table 3-140). Forest Service recommendation 1 and California Fish and Wildlife recommendation 2.2 recommend the same monthly minimum streamflows. The minimum streamflow requirement under the existing license ranges from 5 to 10 cfs.

Our Analysis

Under estimated unregulated conditions in this stream reach of the Bear River, median monthly flows would be less than proposed minimum streamflows (table 3-140) from July through November in extreme critically dry and critically dry years and July through December in all other years. Highest estimated unregulated median monthly flows (31 to 55 cfs) occur in February to May. Historical median monthly flows under the existing license exceed unregulated flows from July through October. Minimum historical monthly flows (90 percent exceedance flow) are relatively constant throughout the year (5.1 to 5.6 cfs). The proposed action would ensure that minimum streamflows would be higher than historical conditions under the existing license in all years, but would be lower than estimated unregulated median flows during winter and spring (January to May). The proposed minimum streamflows would also introduce seasonal flow variability in all years.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-53) indicate that maximum habitat for juveniles occur at about 15 cfs and for adults at about 35 cfs. Maximum habitat for fry occurs at the low flow limit of the model (about 5 cfs), decreasing sharply to about 30 percent of maximum at about 30 cfs. Maximum spawning habitat in the stream reach is relatively constant from about 30 to 85 cfs. Proposed minimum streamflows would provide greater than 79 to 87 percent of maximum habitat for adults in dry to wet years and 73 to 87 percent of maximum in extreme critically dry and critically dry years (table 3-141). Proposed minimum streamflows would provide 97to 100 percent of maximum available habitat in all months and all years (table 3-141). About 70 to 73 percent of maximum spawning habitat would be available in dry to wet years and in April to May of extreme critically dry and

Between October and February, the adult habitat frequency curve for estimated unregulated conditions is higher than that for the proposed minimum streamflows; in March through June, the frequency curves for flows under the existing license, proposed minimum streamflows, and estimated unregulated flows are very similar. During the typical low flow period of the year in July through September, the proposed minimum streamflows and existing license flows provide higher habitat frequencies than the estimated unregulated condition (figure 3-54 provides an example for August and September). During the early spawning season (March and April), the habitat frequency curves for all three flow conditions are similar; estimated unregulated conditions are slightly higher than the proposed minimum streamflows would provide, and the historical flow frequency curve under the existing license is slightly lower than the other two flow conditions (figure 3-55). The minimum streamflows proposed by PG&E and the relicensing stakeholders for this stream reach of the Bear River downstream of Drum afterbay dam would enhance existing habitat conditions for resident rainbow trout, providing near maximum habitat for juveniles throughout the year in all years. The proposed flows would provide habitat near or above the 80 percent target for adult rainbow trout. Spawning habitat would be 70 to 73 percent of maximum available during the spawning season in most years.

**Lower Drum Project**

Flow in a stream reach affects the quality and quantity of habitat available to aquatic organisms through its effect on a range of aquatic habitat features including, but not limited to, water depth, inundation, wetted perimeter, cover, and velocity. In stream reaches where flow is diverted for power generation, water supply, or other uses, the quantity of water and natural seasonal and inter-annual variability within the stream reach are typically reduced. To improve habitat conditions for resident aquatic organisms, PG&E proposes minimum streamflows (DS-AQR1, Part 1, *Water Year Type*; Part 2, *Minimum Streamflows*; DS-AQR5) for four stream reaches affected by the Lower Drum Project, which are generally consistent with minimum streamflows specified in Forest Service recommendation 1 and California Fish and Wildlife recommendation 2.2 for the respective stream reaches. Compliance at these four stream reaches would be demonstrated through continuous monitoring. PG&E and the relicensing stakeholders anticipate that the proposed minimum streamflows would preserve or enhance aquatic habitat for resident rainbow trout and foothill yellow-legged frog compared to conditions with minimum streamflows (where they have been specified) under the existing license (table 3-100). Compared to estimated unregulated flow conditions, the proposed flows would frequently provide more habitat for a greater percentage of the time during summer and fall, when unregulated flows in many high elevation headwater stream reaches would otherwise be less than proposed flows; proposed flows would provide similar or less habitat than unregulated conditions during winter and spring, when natural unregulated runoff would be higher than the proposed flows.

The proposed minimum streamflows and estimated aquatic habitat changes for stream reaches affected by the proposed Lower Drum Project are discussed below by development in general upstream to downstream order.

**Halsey Development**

*Bear River Diversion Dam and Bear River Canal*

PG&E proposes (DS-AQR6, *Coordination of DS and YB Project Operations Regarding the YB Project Minimum Streamflows in the Bear River below Rollins Reservoir at YB-196*) a measure to coordinate Lower Drum Project operations at the Bear River canal diversion dam with Yuba-Bear Project operations at the Rollins Development to ensure compliance with minimum streamflow requirements for the downstream Bear River (at YB-196). The goal of this measure is the same as BLM condition 3, California Fish and Wildlife recommendation 2.3, and Forest Service 10(a) recommendation 4. BLM specifies that PG&E's compliance with this measure at the Lower Drum Project, "will be the act of not diverting water into the Bear River canal that [NID] releases from the Yuba-Bear Project's Rollins reservoir to meet its [minimum streamflow requirement] in the Bear River below Rollins as determined utilizing data from NID's YB-196 gage in Bear River and PG&E's YB-50 gage in Bear River canal, and the coordinated operations flow forecasts for water that NID would provide at YB-196 and for water that PG&E would divert to the Bear River canal." The Coordinated Operations Plan would require coordination between PG&E and NID to ensure compliance with this measure. Forest Service recommendation 4 contains language that would specifically prohibit diversion of water to the Bear River canal when flows in the Bear River at YB-197 are not in compliance with the license requirements for the Bear River below Rollins dam.

Our Analysis

NID proposes minimum streamflows for the Bear River downstream of the Rollins dam, which we discuss in detail later under the Yuba-Bear Project, Rollins Development; compliance with that condition would be measured at gage YB-196, which is located downstream of the Lower Drum Project's Bear River canal diversion dam. Although NID might release adequate flows at Rollins dam to meet the compliance requirements at YB-196, the potential exists that PG&E could divert enough water to the Bear River canal such that releases downstream from the Bear River canal diversion dam would not be in compliance with proposed minimum streamflows required at YB-196. At any time that flows at YB-196 are not in compliance with the minimum streamflow requirement for Bear River below Rollins dam, this recommendation would prohibit diversion of water by the Lower Drum Project into the Bear River canal until such time as flows are in compliance at YB-196. Ongoing coordination required by the Coordinated Operations Plan proposed by PG&E and the stakeholders would ensure that PG&E and NID coordinate the operations of both projects to remain in compliance with the minimum streamflows for the lower Bear River included in the new license. Prohibition of diversion of water to the Bear River canal when YB-197 is out of compliance with minimum streamflow requirements provides a robust standard to ensure compliance.

**Wise and Wise No. 2 Developments**

*Dry Creek below Halsey Afterbay Dam*

PG&E proposes to provide minimum streamflows of 1 cfs in Dry Creek downstream of the Halsey afterbay dam at all times (table 3-142). Forest Service recommendation 1 and California Fish and Wildlife recommendation 2.2 recommend the same monthly minimum streamflows. Under the existing license, there is no minimum streamflow requirement for Dry Creek downstream of Halsey afterbay dam.

NMFS proposed year-round minimum streamflows of 1 cfs in Dry Creek below Halsey afterbay dam, which is consistent with the PG&E proposal, the Forest Service recommendation, and the California Fish and Wildlife recommendation.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in Dry Creek downstream of Halsey afterbay dam. The average wetted width at the study sites was less than 10 feet, and average depth was less than 0.8 foot. The model flow range (about 0.2 to 7.5 cfs) captures the proposed minimum streamflows (1 cfs). The breakpoint in the flow versus wetted perimeter curve (figure 3-56) used by the stakeholders as the target summer flow occurs at about 1 cfs. Between 0.2 cfs and 1 cfs, the wetted perimeter increases by about 40 percent.

Under the existing license, there are no minimum streamflows for this stream reach. PG&E does not present a flow frequency analysis for historical flows in Dry Creek below Halsey afterbay dam. Under estimated unregulated conditions, median flows in Dry Creek would be at or less than the proposed minimum flow during August through October. Median monthly unregulated flows are highest during March and April (6.1 to 6.5 cfs). There are no anadromous fish in the project-affected reaches of Dry Creek below Halsey afterbay dam.

The proposed flows would ensure minimum streamflows of at least 1 cfs throughout the year, including dry periods when this reach of Dry Creek has historically been dry. The proposed minimum streamflows for Dry Creek immediately below Halsey afterbay dam would ensure more aquatic habitat for resident species in this stream reach throughout the summer than under existing conditions. The range of flows in this stream reach is likely to improve and enhance aquatic habitat compared to existing license conditions; the range of peak spring flows in this stream reach is likely to remain similar to existing conditions.

*Rock Creek below Rock Creek Reservoir Dam*

PG&E proposes to provide minimum streamflows of 1 to 3 cfs, depending on month and water year types, in Rock Creek downstream of the Rock Creek diversion dam (table 3-143). During extreme critically dry to below normal years, the minimum flow would be 1 cfs in all months except March when proposed flows would be 3 cfs; during above normal and wet years, minimum streamflows would be 2 to 3 cfs. Forest Service recommendation 1 and California Fish and Wildlife recommendation 2.2 recommend the same monthly minimum streamflows.

NMFS also proposed year-round minimum streamflows of 1 cfs in Rock Creek downstream of the Rock Creek reservoir dam, which is consistent with the PG&E proposal, the Forest Service recommendation, and the California Fish and Wildlife recommendation.

Our Analysis

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in Rock Creek downstream of Rock Creek reservoir dam. The average wetted width at the study sites was less than 10 feet, and average depth was less than 1 foot. The model flow range (about 0.4 to 9.2 cfs) captures the range of proposed minimum streamflows (1 to 3 cfs). The breakpoint in the flow versus wetted perimeter curve (figure 3-57) occurs at about 3 cfs; the application of the breakpoint was used by PG&E and the relicensing stakeholders to establish a summer low-flow standard. Between 0.4 cfs and 3 cfs, the wetted perimeter increases by about 32 percent.

Under the existing license, there are no required minimum streamflows for this stream reach. Historical median monthly flow under the existing license is 0.2 cfs year round except in January and July when flow is 0.1 and 0.3 cfs, respectively. Minimum historical monthly flows (90 percent exceedance) are about 0 cfs all year except March through April (0.1 cfs). Maximum historical monthly flows range from 8 to 35 cfs with no particular seasonal peak. Under estimated unregulated conditions, median flows

in this reach of Rock Creek would be at or less than the proposed minimum flow during July through December in extreme critically dry to below normal years and during June through January in above normal and wet years. The proposed flows would ensure minimum streamflows of at least 1 cfs throughout the year in extreme critically dry to below normal years and 2 to 3 cfs in above normal and wet years. There are no anadromous fish in the project-affected reaches of Rock Creek below Rock Creek reservoir.

The proposed minimum streamflows would ensure more aquatic habitat for resident aquatic species in this stream reach throughout the summer than under the existing license conditions, and the flows would introduce some inter-annual variability, depending on water year type. The range of flows in this stream reach is likely to improve and enhance aquatic habitat compared to existing conditions.

*Auburn Ravine below Wise and Wise No. 2 Powerhouses*

To support resident rainbow trout, PG&E proposes minimum streamflows of 2 to 18 cfs, depending on month and water year type, in Auburn Ravine at the release point (RM 27.6) from South canal below the Wise and Wise No. 2 Developments (table 3-144). Forest Service (recommendation 1) and California Fish and Wildlife (recommendation 2.2) recommend the same monthly minimum streamflows. NMFS also recommends year-round minimum streamflows of 6 cfs immediately downstream of the South canal release point to support anadromous salmonids in Auburn Ravine.

PG&E proposes that during an outage of the Bear River, Upper or Lower Wise, or South canals, the minimum flow at the compliance point in Auburn Ravine would be the natural flow in Auburn Ravine measured at an upstream location to be agreed on by the relicensing stakeholders. California Fish and Wildlife recommends that during a canal outage the minimum flow be the specified minimum streamflow (table 3-144) for the appropriate month and water year or 5 cfs, whichever is less.

Our Analysis

Flows in Auburn Ravine are highly regulated by the many non-project water deliveries and diversions that occur downstream of PG&E's release from South canal (*Auburn Ravine Streamflows-Supplement to the License Application*, April 2012; Technical Memorandum 3-13, *Western Placer County Streams*). The downstream geographic extent of direct effects of PG&E's release of flow from South canal to Auburn Ravine is limited to the upper 1 mile of Auburn Ravine (FERC, 2009a). Direct effects of the Lower Drum Project do not extend below the confluence of PCWA's Auburn tunnel with Auburn Ravine, because of the relatively large non-project consumptive water deliveries made at Auburn tunnel. Particularly during summer and fall, those combined non-project water deliveries are typically considerably higher than the relatively small minimum streamflow releases made by PG&E at South canal. The cumulative effects on flows of the project and of these numerous non-project diversions and deliveries of water in Auburn Ravine, including from Auburn tunnel, are discussed in more detail in section 3.3.2.3, *Cumulative Effects*, and section 3.3.4, *Threatened and Endangered Species*. The relicensing stakeholders recognized the complexity of these interacting water uses in downstream reaches and focused on providing flows in Auburn Ravine to enhance aquatic habitat for resident rainbow trout in the area immediately downstream of PG&E's release point from South canal.

The factors influencing flow in the stream reaches of Auburn Ravine (*Auburn Ravine Streamflows-Supplement to the Final License Application*, April 2012; Technical Memorandum 3-13, *Western Placer County Streams*) downstream of PG&E's flow release from South canal (figure 3-58) are complex and interact to affect aquatic habitat and species. The upper reach of Auburn Ravine is about 1 mile long and is directly influenced by PG&E's release from South canal (RM 27.46), which is less than 0.1 mile below an overflow to Auburn Ravine at RM 27.5 from the PCWA pump facilities from Auburn tunnel. Proposed minimum streamflow releases from South canal range from 4 to 18 cfs

depending on month and water year, but under the existing license are typically 40 to 80 cfs during winter hydropower operations and can increase up to 150 cfs between April and November to meet NID water delivery demands. Between April and November PG&E releases water to Auburn Ravine from South canal primarily to meet contractual obligations for water delivery to NID and PCWA. North Ravine enters at RM 27.3 and carries water deliveries (3 to 15 cfs) from NID's non-project Combie III canal into the upper reach with an additional major discharge of 1 to 9 cfs from the City of Auburn waste water treatment plant (RM 27). Ophir Cataract at RM 26.6, located just upstream of Auburn tunnel, is a natural barrier to upstream migration of Central Valley steelhead and is the upstream extent of steelhead critical habitat.

The middle stream reach of Auburn Ravine begins below PCWA's Auburn tunnel (RM 26.4 and extends about 2.6 miles downstream to NID's non-project Auburn Ravine 1 diversion dam (RM 23.8). Although the Auburn Tummel capacity is 150 cfs, PCWA typically releases up to 50 cfs between April and November into Auburn Ravine with water pumped from the North Fork American River. Within this middle stream reach there is a PCWA delivery of about 25 cfs from South canal via an unnamed tributary which enters Auburn Ravine at RM 26.1. PG&E identified several small private diversions and withdrawals from this reach of Auburn Ravine.

The non-project Auburn Ravine 1 diversion dam (RM 23.8) is the first large water diversion downstream from the PG&E release from South canal to Auburn Ravine. This 11-ft high dam is a barrier to upstream steelhead migration during all but the most infrequent hydrological conditions. Although designated steelhead critical habitat extends upstream to RM 26.6, it is unlikely that steelhead occupy this 2.8 mile reach because of the migration barrier at Auburn Ravine 1 diversion dam (PG&E 2010, 2012a). This is discussed in more detail in section 3.3.4, *Threatened and Endangered Species*.

Downstream from the Auburn Ravine 1 diversion dam (figure 3-59), numerous diversions by NID, PCWA, and other riparian water rights holders affect the flows in the lower stream reach of Auburn Ravine (*Auburn Ravine Streamflows-Supplement to the License Application*, April 2012; Technical Memorandum 3-13, *Western Placer County Streams*). In addition, PG&E makes contractual water deliveries to PCWA at several locations along South canal to meet their water delivery requirements, releasing this water into tributaries that enter lower Auburn Ravine farther downstream from the Auburn Ravine 1 diversion dam. On average during the irrigation season, PG&E's releases from South canal at RM 27.5 historically account for about 27 percent of flows in this reach of Auburn Ravine under the existing license.

Under the existing license, PG&E is not required to provide minimum releases to Auburn Ravine from the South canal. Auburn Ravine does, however, have flow under most conditions, because of contractual delivery obligations to NID and PCWA and because the combined hydraulic capacity of the discharge of the Wise powerhouses (473 cfs) exceeds the hydraulic capacity of South canal (375 cfs). This excess canal water is normally released via a stop-log gate in South canal to Auburn Ravine a short distance downstream of the Wise and Wise No. 2 Developments. The primary use of water delivered to NID and PCWA is for agriculture and irrigation customers between spring and early fall. Water withdrawals by NID and PCWA from Auburn Ravine between mid-October and the following spring are minimal. During winter withdrawals from Auburn Ravine are primarily by small private riparian property owners.

Historical median monthly flow at PG&E's release from South canal to the upper stream reach of Auburn Ravine under the existing license is 34.5 to 171.0 cfs from May through November and 239.2 to 300.2 cfs in December through April (table 3-62), significantly higher than proposed minimum streamflows. Annual planned canal outages for maintenance result in relatively low median flows in November. Minimum historical monthly flows (90 percent exceedance) are 10.0 to 15.0 cfs in April

through December, 1.2 to 2.3 cfs in October and November, and 20.8 to 46.9 cfs January through March. Maximum historical monthly flows range from 143.0 to 342.1 cfs with no particular seasonal peak. PG&E did not provide estimated unregulated flow data for this reach of Auburn Ravine, but estimates that natural flow is typically 5-10 cfs. The proposed minimum flows would ensure minimum streamflows of at least 2 to 4 cfs throughout the year in extreme critically dry to critically dry years, 4 to 6 cfs in dry and below normal years, and 4 to 18 cfs in above normal and wet years. As a result of contractual obligations for water delivery to NID and PCWA for consumptive use and hydraulic capacity differences between the Wise powerhouses and South canal, during most of the year, except during canal outages, releases by PG&E to upper Auburn Ravine will continue to be substantially higher than the minimum streamflows proposed for the new license.

Habitat-flow simulations using the PHABSIM model for resident rainbow trout in the upper stream reach (figure 3-60) indicate that maximum habitat occurs at about 8 cfs for juveniles and at about 10 cfs for adults. Maximum habitat for fry occurs near the low flow limit of the model (about 3 cfs), decreasing sharply to about 40 percent of maximum at about 25 cfs and continuing to decrease variably to 18 percent of maximum at 175 cfs. Spawning habitat in the upper stream reach peaks at about 28 cfs; at least 80 percent of habitat would be available between 10 and 70 cfs. Proposed minimum streamflows would provide 68 to 85 percent of maximum habitat for adults in extreme critically dry and critically dry years depending on month and 85 to 100 percent of maximum in dry to wet years (table 3-145). Proposed minimum streamflows would provide 76 percent of maximum habitat for juveniles in extreme critically dry and critically dry years depending on month and 91 to 98 percent of maximum in dry to wet years (table 3-145). In April, available spawning habitat would increase from 29 percent in extreme critically dry years to 95 percent in wet years (table 3-145). In May and June, available spawning habitat would increase from 29 percent in extreme critically dry and critically dry years to 54 percent in all wetter years. Based on these habitat analyses PG&E, the Forest Service, and California Fish and Wildlife agreed on a schedule of minimum streamflows in Auburn Ravine for the focused purpose of enhancing the habitat for resident rainbow trout immediately downstream from South canal in the upper stream reach of Auburn Ravine when there is water available in South canal.

In Auburn Ravine, minimum streamflows proposed by PG&E and the relicensing stakeholders are equal to or higher than NMFS' recommended flows during March and April in dry and wetter years. During other months in dry and wetter years, PG&E proposed minimum streamflows of 4 cfs to support resident rainbow trout in the upper stream reach of Auburn Ravine compared to 6 cfs recommended by NMFS to support Central Valley steelhead in middle and lower stream reaches of Auburn Ravine. Project augmented flows proposed by PG&E to benefit resident species are more appropriate in the upper stream reach of Auburn Ravine than flows targeting anadromous salmonids that are unable to access this stream reach due to natural and man-made barriers at Ophir Cataract (RM 26.6) and Auburn Ravine 1 diversion dam (RM 23.8). Based on PG&E's habitat-flow analysis, the 2 cfs difference between PG&E's proposed 4 cfs flows and NMFS' recommended 6 cfs flows would result in only about a 1 percent increase in habitat for resident rainbow trout adults, juveniles, and spawning and about a 6 percent decrease in fry habitat. Given the numerous non-project discharges and withdrawals that occur throughout Auburn Ravine, it is unlikely that the 2 cfs difference between the PG&E proposal and NMFS recommendation during drier years could generate any meaningful additional enhancement in habitat for anadromous salmonids in the upper and middle stream reaches of Auburn Ravine and, in particular, in lower Auburn Ravine below Auburn Ravine 1 diversion dam. Save Auburn Ravine Salmon and Steelhead's comments on the draft EIS point out that salmon spawned in stream reaches of Auburn Ravine downstream of Auburn 1 diversion dam where spawning has not occurred in many years. It is likely that the higher minimum flows proposed by PG&E and normal operational flows and contractual water deliveries would continue to support this habitat utilization.

PG&E and California Fish and Wildlife differ on the minimum flow to be released during canal outages affecting the South canal release point. Planned outages for annual maintenance of the canals have historically been scheduled for late October and early November after contractual obligations to meet agricultural demand for water decline. When the Bear River canal, upper Wise canal, or lower Wise canal is taken out of service, no water enters South canal from the Wise powerhouses and PG&E has no additional storage or facilities from which to provide water to augment natural baseflows in Auburn Ravine. PG&E schedules outages of the Lower Drum Project canal system beginning with the Bear River canal and moving sequentially downstream through the Upper and Lower Wise canals, optimizing water storage for delivery downstream; this process minimizes the period during which water is not available for delivery to Auburn Ravine from South canal. Because there is no source of water controlled by PG&E from which to release water to upper Auburn Ravine during a canal outage, the minimum streamflow in this reach of Auburn Ravine would be no less than the natural flow in Auburn Ravine at the time of the outage. PG&E's proposed measure is appropriate during a canal outage, since they do not divert water from Auburn Ravine, operation of the Wise and Wise No. 2 Developments does not affect flows in Auburn Ravine, and releases from South canal when the canals are operating augment the natural flow to enhance aquatic habitat. California Fish and Wildlife, Forest Service, and other relicensing stakeholders in comments on the draft EIS identified other sources of water that could be available to augment flows in Auburn Ravine during canal outages; however, these sources are controlled by entities other than PG&E and the Commission does not have jurisdiction over these sources nor the authority to require use of these sources. The proposed minimum streamflows would ensure more aquatic habitat in the upper stream reach of Auburn Ravine below PG&E's South canal discharge throughout the summer than under the existing license conditions, and the flows would introduce some inter-annual variability, depending on water year type. The range of flows in this stream reach is likely to improve and enhance aquatic habitat compared to existing license conditions. Additional discharges from the City of Auburn waste water treatment plant to the upper stream reach of Auburn Ravine and PCWA's Auburn tunnel to the middle stream reach of Auburn Ravine further augment the natural base flow, cumulatively affecting aquatic habitat in the middle and lower stream reaches of Auburn Ravine in conjunction with numerous other withdrawals and discharges in those reaches.

**Newcastle Development**

*Mormon Ravine below Newcastle Powerhouse Header Box*

PG&E proposes to provide minimum streamflows of 5 cfs in Mormon Ravine downstream of the Newcastle Development at all times in all years (table 3-146). If a critically dry year is preceded by a critically dry or extreme critically dry year, the minimum would be reduced to 1 cfs. Forest Service (10(a) recommendation 1) and California Fish and Wildlife (recommendation 2.2) recommend the same monthly minimum streamflows proposed by PG&E.

Reclamation recommends a minimum streamflow regime (10(a) recommendation A.1.e) for Mormon Ravine downstream of the Newcastle Development powerhouse of 50 to 200 cfs between January and May during extreme critically dry, critically dry, and dry year (table 3-147); no minimum is specified for May through December. Reclamation's objective for making this recommendation is to protect and augment the cold water pool in Folsom Lake which Reclamation relies on to comply with downstream maximum summer water temperature limits in the lower American River, consistent with their obligations under the Biological Opinion for the Central Valley Project and State Water Project. The Reclamation recommendation is particularly targeted at maintaining higher flows of cold water to Folsom Lake from Mormon Ravine during periods in the spring when the Newcastle Development is not operating. Reclamation recommends that following an unplanned outage of less than 2 weeks at the Newcastle powerhouse during January to May, PG&E make up the deficit water volume resulting from the outage by making additional water releases during the subsequent 4 weeks.

Our Analysis

In general, Reclamation's recommended minimum streamflows during winter and spring (January through May) to protect the Folsom Lake cold water pool are slightly lower than the historical monthly average (1987-2008) flow entering Folsom Lake via Mormon Ravine during normal operation of the Newcastle powerhouse under the existing license. However, Reclamation's minimum streamflow recommendations are nearly two orders of magnitude higher than the minimum streamflows proposed by PG&E and recommended by the Forest Service and California Fish and Wildlife specifically for the benefit of aquatic habitat in Mormon Ravine.

The developments that comprise the proposed Lower Drum Project have always been operated first to meet historical contractual consumptive water supply obligations, which are tied to the historical firm delivery capability of the project in dry years. Through diversions from South canal and Auburn Ravine, PCWA uses all PG&E contract water (100,400 acre-feet per water year) in years with low spring runoff. With completion of the Newcastle powerhouse in 1931, water discharged from the Wise powerhouses in excess of contractual obligations to NID and PCWA in Auburn Ravine have been transferred via the South canal and discharged to the American River watershed. The Newcastle powerhouse is the most downstream development in the Lower Drum Project and discharges to Mormon Ravine about 0.3 mile above the high water elevation of Folsom Lake which is managed by Reclamation. Under the existing license, the minimum streamflow requirement for Mormon Ravine is 5 cfs with no minimum streamflow during an outage of South canal. PG&E does not divert any water from Mormon Ravine.

Increased water demand to meet minimum streamflows and other environmental flow measures in upstream affected reaches of the proposed Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects could reduce the quantity of excess water that reaches Newcastle powerhouse on Mormon Ravine under the new license. During winter and spring water delivery demand for agriculture and irrigation are typically minimal, so most water delivered to South canal above minimum streamflow releases to Auburn Ravine (see previous section) would be used for power generation at the Newcastle Development and be released to Mormon Ravine. Flows discharged to Mormon Ravine as a result of Newcastle powerhouse operations during winter and spring of dry and wetter water years are likely to remain similar to historical flows under the existing license, that is, similar to minimum streamflows recommended by Reclamation. During extreme critically dry and critically dry water years, it is possible that monthly average flows reaching Newcastle powerhouse in the South canal would be slightly less than under the existing license, once other project-related upstream minimum streamflows have been met.

During outages of the Bear River canal, Upper Wise canal, Lower Wise canal, or South canal, water would not be available for discharge to meet minimum streamflows in Mormon Ravine once South canal drains and Newcastle power house shuts down. Because water delivered to western Placer County through this canal system is primarily used to meet contractual water delivery obligations of NID and PCWA, planned canal outages for annual maintenance are typically scheduled for after the agriculture and irrigation season demand declines in early October. Planned outages in late October and early November would not affect the cold water pool in Folsom Lake which is why Reclamation has not proposed minimum flows in this time period. Canal outages during January through May are unusual, and are usually the result of an emergency shutdown or identification of an urgent maintenance requirement that cannot be delayed until the scheduled annual maintenance outage. PG&E would be unable to meet Reclamation's minimum flows during January through May, if one of these infrequent unplanned or emergency outages occurred. The relatively small difference between the historical monthly average flows under the existing license and Reclamation's recommended flows for the same seasonal period indicates that there is little excess flow in the system at Mormon Ravine that could be used to further increase flow following an outage to make up the outage-related deficit. In addition, the

hydraulic capacity constraints of South canal also limit the amount of water that PG&E is able to deliver to the Newcastle Development to make up the flow deficit that would result from a canal outage of any more than a few days during winter and spring; during December through March flows at the Newcastle powerhouse are frequently near the hydraulic capacity of the canal and powerhouse.

PCWA commented that Reclamation's Mormon Ravine minimum streamflow recommendation should be rejected because it would directly affect the contractual water deliveries that PCWA relies on to meet current and future water demands of customers in its service area. As discussed previously, the primary purpose of this canal system is to divert water from the Yuba River and Bear River watersheds to Auburn and Mormon Ravines to meet water delivery obligations to downstream agricultural, municipal, and commercial customers. PG&E contractually delivers water to PCWA from the Bear River canal, Upper and Lower Wise canals, and, in particular, from South canal between the Wise and Newcastle powerhouses. PCWA points out that under license conditions proposed and recommended by PG&E, NID, the Forest Service, and BLM, much of this historically excess runoff delivered under the existing licenses from the Yuba and Bear River watersheds would be retained in those watersheds in the future to comply with environmental measures (e.g., minimum streamflows, spill cessation, and supplemental flows for water temperature management) within those watersheds. PCWA is concerned that as a result of these proposed environmental measures, the volume of water available for diversion from the Bear River at the Bear River canal diversion dam would be significantly reduced under future license conditions, making the remaining volume inadequate to still meet both contractual deliveries to PCWA for consumptive and water necessary to meet Reclamation's minimum streamflow recommendations for Mormon Ravine and Folsom Lake via the Newcastle Development. PCWA states that Reclamation can assert no claim against PG&E or PCWA to require any water deliveries into Folsom reservoir from the Yuba or Bear Rivers (Stevens v. Oakdale Irrigation District (1939) 13 Cal.2d 343, 348-353.). Reclamation's requirements under their water rights and regulating Biological Opinions for instream flows and temperatures in the Lower American River apply only to Reclamation's Central Valley Project water rights and are not conditioned upon or reliant upon the inter-basin transfer of water from the Yuba or Bear Rivers. PCWA explains that the primary components of the Lower Drum Project's canal delivery system date to the early 1900s prior to when the system was retrofitted for hydroelectric generation. Until 1931, all water discharged from the Wise powerhouses was delivered directly to Auburn Ravine; however, to reduce riparian property damage along Auburn Ravine associated with the higher than natural flows in Auburn Ravine, South canal and the Newcastle Development were constructed to divert excess flow from Auburn Ravine and provide an alternative release location for those flows.

PG&E's proposed minimum streamflows at upstream project-affected stream reaches are balanced by a reduction in flow releases and generation at the Newcastle Development, the most downstream development in the existing Drum-Spaulding Project (Lower Drum Project). Flows used for generation at Newcastle are the surplus of interbasin transfers under legal water rights and agreements used to meet water delivery to PCWA and NID customers. The minimum streamflows proposed by PG&E for the Newcastle Development would ensure adequate aquatic habitat in Mormon Ravine in the summer except during canal outages. While generation and discharges from the Newcastle powerhouse are likely to decrease during late spring and summer compared to the existing license, the range of minimum streamflows in Mormon Ravine would improve at other times (e.g., late summer and fall). Historically under the existing license, median monthly discharge peaks (125 to 280 cfs) at Newcastle between December and May, the period of peak runoff in the upstream watersheds of the existing Drum-Spaulding Project and Yuba-Bear Projects and the period during which Reclamation has proposed minimum streamflows of 50 to 200 cfs. The purpose of Reclamation's recommended minimum streamflows is to maintain the cold water pool of Folsom Lake, and is not designed to protect or enhance habitat or water quality in the short projected-affected stream reach of Mormon Ravine below the Newcastle Development. In addition to flows from Mormon Ravine, the coldwater pool of Folsom Lake

is strongly affected by non-project dams, powerhouses, and diversions in the North Fork American River and its tributaries upstream of Folsom Lake.

Minimum streamflows proposed by PG&E and normal operation of the Newcastle Development would protect aquatic resources in Mormon Ravine and outside of an unplanned or emergency canal outage would be adequate to continue to support the cold water pool in Folsom Lake. Depending on the duration of unplanned and emergency outages during winter and spring, Reclamation could experience some deficit in coldwater inflow from the Lower Drum Project. However, the magnitude and frequency of such outages and deficits is not likely to be different than experienced under the existing license. Except during a canal outage, the quantity of water available to Folsom Lake through the proposed Lower Drum Project is the result of interbasin transfer of water to meet contractual delivery obligations for multiple uses and is affected by a carefully managed balance of water rights, consumptive water delivery, power generation, and protection of aquatic resources in the Middle Yuba River, Canyon Creek, South Yuba River, and Bear River watersheds and various Placer County streams. Operations and habitat modeling were integral components of extensive negotiations that lead to the increased minimum streamflows and additional flow conditions proposed for many of the project-affected stream reaches in those upstream watersheds. These flow conditions would result in improved aquatic habitat in most project-affected reaches while protecting delivery of consumptive water resources, and reductions in power generation (section 3.3.2.2.6**,** *Effects on Water Storage and Use*, and section 4, *Developmental Analysis*), while also protecting the economic reliability of the proposed projects. As a result of meeting the increased flow requirements for upstream project-affected reaches, flows available at the Newcastle Development could be reduced during some seasons and some water years. During peak flows in winter and spring, releases from the Newcastle Development would likely be similar to the existing license and would support maximization of the coldwater pool in Folsom Lake described by Reclamation.

**Deer Creek Project**

Flow in a stream reach affects the quality and quantity of habitat available to aquatic organisms through its effect on a range of aquatic habitat features including, but not limited to, water depth, inundation, wetted perimeter, cover, and velocity. Where streamflow is diverted for power generation, water supply, or other uses, the quantity of water and natural seasonal and inter-annual variability are typically reduced. To improve habitat conditions for resident aquatic organisms, PG&E proposes minimum streamflows (DC-AQR1, Part 1, *Minimum Streamflows; Part 2, Canal Outages*; DC-AQR2) for one stream reach affected by the Deer Creek Project, which are generally consistent with minimum streamflows specified in Forest Service condition 29 and California Fish and Wildlife recommendation 2.2 for the respective stream reaches. Compliance at this stream reach would be demonstrated through continuous monitoring. PG&E and the relicensing stakeholders anticipate that the proposed minimum streamflows would preserve or enhance aquatic habitat for resident rainbow trout and foothill yellow-legged frog compared to conditions with minimum streamflows (where they have been specified) under the existing license (table 3-100). Compared to estimated unregulated flow conditions, the proposed flows would frequently provide more habitat for a greater percentage of the time during summer and fall, when unregulated flows in many high elevation headwater stream reaches would otherwise be less than proposed flows; proposed flows would provide similar or less habitat than unregulated conditions during winter and spring, when natural unregulated runoff would be higher than the proposed flows.

**Deer Creek Development**

*South Fork Deer Creek below Deer Creek Powerhouse*

PG&E proposes to provide minimum streamflows (table 3-125) of 5 cfs year round and in all years, to the South Fork Deer Creek below the Deer Creek powerhouse. Flow would be measured in the

Chalk Bluff canal upstream of the Deer Creek forebay. Forest Service condition 29 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

PG&E summarized historical flows under the existing license through the Deer Creek powerhouse, but did not present a frequency analysis for unregulated flows because there would be no waterway and no flow at this location without the South Yuba canal, Chalk Bluff canal, and Deer Creek powerhouse. The project-affected stream reach of the South Fork Deer Creek between the powerhouse tailrace and NID's Cascade diversion dam (non-project) is only 0.1 mile long. Under the existing license, there are no required minimum streamflows for this stream reach. PG&E and the relicensing stakeholders' evaluation of minimum instream flows focused on the need to maintain some water in the channel of South Fork Deer Creek to the Cascade diversion during periods when the Deer Creek powerhouse is out of service and PG&E cannot deliver water to South Fork Deer Creek. When there is not a call for water at NID's Cascade diversion, PG&E would still be responsible for maintaining some flow in this stream reach. Historical median monthly flows through the powerhouse range from 39 to 60 cfs under the existing license except in April when the median flow is 0 cfs. Peak flows, represented by the 10 percent exceedance flow, range from 60 to 91 cfs, and minimum streamflows (90 percent exceedance) are 0 cfs from January through May and about 30 to 50 cfs the rest of the year.

PG&E and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in run, riffle, and pool habitats at one study site in the South Fork Deer Creek. The average wetted width at the study site was less than 15 feet, and average depth was less than 1 foot. The range of study flows (35 to 81 cfs) and associated model flow range (14 to 202 cfs) do not capture the proposed minimum streamflows (5 cfs). However, the typical historical flows associated with powerhouse operation (40 to 60 cfs ranging to peaks near 90 cfs) under the existing license provide a 25 to 35 percent increase in the wetted perimeter in South Fork Deer Creek compared to the proposed 5 cfs minimum discharge. These flows do not account for the natural baseflow in South Fork Deer Creek upstream of the powerhouse tailrace. Typically, outages of these canals occur for about 2 weeks in late March to early April when unregulated flows in South Fork Deer Creek are likely to be near peak. Although PG&E did not estimate unregulated hydrology for the South Fork Deer Creek, during these early spring months some upstream flow should exist in South Fork Deer Creek as a result of snow melt and runoff. Under the proposed minimum streamflows, PG&E would be exempt from the minimum flow requirements when the South Yuba canal or Chalk Bluff canal is out of service because there is no natural channel, would be no source of water, and no mechanism for transfer of water to South Fork Deer Creek.

The proposed minimum streamflows would ensure the availability of aquatic habitat in this stream reach throughout the summer, irrespective of base flows in South Fork Deer Creek without the powerhouse discharge. This minimum flow would be 5 cfs higher than historical releases between January and May under the existing license. The range of flows in this stream reach is likely to remain similar to existing conditions, but the proposed minimum streamflows would ensure that the stream reach receives at least 5 cfs from the powerhouse throughout the year even during the driest years except during South Yuba or Chalk Bluff canal outages.

**Yuba-Bear Project**

Flow in a stream reach affects the quality and quantity of habitat available to aquatic organisms through its effect on a range of aquatic habitat features including, but not limited to, water depth, inundation, wetted perimeter, cover, and velocity. Where streamflow is diverted for power generation, water supply, or other uses, the quantity of water and natural seasonal and inter-annual variability are typically reduced. To improve habitat conditions for resident aquatic organisms, NID proposes a monthly minimum streamflow regime (YB-AQR1, Part 2) for 15 project-affected stream reaches conditioned on

six water year types (section 3.3.2.2.1, *Water Year Type*). NID's proposed minimum streamflows are generally consistent with minimum streamflows specified in Forest Service condition 29 and BLM condition 4 and recommended in California Fish and Wildlife recommendation 2.2 for the respective stream reaches. NID and the relicensing stakeholders anticipate that the proposed minimum streamflow regime would preserve or enhance aquatic habitat compared to conditions with minimum streamflows (where they have been specified) under the existing license (table 3-148). Compared to estimated unregulated flow conditions, the proposed flows would frequently provide more habitat for a greater percentage of the time during summer and fall, when unregulated flows in many high elevation headwater stream reaches would otherwise be less than the proposed flows; proposed flows would provide similar or less habitat than unregulated conditions during winter and spring, when natural unregulated runoff would be higher than the proposed flows.

The proposed minimum streamflows and estimated aquatic habitat changes for stream reaches affected by the Yuba-Bear Project are discussed below by development in general upstream to downstream order. Two additional project-affected stream reaches associated with the Chicago Park Development are also discussed in this section: Bear River below the Chicago Park powerhouse where powerhouse outages can temporarily reduce minimum streamflows and Steephollow Creek where occasional spills from the Chicago Park flume can affect aquatic habitat.

**Bowman Development**

*Middle Yuba River below Jackson Meadows* R*eservoir* D*am*

NID's proposes minimum streamflows of 11 to 120 cfs, depending on month and water year type, in the Middle Yuba River downstream of Jackson Meadows reservoir dam (table 3-149). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows. The minimum streamflow under the existing license is 5 cfs year round.

Our Analysis

Under estimated unregulated conditions in this reach of the Middle Yuba River, median monthly flows would generally be less than proposed minimum streamflows (table 3-149) from July through November in dry to wet years and from August through November in extreme critically dry and critically dry years. Highest unregulated median monthly flows (about 110 to 356 cfs) occur in April to June. Historical median monthly flows under the existing license range from an annual low of 9 to 11 cfs in November to February to high flows from 99 to 145 cfs between May and October. Minimum historical monthly flows (90 percent exceedance flow) are 5 to 9 cfs under the existing license. Highest historical median flows under the existing license (144.0 to 145.5 cfs) occur in September and October when estimated unregulated flows would typically be at the annual low (5 cfs). The proposed minimum streamflows would be higher than estimated unregulated median flows during late summer and fall (August to November), but lower during winter and spring. The proposed minimum streamflows would shift seasonal flow variability to mimic better the natural seasonal hydrograph.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-61) indicate that maximum habitat occurs at about 20 cfs for juveniles and at about 35 cfs for adults. Maximum habitat for fry occurs at the low flow limit of the model (about 5 cfs), decreasing sharply to about 33 percent of maximum at about 140 cfs, and then increasing steadily to about 87 percent at the upper model limit of 460 cfs. Spawning habitat in the stream reach increases from a minimum at the lower model boundary of 5 cfs to a maximum at about 120 cfs and then gradually decreases to about 62 percent of maximum as flow increases to the upper model boundary of about 460 cfs. Proposed minimum streamflows would provide greater than 80 to 100 percent of maximum habitat for adults in all years (table 3-150). Proposed minimum streamflows would provide 75 to 100 percent of maximum available habitat for juveniles in all

months and all years (table 3-150). Highest juvenile habitat availability during fall and winter would occur during above normal years; highest juvenile habitat during spring would occur during extreme critically dry and critically dry years. The higher flows proposed during dry and wetter years would reduce available habitat for juvenile. Proposed flows would provide the highest amount of spawning habitat in May during all years (79 to 100 percent), depending on water year type. Spawning habitat in April and June would range from 33 to 100 percent, depending on water year type (table 3-150).

In general, the HEA analysis indicates that available habitat (WUA) duration for adults under the proposed minimum streamflows would be similar or higher than both historical flows under the existing license and estimated unregulated flows (figure 3-62) provides an example for August and September). Habitat duration under estimated unregulated conditions is predicted to be better than under proposed flows only in April.

The minimum streamflows proposed by NID and the relicensing stakeholders for the Middle Yuba River downstream of Jackson Meadows reservoir dam would enhance existing habitat conditions for resident rainbow trout. The proposed schedule of minimum streamflows would create inter-annual variability and seasonal variation mimicking variability typical of a natural, unregulated hydrograph. Proposed flows would provide in excess of the 80 percent of maximum habitat target for juveniles and adults throughout the year in all years. Even during extreme critically dry years, spawning habitat would be near the 80 percent target for a portion of the spawning season.

*Middle Yuba River below Milton Diversion Dam*

NID's proposes to provide minimum streamflows of 4 to 70 cfs, depending on month and water year type, in the Middle Yuba River downstream of Milton diversion dam (table 3-151). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows. The minimum streamflow under the existing license is 3 cfs.

NID proposes (YB-AQR1, Part 4) and the relicensing stakeholders recommend some flexibility for determining winter minimum streamflows for Middle Yuba River based on near-term meteorological conditions (table 3-151). In the event that California DWR Bulletin 120 indicates that the recent year was a wet year, but precipitation records from July 1 through late fall/winter indicate that the upcoming year could be a dry year, a small 5-cfs decrease in the minimum streamflow is proposed for November to January in Middle Yuba River below Milton diversion dam. In February, minimum streamflows would revert to the appropriate proposed monthly minimum based on the California DWR Bulletin 120 water year designation.

Under section 10(j), NMFS recommends minimum streamflows of 10 to 200 cfs to be implemented in the future (table 3-152) to support reintroduction of spring-run Chinook salmon and Central Valley steelhead to the upper Yuba River upstream of Englebright dam, including Middle Yuba River downstream of Milton diversion dam. The flows are proposed regardless of water year type, except for extreme critically dry years when consultation would be required among the Commission, NMFS, NID, PG&E, the U.S. Army Corps of Engineers, and other stakeholders involved in the anadromous salmonid reintroduction program.

YCWA recommends that the new licenses for the Yuba-Bear and Drum-Spaulding Projects include a requirement to reopen the licenses to address the potential for higher minimum streamflows in the new license for the Yuba River Project (FERC Project No. 2246). YCWA specifically requests that the Commission reserve its authority in the Yuba-Bear and Drum-Spaulding licenses to require NID and PG&E to mitigate or avoid cumulative impacts of their projects, including diversions in the Yuba River Basin, as such issues may arise in the relicensing of the Yuba River Project, or in other proceedings related to Yuba River flows.

Our Analysis

Under estimated unregulated conditions in this stream reach of the Middle Yuba River, median monthly flows would generally be less than proposed minimum streamflows (table 3-151) in September and October in critically dry and dry years, and July through November in below normal to wet years; proposed flows in extreme critically dry years would be less than estimated median monthly unregulated flows. Highest estimated unregulated median monthly flows (about 115 to 378 cfs) occur in April to June. Historical median monthly flows under the existing license are consistently 4 cfs or less, year round. Minimum historical monthly flows (90 percent exceedance flow) are 3.4 cfs or less. The proposed minimum streamflows would ensure higher minimum streamflows than under existing license conditions in all years, but would be lower than estimated unregulated median flows during winter and spring (December to June). The proposed minimum streamflows would also introduce seasonal flow variability in all years, which does not occur under the existing license. NID's proposal to reduce minimum streamflows during winters leading into potentially dry years would still be considerably higher than the 3 cfs minimum streamflow under the existing license during winter in Middle Yuba River below Milton diversion dam.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-63) indicate that maximum habitat occurs at about 45 cfs for juveniles and at about 65 cfs for adults. Maximum habitat for fry occurs at the low flow limit of the model (about 15 cfs), decreasing sharply to about 50 percent of maximum at about 100 cfs, and then increasing steadily to about 80 percent at about 600 cfs. Maximum spawning habitat in the stream reach is relatively constant from about 50 to 1,100 cfs with a slight decrease between 300 and 600 cfs. Proposed minimum streamflows would provide greater than 40 to 100 percent of maximum habitat for adults, depending on month and water year type (table 3-153). During extreme critically dry, critically dry, and dry years, available habitat would be less than 50 percent year round; during below normal to wet years, habitat for adults would exceed 80 percent of maximum in spring and early summer (March to July). Juvenile habitat availability under proposed flows would range from 56 to 100 percent, with the highest availability in spring (April to June) ranging from 65 percent in extreme critically dry years to 100 percent in wet years. In below normal to wet years, juvenile habitat would be 77 to 100 percent of maximum year round. Proposed flows would provide the highest amount of spawning habitat in May during all years (27 to 76 percent, depending on water year type). Spawning habitat in April and June would range from 27 to 74 percent, depending on water year type (table 3-153).

NMFS recommended minimum streamflows are associated with planning for future reintroduction of spring-run Chinook salmon and Central Valley steelhead to the upper Yuba River upstream of Englebright dam, including Middle Yuba River between Our House diversion dam (non-project) and Milton diversion dam. NMFS expects that these reintroduction efforts may occur sometime during any new license term of the existing Drum-Spaulding and Yuba-Bear Projects. The timing of the reintroduction is highly uncertain, but NMFS recommends these minimum streamflows for future implementation when reintroduction does occur. The NMFS recommended flows to support this reintroduction in Middle Yuba River below Milton diversion dam are generally higher than those proposed by NID, Forest Service 4(e) conditions, and recommended by California Fish and Wildlife; however, during below normal to wet years, NID's proposed flows are higher in January to March. NID's proposed flows are also higher in April to June during above normal and wet years. Given the uncertain schedule and progress toward reintroduction of anadromous salmonids in this watershed and ongoing studies associated with this reintroduction, it is premature to determine appropriate flows to support reintroduction of anadromous salmonids for future implementation as recommended by NMFS.

Relatively high numbers of egg masses and tadpoles of foothill yellow-legged frog were identified at several locations during field surveys of the stream reach below Milton diversion dam. Habitat flow analysis for foothill yellow-legged frog indicates that proposed minimum streamflows from

May through September would provide in excess of 90 percent of maximum habitat for these early life stages (reproduction through metamorphosis) in most water years (table 3-154). During May in above normal and wet years, higher flows would reduce habitat for foothill yellow-legged frog eggs to 81 and 77 percent of maximum, respectively. The NMFS flow proposal to support anadromous salmonids would increase flows in the Middle Yuba River below the Milton diversion dam from 10 cfs at the end of May to 200 cfs on June 1 during peak foothill yellow-legged frog egg occurrence. The increase in flow from 30 cfs in dry years to 70 cfs in wet years results in a decrease in frog egg habitat from a peak of 99 percent of maximum to 77 percent of maximum (table 3-154). An increase in flow of the magnitude proposed by NMFS would cause a major loss of egg habitat and is likely to quickly flush existing egg masses downstream.

YCWA's reopener recommendation is associated with the potential effect of minimum streamflows and water transfers by the Yuba-Bear Project in Middle Yuba River and the Upper Drum-Spaulding Project in South Yuba River on minimum flow releases stipulated in the Yuba River Accord for the Yuba River Project (FERC project no. 2246), which is involved in a separate relicensing process at this time. The Yuba River Accord minimum flows were negotiated to provide the optimum benefits from available water supplies to lower Yuba River fisheries. YCWA intends to continue the Yuba River Accord minimum streamflows in the new license for the Yuba River Project. YCWA indicates that it agreed to meet the Yuba River Accord flows with the understanding that upstream, out-of-basin flows at the existing Yuba-Bear and Drum-Spaulding Projects would continue at their present rates. Proposed minimum streamflows for the Yuba-Bear, Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects discussed above would be greater than present flows under the existing licenses; other flow conditions (e.g., spill cessation, *Supplemental Flows*) would also increase flows in the Middle Yuba River, Canyon Creek, and South Yuba River. YCWA states that if required minimum streamflows from the Yuba River Project increase under its new license from those specified in the Yuba River Accord, then NID and PG&E should be required to make up a proportionate share of the increase through reduced water transfers by the Yuba-Bear and Drum-Spaulding Projects, since all three projects cumulatively affect flows in the lower Yuba River.

PCWA disagrees with YCWA's recommendation for a reopener in the Yuba-Bear and Upper Drum-Spaulding Project licenses to address future minimum flow measures that potentially could be implemented for the lower Yuba River in the Yuba River Projects' new license. PCWA points out that the contractual water deliveries from PG&E's proposed Lower Drum Project to meet consumptive water demands of PCWA customers are based on senior water rights held by NID and PG&E for transfer from the Middle and South Yuba Rivers. PCWA details the history of water rights of the respective project licensees and water purveyors in the upper and lower Yuba River. PCWA contends that the premise of YCWA's request is faulty and fails to adequately represent the nature of legally established water rights in the various basins and agreements established in the Yuba River Accord for the lower Yuba River. PCWA states that the YCWA proposal would use the relicensing process to curtail the senior water rights held by NID and PG&E to benefit the junior water rights YCWA holds, thus short-circuiting California's established water right processes that have precedence over the Commission's relicensing process.

The request by YCWA for a measure to reopen the Yuba-Bear Project license to address potential changes in minimum flow conditions in the future Yuba River Project license is procedural issue, not an environmental matter that requires discussion in our environmental analysis.

The minimum streamflows proposed by NID and the relicensing stakeholders for the Middle Yuba River downstream of Milton diversion dam would enhance existing habitat conditions for resident rainbow trout, but frequently do not achieve the target of 80 percent of maximum available habitat. Adult habitat would meet or exceed this target during the spring and early summer and juvenile habitat year round during below normal or wetter years. Spawning habitat reaches 76 percent in May during wetter

years. Foothill yellow-legged frog egg and tadpoles were abundant at some locations in the stream reach from Milton diversion dam downstream to Wolf Creek. The proposed minimum streamflows would provide in excess of 90 percent of maximum habitat for these life stages during most of their period of occurrence in this stream reach in most years. High flows proposed by NMFS when anadromous fish reintroduction occurs are likely to adversely affect development of foothill yellow-legged frog eggs in this stream reach. The schedule of minimum streamflows proposed by NID would create inter-annual variability and seasonal variation mimicking variability typical of an unregulated hydrograph. NID's proposed schedule of minimum streamflows for the Middle Yuba River downstream of Milton diversion dam balances an improvement in aquatic habitat for rainbow trout, near maximum habitat for foothill yellow-legged frog, water rights and obligations for consumptive water deliveries, and project power generation. The request by YCWA for a condition to reopen the Yuba-Bear Project license to address potential changes in minimum flow conditions in the future Yuba River Project license is a procedural matter that would be addressed in the license order. Each project is evaluated on its own merits, and the standard reopener article would address any future need to revisit license flow conditions if the facts warrant.

*Wilson Creek below Wilson Creek Diversion Dam*

NID's proposes to provide minimum streamflows of 0.25 cfs or natural flow, whichever is less, in Wilson Creek downstream of Wilson Creek diversion dam (table 3-155). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows. There is no minimum streamflow under the existing license.

Our Analysis

NID and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in Wilson Creek downstream of Wilson Creek diversion dam. The average wetted width at the study sites was less than 10 feet, and average depth was less than 1 foot. The model flow range (about 0.02 to 6.75 cfs) captures the proposed minimum flow, 0.25 cfs. The breakpoint in the flow versus wetted perimeter curve (figure 3-64), the target used by the relicensing stakeholders to set summer flow, occurs at about 2.5 cfs. Between 0.01 cfs and 0.25 cfs (the proposed minimum flow), the wetted perimeter increases by about 10 percent.

Under the existing license, there are no minimum streamflows for this stream reach. No data are available for historical flows under the existing license or to estimate unregulated flow conditions.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach throughout the summer than under existing license conditions when most flow is diverted from Wilson Creek to the Milton Bowman diversion conduit. The range of flows in this stream reach is likely to improve and enhance aquatic habitat compared to existing license conditions.

*Jackson Creek below Jackson Lake Dam*

NID's proposes to provide minimum streamflows of 0.5 to 3 cfs, depending on month and water year type, in Jackson Creek downstream of Jackson Lake dam (table 3-156). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows. The minimum streamflow under the existing license is 0.75 cfs.

Our Analysis

NID and the relicensing stakeholders used the CFR model to assess the relationship between flow and aquatic habitat at transects in Jackson Creek downstream of Jackson Lake dam. The average wetted

width at the study sites was less than 10 feet, and average depth was less than 1 foot. The model flow range (about 0.75 to 7.43 cfs) captures the range of proposed minimum streamflows (0. 5 to 3.0 cfs). The breakpoint in the flow versus wetted perimeter curve (figure 3-65) occurs at about 2.5 cfs; the application of the breakpoint was used by NID and the relicensing stakeholders as a target for summer minimum streamflows. Between 0.75 cfs and 3 cfs (the proposed minimum flow in June of wet years), the wetted perimeter increases by about 12 percent.

The minimum flow specified under the existing license is 0.75 cfs year round in all years; the historical minimum streamflows (90 percent exceedance) have been about 0.9 cfs year round. Under the existing license, the median monthly flow is 1.2 to1.6 cfs year round; maximum flows are about 1.7 to 2 cfs year round. Under estimated unregulated conditions, the median monthly flow would be less than the proposed minimum flow from July through November in extreme critically dry and critically dry years, and from July through December in all other years. Highest estimated median monthly unregulated flows occur in April and May (6.1 to 9.7 cfs). Proposed minimum streamflows in all but wet years are generally less than the historical median flow under the existing license. It is likely with the distribution of flows proposed by NID that flow conditions would be similar to those under the existing license; however, the proposed minimum streamflows would ensure that streamflows would be no less than 0.5 cfs in extreme critically dry and critically dry years and at least 0.75 cfs year round in all other years.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach throughout the summer than under existing conditions in above normal and wet years and similar habitat in dry and below normal years. The range of proposed flows would provide seasonal and inter-annual variability in this stream reach and would be likely to improve and enhance aquatic habitat compared to existing conditions during wetter years.

*Canyon Creek below French Lake Dam*

NID proposes to provide minimum streamflows of 5 to 18 cfs, depending on month and water year type, in Canyon Creek downstream of French Lake dam (table 3-157). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

Under estimated unregulated conditions in the reach of Canyon Creek below French Lake dam, median monthly flows would generally be less than proposed minimum streamflows (table 3-157) from July through December in all years, through January in dry and below normal years, through February during above normal years, and through March during above normal and wet years. Highest estimated unregulated median monthly flows (about 17 to 69 cfs) occur in March to June. The required minimum streamflow under the existing license is 2.5 cfs year round during all years. Historical records under the existing license demonstrate very low variability in flow through this stream reach. Historical median monthly flows range from 2.9 to 3.2 cfs under the existing license. Minimum historical monthly flows range from 2.7 to 2.9 cfs, and maximum historical monthly flows range from 3.1 to 3.2 cfs under the existing license. NID proposes minimum streamflows that would be higher than estimated unregulated median flows during late summer and fall (August to November), but lower during winter and spring. The proposed minimum streamflows would provide seasonal flow variability during wetter years.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-66) indicate that maximum habitat occurs at about 10 cfs for juveniles and at about 18 cfs for adults. Maximum habitat for fry occurs near the low flow limit of the model (about 4 cfs), decreasing sharply to about 36 percent of maximum at about 35 cfs, and then variably decreasing to about 30 percent at about 130 cfs. Maximum spawning habitat in the stream reach is relatively constant from about 10 cfs to 160 cfs at the upper model

limit. Proposed minimum streamflows would provide at least 78 percent of maximum habitat for adults in below normal to wet years (table 3-158) and 73 percent in extreme critically dry and critically dry years. Proposed minimum streamflows would provide 88 to 100 percent of maximum available juvenile habitat in all months and all years (table 3-158). Highest juvenile habitat availability (100 percent) during fall and winter would occur during above normal years. Proposed flows would provide at least 80 percent of maximum spawning habitat in dry to wet years. Spawning habitat in extreme critically dry and critically dry years would be about 80 percent of maximum (table 3-158).

In general, the HEA analysis indicates that available habitat (WUA) duration for adults under the proposed minimum streamflows would be similar to or higher than both historical flows under the existing license and estimated unregulated flows (figure 3-67 provides an example for August and September).

The minimum streamflows proposed by NID and the relicensing stakeholders for Canyon Creek downstream of French Lake dam would enhance existing habitat conditions for resident rainbow trout in most years. The proposed schedule of minimum streamflows would create inter-annual variability and improve seasonal variation mimicking variability typical of an unregulated hydrograph. Proposed flows would provide in excess of the 80 percent of maximum habitat target for juveniles and adults throughout the year in dry and wetter years. Even during extreme critically dry and critically dry years, spawning habitat would be near at least 70 percent.

*Canyon Creek below Faucherie Lake Dam*

NID's proposes to provide minimum streamflows of 5 to 18 cfs, depending on month and water year type, in Canyon Creek downstream of Faucherie Lake dam (table 3-159). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

Under estimated unregulated conditions in the stream reach of Canyon Creek below Faucherie Lake dam, median monthly flows would generally be less than proposed minimum streamflows (table 3-159) from July through November in all years, through December in below normal years, through January in above normal, and through February during wet years. Highest estimated unregulated median monthly flows (about 34 to 129 cfs) occur in March to June. There is no required minimum flow under the existing license. Historical records demonstrate very low variability in flow in this stream reach under the existing license; minimum historical monthly flows range from 2.7 to 2.9 cfs (except 1.3 cfs in September) under the existing license. Historical median monthly flows range from 2.9 to 3.0 cfs, and maximum historical monthly flows range from 3.1 to 3.3 cfs under the existing license. The proposed action would provide minimum streamflows that would be higher than estimated unregulated median flows during late summer and fall (August to November), but lower during winter and spring. The proposed minimum streamflows would provide seasonal flow variability during wetter years. No minimum streamflow is required in this stream reach under the existing license.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-68) indicate that maximum habitat occurs at about 10 cfs for juveniles and at about 18 cfs for adults. Maximum habitat for fry occurs near the low flow limit of the model (about 5 cfs), decreasing sharply to about 35 percent of maximum at about 90 cfs, and then variably increasing to about 60 percent at 225 cfs, the upper limit of the model. Maximum spawning habitat in the stream reach occurs at about 30 cfs and gradually decreases to about 50 percent of maximum at the upper model limit. Proposed minimum streamflows would provide at least 89 percent of maximum habitat for adults in all years (table 3-160). Proposed minimum streamflows would provide 94 to 100 percent of maximum available juvenile habitat in all months and all

years (table 3-160); higher proposed minimum streamflows during summer and fall in above normal and wet years would reduce available habitat from 100 percent of maximum provided in below normal years. Proposed flows would provide greater than 80 percent of maximum spawning habitat in above normal and wet years, but 47 percent in extreme critically dry and critically dry years, and 53 and 70 percent in dry and below normal years, respectively (table 3-160).

In general, the HEA analysis indicates that available habitat (WUA) duration for adults under the proposed minimum streamflows would be similar or higher than both historical flows under the existing license and estimated unregulated flows (figure 3-69 provides an example for August and September).

The minimum streamflows proposed by NID and the relicensing stakeholders for Canyon Creek downstream of Faucherie Lake dam would enhance existing habitat conditions for resident rainbow trout in most years. The proposed schedule of minimum streamflows would create inter-annual variability and improve seasonal variation, mimicking variability typical of an unregulated hydrograph. Proposed flows would provide in excess of the 80 percent of maximum habitat target for juveniles and adults throughout the year in all years. During below normal to wet years, spawning habitat would be at least 70 percent.

*Canyon Creek below Sawmill Lake Dam*

NID's proposes to provide minimum streamflows of 5 to 18 cfs, depending on month and water year type, in Canyon Creek downstream of Sawmill Lake dam (table 3-161). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

Under estimated unregulated conditions in the reach of Canyon Creek below Sawmill Lake dam, median monthly flows would generally be less than proposed minimum streamflows (table 3-161) from July through November in all years and from July through December in wet years. Highest estimated unregulated median monthly flows (about 61 to 231 cfs) occur in March to June. Historical records demonstrate very low variability in flow through this stream reach under the existing license. Historical median monthly flows range from 3.4 to 4.2 cfs and minimum historical monthly flows range from 2.8 to 3.0 cfs under the existing license. Maximum historical monthly flows range from 6.1 to 57.0 cfs; however, highest maximum flows under the existing license occur in late summer through early winter with lows in the spring, the opposite of the seasonal pattern observed under estimated unregulated conditions. The proposed action would provide minimum streamflows that would be higher than estimated unregulated median flows during late summer and fall (August to November), but lower during winter and spring. The proposed minimum streamflows would provide inter-annual variability, but no seasonal flow variability. No minimum streamflow is required in this stream reach under the existing license.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-70) indicate that maximum habitat occurs at about 35 cfs for juveniles and at about 55 cfs for adults. Maximum habitat for fry occurs near the low flow limit of the model (about 10 cfs), decreasing sharply to about 42 percent of maximum at about 55 cfs, and then variably decreasing to about 34 percent at about 280 cfs. Maximum spawning habitat in this stream reach peaks at 50 cfs and is relatively constant from about 35 cfs to 280 cfs at the upper model limit. Proposed minimum streamflows would provide 80 percent of maximum habitat for adults in wet years (table 3-162), 73 percent in above normal years, 59 percent in below normal years, and 42 percent in extreme critically dry and critically dry years. Proposed minimum streamflows would provide at least 81 percent of maximum available juvenile habitat in below normal and wetter years (table 3-162), 70 percent in dry years, and 65 percent in extreme critically dry and

critically dry years. Spawning habitat in extreme critically dry and critically dry years would be about 28 percent of maximum (table 3-162), increasing to 62 percent in wet years.

In general, the HEA analysis indicates that available habitat (WUA) duration for adults under the proposed minimum streamflows would be similar to or higher than both historical flows under the existing license and estimated unregulated flows (figure 3-71 provides an example for August and September). Between January and June, the exceedance curves for all three flow conditions (proposed, historical under the existing license, and estimated unregulated) are very similar, with the proposed flow conditions usually slightly higher; from July through December, the proposed flows would provide significantly higher WUAs more frequently than under estimated unregulated conditions or the existing license.

The minimum streamflows proposed by NID and the relicensing stakeholders for Canyon Creek downstream of Sawmill Lake dam would enhance existing habitat conditions for resident rainbow trout in most years compared to existing license conditions. The proposed schedule of minimum streamflows would create inter-annual variability. Proposed flows would provide in excess of the 80 percent of maximum habitat target for juveniles throughout the year in below normal and wetter years.

*Canyon Creek below Bowman-Spaulding Diversion Dam*

NID proposes to provide minimum streamflows of 4 to 60 cfs, depending on month and water year type, in Canyon Creek downstream of Bowman-Spaulding diversion dam (table 3-163). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

NID (YB-AQR1, Part 4) and the relicensing stakeholders propose and recommend some flexibility for determining winter minimum streamflows for Canyon Creek based on near-term meteorological conditions. In the event that California DWR Bulletin 120 from the spring forecast that the recent year would be a wet year, but summer precipitation records from July 1 through late fall/winter indicate that the upcoming year could be a dry year, a small (5 cfs) decrease in the minimum streamflow is proposed during January in Canyon Creek below Bowman-Spaulding diversion dam. In February, minimum streamflows would revert to the appropriate monthly minimum based on the most recent California DWR Bulletin 120 water year designation forecast.

To support reintroduction of anadromous salmonids in the upper Yuba River above Englebright dam, NMFS recommends under section 10(j) flows of 15 to 75 cfs in all years (table 3-164) for this reach of Canyon Creek.

Our Analysis

Under unregulated conditions in the reach of Canyon Creek below the Bowman-Spaulding diversion dam, median monthly flows would generally be less than proposed minimum streamflows (table 3-163) from August through October in all years, July through October in critically dry years, and July through November in dry and wetter years. Highest unregulated median monthly flows (about 66 to 380 cfs) occur in February to June. The minimum flow required for this reach of Canyon Creek under the existing license is 3 cfs between April 1 and October 31 and 2 cfs between November 1 and March 31. Historical records demonstrate very low variability in flow in this stream reach. Historical median monthly flows range from 4.1 to 6.3 cfs; minimum historical monthly flows range from 2.1 to 3.3 cfs; and maximum historical monthly flows range from 6.6 to 270 cfs. Historical monthly maximum flows are similar to the unregulated median flows. The proposed action would provide minimum streamflows that would be higher than unregulated median flows during late summer and fall, but lower during winter and

spring. The proposed minimum streamflows would provide inter-annual and seasonal flow variability during all years.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-72) indicate that maximum habitat occurs at about 25 cfs for juveniles and at about 80 cfs for adults. Maximum habitat for fry occurs near the low flow limit of the model (less than 10 cfs), decreasing sharply to about 35 percent of maximum at about 90 cfs, and then variably increasing to about 36 percent at 530 cfs, the upper limit of the model. Maximum spawning habitat in the reach occurs at about 40 cfs and gradually decreases to about 32 percent of maximum at the upper model limit. Proposed minimum streamflows would provide at least 79 percent of maximum habitat for adults between February and September in below normal and wetter years (table 3-165) and 66 percent during fall and early winter; available adult habitat in extreme critically dry, critically dry, and dry years would equal about 40, 50, and 66 percent of maximum, respectively. Proposed minimum streamflows would provide at least 89 percent of maximum available juvenile habitat year round in dry or wetter years (table 3-165); during critically dry years, habitat would be 75 percent of maximum in fall and winter and at least 89 percent in spring and summer. Habitat for juveniles during extreme critically dry years would be 64 to 75 percent of maximum. Proposed flows would generally provide greater than 80 percent of maximum spawning habitat in below normal and wetter years, but 28 to 39 percent in extreme critically dry years, 59 to 75 percent in critically dry years, and 75 to 86 percent in dry years (table 3-165). The proposed reduced winter flows in anticipation of an upcoming dry season would still be considerably higher than the 2 cfs minimum in Canyon Creek under the existing license.

In general, the HEA analysis indicates that available habitat (WUA) duration for adults under the proposed minimum streamflows would be similar or higher than both historical flows under the existing license and estimated unregulated flows (figure 3-73 provides an example for August and September). Between January and June, the exceedance curves for all three flow conditions (proposed, existing license, and estimated unregulated) are very similar with the proposed flow conditions usually slightly higher; from July through December, the proposed flows would provide significantly higher WUAs more frequently than under estimated unregulated conditions or under the existing license.

Foothill yellow-legged frog egg masses were found during relicensing surveys at a location about 9.3 miles downstream of Bowman-Spaulding diversion dam. The habitat modeling for foothill yellow-legged frog indicates that the proposed minimum streamflows would provide 83 to 100 percent of the maximum available habitat for foothill yellow-legged frog eggs and tadpoles under extreme critically dry to below normal years (table 3-166). As proposed minimum streamflows increase with wetter years, the available foothill yellow-legged frog habitat decreases to 69 to 84 percent in above normal years and 64 to 83 percent in wet years.

A plan for reintroducing spring-run Chinook salmon and Central Valley steelhead to the upper Yuba River upstream of Englebright dam, including South Yuba River and tributaries below Lake Spaulding dam, is in development. NMFS expects these reintroduction efforts may occur sometime during any new license term of the Drum-Spaulding Project. The schedule for the reintroduction is uncertain, but NMFS has proposed these flows for future implementation when reintroduction does occur. The NMFS recommended flows to support this reintroduction in Canyon Creek below Bowman-Spaulding diversion dam are generally higher than those proposed by NID, Forest Service 4(e) conditions, and recommended by California Fish and Wildlife.

The increased minimum flows recommended by NMFS to support future reintroduction of spring-run Chinook salmon and Central Valley steelhead would likely reduce critical habitat for foothill yellow-legged frog. As NID's proposed flows in May increase from 15 cfs during critically dry years to 60 cfs in wet years, the predicted percent of maximum habitat available for foothill yellow-legged frog

decreases from 96 percent to 77 percent (table 3-166); NMFS' recommended flow (75 cfs) during peak foothill yellow-legged frog egg occurrence in May and June would further reduce available habitat. NMFS' recommended 30-cfs flows in July through September when tadpoles would be present are equal to or higher than NID's recommended flows during all water years except July in wet years. Consequently, while the proposed NID flows would provide tadpole habitat 89 percent of maximum or greater in extreme critically dry years to below normal years and 79 percent of maximum habitat in August and September of above normal and wet years, the NMFS flow would provide only 64 percent of habitat during all three months regardless of water year (table 3-166).

The minimum streamflows proposed by NID and the relicensing stakeholders for Canyon Creek downstream of the Bowman-Spaulding diversion dam would enhance existing habitat conditions for resident rainbow trout in most water years compared to existing conditions. Optimum flow conditions for resident rainbow trout and flows recommended by NMFS are not necessarily beneficial to foothill yellow-legged frog. The schedule of minimum streamflows proposed by NID and the relicensing stakeholders establishes a good balance between the flow requirements for these two species providing near maximum habitat availability for foothill yellow-legged frog during drier years while meeting the 80 percent target for rainbow trout during wetter years. The proposed schedule of minimum streamflows would create inter-annual variability and improve seasonal variation, mimicking variability typical of an unregulated hydrograph. The minimum streamflows proposed by NMFS for all years are likely to reduce available habitat for early life stages of foothill yellow-legged frog in Canyon Creek below Bowman-Spaulding diversion dam. Given the uncertain schedule and progress toward reintroduction of anadromous salmonids in this watershed and ongoing studies in the watershed[15], it is premature to determine appropriate flows to support reintroduction of anadromous salmonids for future implementation as recommended by NMFS.

**Dutch Flat No. 2 Development**

*Texas Creek below Texas Creek Diversion Dam*

NID proposes to provide minimum streamflows of 0.6 to 3 cfs, depending on water year type, in Texas Creek downstream of the Texas Creek diversion dam at the Bowman-Spaulding conduit (table 3-167). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

NID and the relicensing stakeholders used both the DFA method and CFR model to assess the relationship between flow and aquatic habitat at transects in Texas Creek below the Texas Creek diversion dam at the Bowman-Spaulding conduit. The average wetted width at the study sites was less than 10 feet, and average depth was less than 1 foot. The model flow range (about 0.36 to 30.68 cfs) captures the range of proposed minimum streamflows (0. 6 to 3.0 cfs). The breakpoints in the flow versus wetted perimeter curve (figure 3-74) occur at about 1 cfs and 3 cfs; the application of the breakpoint was used by NID and the relicensing stakeholders to establish a summer low-flow target. Between 1 cfs and 3 cfs (the proposed minimum streamflow year round in above normal and wet years), the wetted perimeter increases by about 15 percent.

[15] Ongoing efforts by Lower Yuba Technical Work Group, Yuba Salmon Forum, and work completed by the Upper Yuba River Studies Program in cooperation with NMFS.

During the DFA/CFR field study, California Fish and Wildlife staff noted at the low calibration flow (0.90 cfs) that a small amount of good refuge habitat existed in this stream reach. Deep pools were observed in the upper stream reach and connectivity was established between habitat types at this flow. At the lowest flow, California Fish and Wildlife staff observed that all flow remained subsurface through the large cobble field at the confluence of Texas Creek with Canyon Creek, and there was no stream connectivity from Texas Creek to Canyon Creek. At the middle study flow, California Fish and Wildlife staff noted that stream connectivity was established with Canyon Creek. California Fish and Wildlife concluded that a range of flows between 1 cfs and 5 cfs would be sufficient to maintain fish in good condition in this stream reach. The effects of these spill events from the Bowman-Spaulding conduit on erosion and plans for erosion control and restoration of damaged stream reaches are discussed in detail in sections 3.3.1.2.1, *Slope Stability and Erosion,* and 3.3.1.2.2, *Habitat Restoration*. While the resulting aquatic resource habitat associated with the minimum streamflows proposed by NID and the stakeholders does not meet the optimal criteria, other measures for this stream reach (i.e., erosion mitigation, section 3.3.1.2.1, *Slope Stability and Erosion*) would be expected to improve habitat conditions for aquatic resources.

Historical flow data were not presented for this stream reach, but the stream is dry for much of the year under existing license conditions. Under estimated unregulated conditions, the median monthly flow would be less than the proposed minimum flow from July through October in extreme critically dry to dry years and from July through November in below normal to wet years. Highest estimated median monthly unregulated flows occur in April and May (51 to 70 cfs). It is likely that the distribution of flows under the proposed flow schedule would be similar to those under the existing license; however, the proposed minimum streamflows would ensure that flows would be no less than 0.6 cfs in extreme critically dry years and increase to 3 cfs in above normal and wet years.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach throughout the summer than under existing conditions, particularly during below normal and wetter years. The proposed minimum streamflows in this stream reach are likely to improve and enhance aquatic habitat compared to existing conditions and would provide inter-annual variability in flows through this stream reach. No minimum streamflow is specified for this stream reach under the existing license.

*Clear Creek below Bowman-Spaulding Conduit*

NID proposes to provide minimum streamflows of 1 to 6 cfs, depending on month and water year type, in Clear Creek below the Bowman-Spaulding conduit (table 3-168). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-75) indicate that the amount of habitat for juveniles and adults increases gradually over the modeled range of flow to the maximum flow of about 37 cfs; the curves for both life stages break to become more asymptotic at about 3 to 5 cfs. Available habitat for fry peaks at less than 5 cfs and then increases to the maximum near the upper flow limit of the model (37 cfs). Maximum spawning habitat in the stream reach occurs at about 37 cfs, with an asymptotic break at about 10 to 15 cfs. Proposed minimum streamflows would generally provide about 47 percent of maximum habitat (at 1 cfs) for adults in extreme critically dry to below normal years (table 3-169) and 59 to 79 percent (at 2 to 6 cfs) in above normal and wet years. Proposed minimum streamflows would generally provide about 55 percent of maximum habitat for adults in extreme critically dry to below normal years (table 3-169) and 67 to 81 percent in above normal and wet years. Proposed flows would generally provide less than 30 percent of maximum spawning habitat except

in May and June of above normal and wet years, when available spawning habitat would be 41 to 64 percent of maximum (table 3-169).

There is no minimum flow requirement in this stream reach under the existing license, and the stream reach is typically dry for much of the year. NID opens the manual dump gate off the Bowman-Spaulding conduit and releases excess water into Clear Creek during winter when the Bowman-Spaulding canal is near capacity. There is evidence of substantial erosion likely due to these winter and other spill events from the Bowman-Spaulding conduit. The effects of these spill events on erosion and plans for erosion control and restoration of damaged stream reaches are discussed in detail in sections 3.3.1.2.1, *Slope Stability and Erosion,* and 3.3.1.2.2, *Habitat Restoration*. Historical flow data under the existing license were not presented for this stream reach, but the stream is dry for much of the year under existing conditions as most water is diverted to the Bowman-Spaulding conduit. Under estimated unregulated conditions, the median monthly flow would be less than the proposed minimum flow from July through November in below normal and drier years and from July through December in above normal and wet years. Highest estimated median monthly unregulated flows occur in April and May (13 to 18 cfs). It is likely that the distribution of flows under the proposed flow schedule would be similar to those under the existing license; however, the proposed minimum streamflows would ensure that flows would be no less than 1 cfs in extreme critically dry to dry years and increase to 2 to 6 cfs minimum streamflows in above normal and wet years.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach throughout the summer than under existing conditions, particularly during below normal and wetter years. The proposed minimum streamflows in this stream reach are likely to improve and enhance aquatic habitat compared to existing license conditions and would provide inter-annual variability in flows through this stream reach. While the resulting aquatic resource habitat associated with the minimum streamflows proposed by NID and the relicensing stakeholders does not meet their optimal criteria, other measures for this stream reach (i.e., erosion mitigation, section 3.3.1.2, *Habitat Restoration*) would be expected to further improve habitat conditions for the aquatic resources.

*Fall Creek below Fall Creek Diversion Dam*

NID proposes to provide minimum streamflows of 1 to 20 cfs, depending on month and water year type, in Fall Creek below the Fall Creek diversion dam at the Bowman-Spaulding conduit (table 3-170).

Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends minimum streamflows (table 3-171) for Fall Creek below the diversion dam at the Bowman-Spaulding conduit that are generally higher, particularly from April through June, than those that NID proposes. In providing alternatives to the Forest Service condition, NID appears to indicate that it is willing to operate the Fall Creek diversion under the Forest Service minimum flow schedule with the caveat that during outages of the Bowman-Spaulding conduit, flow in Fall Creek below the conduit would equal flow in Fall Creek above the Fall Creek diversion.

Our Analysis

There is no minimum flow requirement in this stream reach under the existing license. Historical flow data under the existing license were not presented for this stream reach, but the stream reach is generally dry for most of the year. NID opens the manual dump gate off the Bowman-Spaulding conduit and releases excess water through Clear Creek during winter when flows in the Bowman-Spaulding conduit are near capacity. There is evidence of substantial erosion in the Fall Creek channel below the Bowman-Spaulding conduit likely due to these winter and other spill events from the Bowman-Spaulding conduit. The effects of these spill events on erosion and plans for erosion control and restoration of

damaged stream reaches are discussed in detail in sections 3.3.1.2.1, *Slope Stability and Erosion,* and 3.3.1.2.2, *Habitat Restoration*. Under estimated unregulated conditions, the median monthly flow would be less than the Forest Service's specified minimum flow from July through October in extreme critically dry and critically dry years and from July through November in dry and wetter years. Highest estimated median monthly unregulated flows occur in April and May (56 to 77 cfs). Estimated unregulated maximum flows occur in April to June (105 to 156 cfs). Except in April, May, and June, proposed minimum streamflows range from 2 cfs in extreme critically dry, critically dry, and dry years to 4 to 10 cfs in below normal, above normal, and wet years. In order to mitigate for trout entrained into the Bowman-Spaulding conduit at this location, NID and the relicensing stakeholders agreed to increase flows in April (10 to 20 cfs), May (12.5 to 30 cfs), and June (4 to 25 cfs) when water is available to enhance spawning opportunities in Fall Creek below the conduit. The proposed minimum streamflows would ensure that flows would be no less than 2 cfs in extreme critically dry to critically dry years and increase to at least 6 cfs in above normal and wet years.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-76) indicate that the amount of habitat for juveniles peaks at about 4 cfs and for adults at about 8 cfs. Habitat for these two life stages decreases to about 80 to 87 percent of maximum at about 50 cfs, then increases gradually to about 89 percent at the upper model limit of 165 cfs. Available habitat for fry peaks at about 1 cfs, decreases to about 42 percent of maximum at about 32 cfs, and then increases to a second peak of 60 percent of maximum at 70 cfs. Maximum spawning habitat in the stream reach occurs at about 25 to 30 cfs, with a decline to about 46 percent at the upper model limit (165 cfs). Proposed minimum streamflows would generally provide about 47 percent of maximum habitat for adults in extreme critically dry to below normal years (table 3-172) and 59 to 79 percent (at 2 to 6 cfs) in above normal and wet years. Proposed minimum streamflows would provide at least 80 percent of maximum habitat for adults in dry and wetter years (table 3-172) and 63 percent in extreme critically dry and critically dry years. Proposed flows would generally provide 15 to 46 percent of maximum spawning habitat in July of all years (table 3-172).

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach throughout the summer than under existing license conditions, particularly during below normal and wetter years. The proposed minimum streamflows in this stream reach are likely to improve and enhance aquatic habitat compared to existing license conditions and would provide inter-annual and seasonal variability in flows through this stream reach. While the resulting aquatic resource habitat associated with the minimum streamflows proposed by NID and the relicensing stakeholders does not meet their preferred optimal criteria (80 percent of maximum habitat), other proposed measures for this reach (i.e., control and mitigation of channel erosion damage associated with spills from the Bowman-Spaulding conduit, section 3.3.1.2, *Habitat Restoration*) would be expected to further improve habitat conditions for the aquatic resources.

*Trap Creek below Bowman-Spaulding Conduit*

NID proposes to provide minimum streamflows of 0.25 to 3 cfs, depending on water year type, in Trap Creek downstream of the Bowman-Spaulding conduit (table 3-173). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

NID and the relicensing stakeholders used both the DFA method and CFR model to assess the relationship between flow and aquatic habitat at transects in Trap Creek below the Bowman-Spaulding conduit. The average wetted width at the study sites was less than 8 feet, and average depth was less than 1 foot. The model flow range (about 0.15 to 7.63 cfs) captures the range of proposed minimum

streamflows (0.25 to 3.0 cfs). No clear breakpoint is apparent in the flow versus wetted perimeter curve (figure 3-77); as a result, the breakpoint could not be used by NID and the relicensing stakeholders as a target for determining summer minimum flows as for other stream reaches. Between 0.25 cfs and 3 cfs, the wetted perimeter increases by about 20 percent.

During the DFA/CFR field study, California Fish and Wildlife staff noted (July 29, 2012) that connectivity through the observable stream reach was established at the low study flow (0.37 cfs), but side margin habitat was poorly inundated. In addition, California Fish and Wildlife staff noted significant erosion in the upper part of the stream reach, most likely associated with spills from the Bowman-Spaulding conduit. California Fish and Wildlife determined that a flow equivalent to 30 to 40 percent of the mean annual flow throughout the summer would provide fair to good habitat. This is equivalent to a flow of between 0.79 to 1.1 cfs. Based on its analysis and field observations, California Fish and Wildlife determined that a range of flows between 0.25 cfs and 10 cfs (bank full) would be sufficient to maintain fish in good condition in this stream reach.

No minimum streamflow is specified for this stream reach under the existing license. Historical flow data under the existing license were not presented for this stream reach, but the stream is dry for much of the year under existing conditions. Under estimated unregulated conditions, the median monthly flow would be less than the proposed minimum flow from July through November in extreme critically dry to dry years, from June through November in below normal years, from June through December in above normal years, and from June through January in wet years. Highest estimated median monthly unregulated flows occur in April and May (5 to 7 cfs). It is likely that the distribution of flows under the proposed flow schedule would be similar to that under the existing license; however, the proposed minimum streamflows would ensure that streamflows would be no less than 0.25 cfs in extreme critically dry years, and increase to 1.5 to 3 cfs minimum flows in above normal and wet years.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach throughout the summer than under existing license conditions, particularly during below normal and wetter years. The proposed minimum streamflows in this stream reach are likely to improve and enhance aquatic habitat compared to existing license conditions and would provide inter-annual variability in flows through this stream reach. The effects of these spill events on erosion and plans for erosion control and restoration of damaged stream reaches are discussed in detail in sections 3.3.1.2.1, *Slope Stability and Erosion*. Other proposed measures for this stream reach (i.e., control and mitigation of channel erosion damage associated with spills from the Bowman-Spaulding conduit, section 3.3.1.2, *Habitat Restoration*) would be expected to further improve habitat conditions for the aquatic resources.

*Rucker Creek below Bowman-Spaulding Conduit*

NID proposes to provide minimum streamflows of 0.3 to 3 cfs, depending on water year type, in Rucker Creek downstream of the Bowman-Spaulding conduit (table 3-174). Forest Service condition 27 specifies and California Fish and Wildlife recommendation 2.2 recommends the same monthly minimum streamflows.

Our Analysis

No minimum streamflow is specified for this stream reach under the existing license. Historical flow data under the existing license were not presented for this stream reach, but the stream is dry for much of the year under existing conditions. Under estimated unregulated conditions, the median monthly flow would be less than the proposed minimum flow from July through October in extreme critically dry to dry years, and from July through November in below normal to wet years. Highest estimated median monthly unregulated flows occur in April and May (16 to 21 cfs). Minimum estimated monthly unregulated flows are less than 1 cfs between June and January and the highest maximum monthly

unregulated flows occur in March through June (26 to 43 cfs). It is likely that the distribution of flows under the proposed flow schedule would be similar to those under the existing license; however, the proposed minimum streamflows would ensure that flows would be no less than 0.3 cfs in extreme critically dry and critically dry years and would increase to 2 to 3 cfs in above normal and wet years.

NID and the relicensing stakeholders used both DFA method and CFR model to assess the relationship between flow and aquatic habitat at transects in Rucker Creek below the Bowman-Spaulding conduit. The average wetted width at the study sites was less than 15 feet, and average depth was less than 1.5 feet. The model flow range (about 0.5 to 21 cfs) does not completely capture the range of proposed minimum streamflows (0. 3 to 3.0 cfs). The breakpoints in the flow versus wetted perimeter curve (figure 3-78) occur at about 2.5 cfs; the application of the breakpoint was used by NID and the relicensing stakeholders as a target for minimum summer flows. Between 0.5 cfs and 2.5 cfs, the wetted perimeter increases by almost 60 percent.

During the DFA/CFR field study, California Fish and Wildlife staff noted (July 29, 2012) at the low calibration flow (0.73 cfs) that good connectivity was established through the large cobble substrate. California Fish and Wildlife concluded that the collaboratively developed minimum streamflows would substantially improve conditions for the aquatic biota and provide connectivity with and tributary flow to the South Yuba River. The effects of these spill events on erosion and plans for erosion control and restoration of damaged stream reaches are discussed in detail in sections 3.3.1.2.1, *Slope Stability and Erosion*. While the resulting aquatic resource habitat associated with the minimum streamflows proposed by NID and the relicensing stakeholders does not meet their preferred optimal criteria (80 percent of maximum habitat), other proposed measures for this stream reach (i.e., control and mitigation of channel erosion damage associated with spills from the Bowman-Spaulding conduit, section 3.3.1.2.2, *Habitat Restoration*) would be expected to further improve habitat conditions for the aquatic resources.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach throughout the summer than under existing license conditions, particularly during below normal and wetter years. The proposed minimum streamflows in this stream reach are likely to improve and enhance aquatic habitat compared to existing license conditions and would provide inter-annual variability in flows through this stream reach.

**Chicago Park Development**

*Bear River below Dutch Flat Afterbay Dam*

NID proposes to provide minimum streamflows of 7 to 45 cfs, depending on month and water year type, in the Bear River below Dutch Flat afterbay dam (table 3-175). BLM condition 4 specifies and Forest Service recommendation 2 and California Fish and Wildlife recommendation 2.2 recommend the same monthly minimum streamflows.

Our Analysis

Bear River inflow and discharges from the Dutch Flat No. 1 Development and Dutch Flat No. 2 Development are reregulated in Dutch Flat afterbay; a portion of that flow is diverted to the Chicago Park powerhouse via the Chicago Park flume and the excess is captured in storage and/or released downstream to the Bear River below Dutch Flat afterbay. The existing license requires 10 cfs minimum flow through the Bear River stream reach below Dutch Flat afterbay between May 1 and October 31 and 5 cfs between November 1 and April 30; proposed flows range from 7 to 45 cfs depending on month and water year. Under estimated unregulated conditions, the median monthly flow would be less than the proposed minimum flow during August and September in extreme critically dry, critically dry, and dry years, from August through October in below normal years, August through November in above normal years, and

July through November in wet years. Highest estimated median monthly unregulated flows occur in February through May (51 to 83 cfs); estimated unregulated maximum flows occur during the same months (159 to 222 cfs). Historical flows under the existing license exhibit minimal variability between months. Historical median monthly flows range from 6.3 to 7.1 cfs between November and April and 11 to 12 cfs in May through October under the existing license. Minimum historical monthly flows range from 5.2 to 10 cfs under the existing license. The proposed minimum streamflows would create seasonal and inter-annual variability more typical of a natural hydrograph and ensure that minimum flows would be no less than 7 cfs during fall and winter in extreme critically dry to critically dry years, increasing to at least 30 to 45 cfs between February and June in above normal and wet years.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-79) indicate that the amount of habitat for juveniles and adults peaks at about 15 cfs. Habitat for these two life stages decreases to about 80 to 84 percent of the peak at about 70 cfs and then increases gradually to a second peak at the upper model limit of 440 cfs. Available habitat for fry peaks at about 5 cfs, decreases to about 49 percent of maximum at about 20 cfs, and then increases to a second peak of 85 percent of maximum at 150 to 250 cfs. Maximum spawning habitat in the stream reach occurs at about 45 cfs. Proposed minimum streamflows would provide more than 82 percent of maximum habitat for adults year round in all years (table 3-176). Proposed minimum streamflows would provide at least 90 percent of maximum habitat for juveniles in extreme critically dry and critically dry years (table 3-176); during above normal and wet years, juvenile habitat would decrease during peak spring flows to 84 to 91 percent of maximum. Proposed flows would generally provide 52 to 79 percent of maximum spawning habitat in extreme critically dry and critically dry years (table 3-176) and 79 to 100 percent in below normal to wet years.

In general, the HEA analysis indicates that available habitat (WUA) duration for adults under the proposed minimum streamflows would be similar or higher than both historical flows under the existing license and estimated unregulated flows (figure 3-80 provides an example for August and September). Between October and April, the exceedance curves for all three flow conditions (proposed, existing license, and estimated unregulated) are very similar, with the proposed flow conditions usually slightly higher than or identical to estimated unregulated flow conditions; from May through September, the proposed flows would provide significantly higher WUAs more frequently than under unregulated conditions, and would be almost identical to the existing license conditions.

All foothill yellow-legged frog life stages were found in moderate to high numbers in the Bear River below Dutch Flat afterbay dam. NID developed a habitat versus flow relationship for foothill yellow-legged frog at a site 1.2 miles downstream of Dutch Flat afterbay dam. During topographic data collection, at least five foothill yellow-legged frog egg masses were noted at the site in late May 2009. The model indicated that the WUA for foothill yellow-legged frog eggs in May and June is highest at the lowest modeled flow of 4.4 cfs and decreases sharply as streamflows increase (table 3-177). Foothill yellow-legged frog eggs and tadpoles would have near 100 percent of maximum habitat available in extreme critically dry and critically dry years. Available egg habitat decreases to 30 percent or less in above normal and wet years; tadpole habitat remains at 95 percent during these wetter conditions.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach year round and particularly throughout the summer than under existing license conditions. The proposed minimum streamflows in this stream reach are likely to improve and enhance aquatic habitat compared to existing license conditions and would provide seasonal and inter-annual variability in flows through this stream reach. Other measures (section 3.3.2.2.4*, Recession From Peak Flows and Flow Fluctuations*) for this stream reach would provide additional flows and further improve conditions for both fish and foothill yellow-legged frogs.

*Bear River below Chicago Park Powerhouse*

NID and the relicensing stakeholders do not propose or recommend minimum streamflows specific to the reach of the Bear River below the Chicago Park powerhouse. NID proposes an operational measure for this reach of the Bear River to maintain flows below the powerhouse at the beginning of an outage of the powerhouse or canal: Part 6, *Chicago Park Powerhouse Motoring*. BLM condition 6 specifies and Forest Service recommendation 7 and California Fish and Wildlife recommendation 2.6 recommend the same flow-related measure for this reach of the Bear River.

Our Analysis

Chicago Park Development is comprised of an off-channel powerhouse with water supplied through the Chicago Park flume from Dutch Flat afterbay. No dam or reregulating structures exist on the Bear River between the Dutch Flat afterbay dam and the high water level of Rollins reservoir about 1.5 miles downstream of the Chicago Park powerhouse tailrace. Flows in the Bear River below the Chicago Park powerhouse are an aggregate of: (1) minimum streamflows required below the Dutch Flat afterbay dam (discussed in the preceding section); (2) flows diverted from the Dutch Flat afterbay through the Chicago Park flume to the Chicago Park forebay, penstock, and powerhouse; and (3) tributary accretion below the Dutch Flat afterbay. There are no specific minimum streamflows required in the Bear River below Chicago Park powerhouse tailrace under the existing license or NID and the relicensing stakeholder's proposed and recommended measures other than those required upstream below the Dutch Flat afterbay dam. Under the proposed *Chicago Park Powerhouse Motoring* measure, NID would make a good faith effort to avoid non-routine planned outages of the Chicago Park powerhouse from May 1 through September 15 each year. Depending on water levels and time of the year, if an outage of the Chicago Park powerhouse does occur, flows normally diverted into the Chicago Park flume would begin to spill at the Dutch Flat afterbay dam increasing flows in the Bear River below Dutch Flat afterbay dam. There is a time lag between when the Chicago Park powerhouse shuts down and when the resulting increased flows in the Bear River released at the Dutch Flat afterbay reach the location of the Chicago Park powerhouse tailrace. Until the increasing flows in the Bear River arrive at the Chicago Park powerhouse tailrace, there would be a potential for a rapid decrease in flow in the Bear River below the tailrace at the time that the powerhouse shuts down. By motoring the Chicago Park powerhouse (synchronous condense mode; i.e., continuing to pass water through the powerhouse without generating electricity) flows in the Bear River below the Chicago Park powerhouse would remain relatively stable during the initial period of the outage. Once the rising flows from Dutch Flat afterbay in the Bear River channel arrive at Chicago Park powerhouse, motoring of the powerhouse would be discontinued. This proposed measure would minimize effects of flow fluctuations on available aquatic habitat during initial stages of an outage at the Chicago Park powerhouse.

*Steephollow Creek below the Chicago Park* F*lume*

Under typical operation, the Chicago Park Development does not discharge to and has no effect on flows and aquatic habitat in Steephollow Creek. NID and the relicensing stakeholders have not proposed any minimum streamflow measures for this stream reach.

Our Analysis

Steephollow Creek is a tributary to Bear River that flows under the Chicago Park flume upstream of the powerhouse; a population of foothill yellow-legged frog has been identified in this tributary. NID occasionally releases water to Steephollow Creek from the Chicago Park flume during outages or high flow events that exceed flume hydraulic capacity. The potential effects of these high flow releases to Steephollow Creek on foothill yellow-legged frogs are subject to proposed baseline and high flow event

monitoring and discussed in more detail in section 3.3.3.2.2, *Special-status Wildlife Species, Amphibians and Reptiles*.

**Rollins Development**

*Bear River below Rollins Dam*

NID proposes to provide minimum streamflows of 15 to 125 cfs in the Bear River downstream of Rollins dam depending on month and water year (table 3-178). BLM condition 4 specifies and Forest Service recommendation 2 and California Fish and Wildlife recommendation 2.2 recommend the same monthly minimum streamflows.

Our Analysis

The minimum required streamflows under the existing license are 40 cfs from May 1 to October 31 and 15 cfs from November 1 to April 30 during dry years. During normal and wet years, minimum streamflows increase to 75 cfs from May 1 to October 31 and 20 cfs from November 1 to April 30. Except in November and December, historical median monthly flows under the existing license exceed estimated unregulated flows; maximum historical flows under the existing license exceed estimated unregulated flows throughout the year. From November to April, the minimum historical flows under the existing license are less than estimated unregulated flows, but are higher than estimated unregulated flows between May and October. Under estimated unregulated conditions, the median monthly flow would be less than the proposed minimum flow from July through October in below normal and wetter years and from August through September in critically dry and dry years; the proposed minimum streamflows in extreme critically dry years are less than median estimated unregulated flows in all months. Highest estimated median monthly unregulated flows occur in February through May (214 to 354 cfs); unregulated maximum flows occur during January through May (760 to 1,013 cfs). Historical median and maximum flows under the existing license exhibit seasonal variability similar to estimated unregulated conditions. Historical median monthly flows range from 27 to 585 cfs, and minimum historical monthly flows range from 19 to 84 cfs under the existing license. The proposed minimum streamflows would support seasonal and inter-annual variability typical of a natural hydrograph.

Under the existing license, when the Bear River canal operates at maximum capacity, the remaining flow in the Bear River below Rollins dam is released to the lower Bear River as reflected in the relatively high historical flows compared to estimated unregulated flows. Once higher proposed minimum streamflows in upstream reaches have been met by NID and PG&E (i.e., to the Middle Yuba River at Milton diversion dam, to Canyon Creek below Bowman-Spaulding diversion dam, to South Yuba River below Lake Spaulding dam and to South Fork Deer Creek at the Deer Creek powerhouse), the median releases to the lower Bear River and diversions to the Bear River canal could decrease from that observed historically under the existing license. However, actual streamflows below Rollins dam during high flow periods of the year are likely to be higher than the proposed minimum streamflows during wetter years. In any event, diversion of flow released from Rollins dam at the Bear River diversion dam into the Lower Drum Project's Bear River canal would be limited under the new license such that flows in the lower Bear River measured downstream at gageYB-197 would remain in compliance with the minimum streamflow required under any new license.

Habitat-flow simulations for resident rainbow trout in this stream reach (figure 3-81) indicate that the amount of habitat for juveniles and adults peaks at about 50 cfs and 125 cfs, respectively. Habitat for these two life stages decreases to about 56 to 72 percent of the peak at the upper model limit of 1,000 cfs. Available habitat for fry peaks at about 15 cfs, decreases to about 30 percent of maximum at about 400 cfs, and then increases to a second peak of 45 percent of maximum at 650 to 1,000 cfs. Maximum spawning habitat in the stream reach occurs at about 225 cfs. Proposed minimum streamflows would

provide 26 to 35 percent of maximum habitat for adults year round in extreme critically dry years (table 3-179), rising to 73 to 100 percent in wet years. Proposed minimum streamflows would provide at least 83 percent of maximum habitat for juveniles year round in all years (table 3-179), except November to April in extreme critically dry years, when 74 percent of maximum spawning habitat would be available. Proposed minimum streamflows would generally provide 37 to 45 percent of maximum spawning habitat in extreme critically dry years (table 3-179), 65 to 75 percent in critically dry to below normal years, and 79 to 93 percent in above normal and wet years.

From December through May, available habitat (WUA) duration curves (HEA) for adults under the proposed minimum streamflows would be similar to historical flows under the existing license and slightly lower than estimated unregulated flows. Between June and October, the exceedance curves for proposed flows and existing license flow conditions are very similar and significantly higher than the curves for unregulated flows (figure 3-82 provides an example for July).

The habitat model was developed for one of the locations (RM 4.6) where foothill yellow-legged frog tadpoles were documented. NID and the relicensing stakeholders developed a habitat versus flow relationship for foothill yellow-legged frog and found that WUA for both foothill yellow-legged frog egg mass and tadpole life stages was highest at the lowest modeled flow of 11 cfs. The model indicated that the WUA for foothill yellow-legged frog eggs in May and June would be highest (99 percent of maximum) during extreme critically dry years and lowest (78 to 85 percent) during wet years (table 3-180). Foothill yellow-legged frog tadpoles would have 100 percent of maximum habitat available in extreme critically dry to dry years, decreasing to 85 to 96 percent in wet years.

The proposed minimum streamflows would ensure more aquatic habitat in this stream reach year round and particularly throughout the summer than under existing license conditions. The proposed minimum streamflows in this stream reach of the Bear River are likely to improve and enhance aquatic habitat compared to existing license conditions and would provide seasonal and inter-annual variability in flows through this stream reach.

#### 3.3.2.2.3 Canal Outage Effects on Instream Flows

The existing Drum-Spaulding and Yuba-Bear Projects utilize a number of canals/conduits for inter-basin transfer of water for agricultural, commercial, municipal, and domestic consumption as well as power generation. The cessation of flows in these canals during annual planned outages, non-routine planned outages, and emergency outages can affect the ability to deliver minimum streamflows (section 3.3.2.2.2, *Instream Flows*) in some project-affected stream reaches. PG&E (DS-AQR1, Part 4) and NID (YB-AQR3) propose to identify the schedule for annual and non-routine planned outages during the annual consultation meeting. The proposal also identifies notification procedures in the event of changes in the planned outage schedule or during emergency outages. Five stream reaches in the Upper Drum-Spaulding Project, four stream reaches in the Lower Drum Project, and five stream reaches in the Yuba-Bear Project are affected by canal operations (table 3-181).

**Upper Drum-Spaulding Project**

**Drum No. 1 and No. 2 Development**

Flows in the Bear River upstream of Drum afterbay are an aggregate of natural flows from the upper Bear River watershed and augmentation from the South Yuba canal (at gage YB-139) and the Drum canal (at gage YB-137). Compliance with minimum streamflows in this reach of the Bear River (5 to 13 cfs depending on month) is measured at gage YB-198 located between the South Yuba canal spill and the Drum afterbay (table 3-133). PG&E proposes a 1 to 2 cfs minimum release from the Drum canal spill gate to the Bear River depending on water year. Under normal proposed operations, any deficit

between the proposed minimum streamflow at YB-198 (section 3.3.2.2.2, *Instream Flows*) and the sum of the Drum canal spill (YB-137) and natural flow in the upper Bear River would be made up by spill from the South Yuba canal. PG&E proposes that, during outages of the South Yuba canal (2 weeks in late March and early April) or the Drum canal (2 weeks in late September and early October), the minimum flow at gage YB-198 above Drum afterbay would be no less than natural flow in the Bear River; in addition, PG&E proposes, to the extent possible, to make up the deficit from the proposed minimum streamflow that results from the outage of one of the two canals with additional releases from the other operating canal. PG&E also proposes to avoid simultaneous outages of the Drum and South Yuba canals except during an emergency.

During outages of either South Yuba or Drum canal, PG&E proposes that the minimum flow in the Bear River downstream of Drum afterbay (YB-44) would equal the natural inflow to Drum afterbay; except during an upstream canal outage, PG&E proposes minimum streamflows in the Bear River below the Drum afterbay dam of 10 to 16 cfs, depending on month and water year (table 3-140). PG&E would reduce its diversion from Drum afterbay to the Dutch Flat No. 1 Development in order to comply with the minimum streamflow at YB-44. The Forest Service (condition 29 and recommendation 5), BLM (recommendation 2), and the California Fish and Wildlife (recommendation 2.5) proposals are consistent with this measure.

PG&E proposes (DS-TR4) to implement Bear River Management through Bear Valley upstream of Drum afterbay in order to reduce effects of winter and spill operations of the Drum canal on aquatic and riparian habitat in this stream reach. This proposal would limit winter operational releases from Drum canal measured at YB-137 to no greater than 200 cfs and would implement ramping rates of 0.4 foot/hour measured in the Bear River at YB-198 during increasing and decreasing releases from Drum canal at YB-137. PG&E would limit spills to the Bear River from Drum canal when Drum afterbay is forecast to spill and Dutch Flat no. 1 and no. 2 powerhouses are fully loaded. Forest Service (recommendation 7) and California Fish and Wildlife (recommendation 7.6) recommend the same limits on winter operational spills from Drum canal to Bear River.

PG&E also proposes limits on spills from Drum canal during outages of Drum canal or Drum no. 1 and no. 2 powerhouses as part of Bear River Management through Bear Valley. During outages expected to last more than 30 days PG&E would distribute spills from Drum canal between the Bear River spill gate at YB-137, RM 35.3, the Bear Valley spill gate at RM 33.6, and Tahoe spill gate at RM 31.75. PG&E also proposes to implement ramping when spill flows are reduced at these three spill gates; the rate of flow reduction would not exceed 50 cfs over a 6 hour period. Forest Service (recommendation 7) and California Fish and Wildlife (recommendation 7.6) recommend the same limits on winter operational spills from Drum canal to Bear River.

**Alta Development**

When the Drum canal is out of service, no water is available for diversion via the Towle diversion to Canyon Creek, a tributary to the North Fork of the North Fork American River. PG&E proposes that, during such outages, the minimum flow in Canyon Creek below the Towle diversion dam and Towle canal would be no less than the natural flow in Canyon Creek at gage YB-280, upstream of the inflow from the Towle diversion. During normal canal operations, the proposed minimum streamflows are 1 to 2 cfs (section 3.3.2.2.2, *Instream Flows*; table 3-136); during October and November outside of an outage, minimum streamflows in this reach of Canyon Creek would be 1 cfs. The Forest Service (recommendation 3), BLM (recommendation 2), and the California Fish and Wildlife (recommendation 2.5) proposals are consistent with this measure. Outages of the Drum canal, Towle canal, or Alta powerhouse can affect the ability to comply with proposed minimum streamflows (table 3-139) in Little Bear River below the Alta powerhouse tailrace and the non-project Lower Boardman canal diversion dam

(section 3.3.2.2.2, *Instream Flows*). Proposed minimum streamflows in this reach of the Little Bear River are 0.5 to 4 cfs, depending on month and water year; during October and November when outages are typically scheduled, proposed minimum streamflows would be 0.5 to 1 cfs. PG&E proposes that, during any of these potential outages, the minimum streamflow in Little Bear River below PCWA's Lower Boardman canal diversion dam would be 0.25 cfs, and PG&E would not divert natural flow from the Little Bear River during these outages. The Forest Service (recommendation 5), BLM (recommendation 2), and California Fish and Wildlife (recommendation 2.5) proposals are consistent with this measure.

**Lower Drum Project**

**Wise and Wise No. 2 Developments**

Proposed minimum streamflow in Dry Creek below Halsey afterbay dam is 1 cfs year round in all water years (section 3.3.2.2.2, *Instream Flows*; table 3-142). When the Bear River canal is out of service (3 weeks in late October and early November), the primary inflow to Halsey afterbay is eliminated. PG&E attempts to reduce the effect of a canal outage on downstream resources by maximizing the storage in Halsey forebay and Rock Creek reservoir before initiating planned maintenance outages of Bear River canal. During an outage of the Bear River canal, PG&E proposes that minimum streamflows in Dry Creek below Halsey afterbay dam would equal seepage from Halsey afterbay dam. The Forest Service (recommendation 5), BLM (recommendation 2), and California Fish and Wildlife (recommendation 2.5) proposals are consistent with this measure.

Inflow to Rock Creek reservoir can be reduced during planned outages of Bear River canal, Upper Wise canal, and other portions of the proposed Lower Drum Project in late October to late November or during an emergency canal outage. During these outages, PG&E proposes that minimum streamflows in Rock Creek downstream of Rock Creek reservoir would be 0.5 cfs. Minimum streamflows during October and November outside of an outage would be 1 to 3 cfs, depending on water year type (section 3.3.2.2.2, *Instream Flows*; table 3-143). BLM proposed (recommendation 2) the same minimum streamflow conditions in Rock Creek below Rock Creek reservoir.

PG&E releases water from South canal downstream of the Wise powerhouses into Auburn Ravine. PG&E proposes that, during outages of Bear River canal, upper or lower Wise canal, or South canal when no project delivered water would be available, the minimum flow in Auburn Ravine at the South canal release point would be no less that the natural flow in Auburn Ravine; natural flow would be measured at an appropriate location to be determined in consultation with the relicensing stakeholders within 1 year of license issuance. Proposed minimum streamflows in Auburn Ravine below the South canal release point are 2 to 18 cfs depending on month and water year (section 3.3.2.2.2, *Instream Flows*; table 3-144); during October and November when outages are typically scheduled, proposed minimum streamflows would be 2 to 4 cfs depending on water year. The Forest Service (recommendation 5), BLM (recommendation 2), and California Fish and Wildlife (recommendation 2.5) recommend a minimum streamflow during canal outages of 5 cfs or the specified minimum streamflow for the month and water year type (table 3-144), whichever is lower, during a canal outage.

**Newcastle Development**

When Bear River canal, upper or lower Wise canal, or South canal are out of service there would be no flow to the Newcastle Development or supplemental flow from the Newcastle header box or powerhouse to the Mormon Ravine. With no other source of project-delivered water at Mormon Ravine, PG&E proposes that the proposed minimum flow for Mormon Ravine would be waived during outages of these project facilities. This proposal is consistent with Forest Service recommendation 5, BLM recommendation 2, and California Fish and Wildlife recommendation 2.5; minimum streamflows (50 to 200 cfs) recommended by Reclamation to support the coldwater pool in Folsom Lake (section 3.3.2.2.2,

*Instream Flows*; table 3-147) apply only to January through May and could not be met during an unplanned or emergency canal outage.

*Our Analysis*

PG&E and the relicensing stakeholders have proposed minimum streamflows for project-affected stream reaches (section 3.3.2.2.2, *Instream Flows*); however, PG&E's ability to meet the proposed minimum flows in some stream reaches during outages of project canals can be severely limited given that there may be no water in the canal to release to the affected stream reach. Periodic outages are necessary to perform repairs and routine maintenance required for reliable, efficient, and safe operation of the project facilities. Planned outages for maintenance are generally limited to 2 or 3 weeks or less. The duration of an emergency outage would depend on the nature of the emergency. Advanced planning and minimizing canal outages is a priority for power generation and reliability of water deliveries as well as protection of aquatic resources.

The canal outage measure (DS-AQR1, Part 4) that PG&E proposes would ensure that the streamflow through an affected stream reach would not be less than the natural flow in the stream channel at that time. The minimum flow condition proposed for stream reaches affected by project canal outages effectively limits project diversions from affected stream reaches during canal outages and ensures that, at a minimum, natural flows pass through the associated diversion structures to the downstream reaches. The measure waives compliance with the proposed minimum streamflow for the respective month and water year where spills from canal structures augment the natural flows in the stream channel, as in Bear River above Drum afterbay from the Drum and South Yuba canals, Auburn Ravine from the South canal below the Wise and Wise No. 2 Developments, and Mormon Ravine from South canal below the Newcastle Development. When the Bear River canal, Upper Wise canal, or Lower Wise canal is out of service, no water would be discharged from the Wise powerhouses to South canal; consequently, no water would be available in South canal for release to supplement natural flows in Auburn Ravine to comply with higher proposed minimum streamflows or the 5 cfs alternate minimum release proposed during a canal outage by California Fish and Wildlife and BLM. No other source of water controlled by PG&E is available during a canal outage to make this augmentation. The only flow in Auburn Ravine near South canal during a canal outage would be the natural base flow at this location or discharges to Auburn Ravine made by other non-project water users not controlled by PG&E. The same situation applies to Mormon Ravine located at the lower end of South canal.

At locations where the canal involves a diversion structure on the affected stream reach, PG&E would pass the natural inflow to the diversion impoundment from upstream to the stream reach below the diversion dam, as at Bear River below the Drum afterbay dam, Dry Creek below the Halsey afterbay dam, and Rock Creek below the Rock Creek reservoir dam. At the Drum afterbay, PG&E would reduce diversion to the Dutch Flat no. 1 powerhouse, if necessary to ensure that natural flows from upstream are passed downstream to the Bear River below the Drum afterbay dam. Similarly, regulated flows from non-project diversions in Dry Creek from upstream of Halsey afterbay would be passed to Dry Creek below Halsey afterbay dam.

The upper Bear River above the Drum afterbay is affected by operations of both the Drum and South Yuba canals; at this location PG&E's proposal would avoid simultaneous outages of both canals and, to the extent possible, would make up the difference between natural flow and the specified minimum streamflow from the canal that is still operating.

This reach of Bear River is also affected by high flows spilled from Drum canal during winter operations and during outages of the canal or Drum no. 1 and no. 2 powerhouses that could adversely affect channel morphology and riparian conditions in Bear River upstream of Drum afterbay. Implementation of the measures proposed by PG&E and the relicensing stakeholders would limit the

magnitude of these high flow spills and the rate at which they increase and decrease which would better mimic the rate of flow change of a natural hydrograph. The proposal would dissipate the effects of spills during extended outages (longer than 30 days) by incrementally introducing spills at three locations over a 3.6-mile reach of the Bear River rather than at one point as typically occurs under the existing license. The PG&E proposal also includes qualitative and quantitative baseline surveys of this stream reach and follow-up annual surveys to document conditions in this stream reach, evaluate the effects of spills from the Drum canal on aquatic and riparian habitat in the stream reach, and recommend mitigation or modification of spill flow conditions, as necessary (section 3.3.1.2.2, *Habitat Restoration*, and section 3.3.3.2.1, *Riparian and Wetland Vegetation*). The combination of measures to manage high flows related to spills from Drum canal to Bear River and studies to determine the effects of these spills on aquatic and riparian habitat and recommend mitigation, as necessary, would ensure the protection and enhancement of aquatic resources in this reach of the Bear River.

The planning and scheduling components of this proposed measure would provide adequate advanced notification to resource agencies and other stakeholders during the annual consultation meetings to ensure implementation of appropriate measures to minimize effects on aquatic resources. Such measures include a detailed plan for protection, collection, and relocation, as necessary, of fish trapped in the canals when the canals are drained during an outage (section 3.3.2.2.8, *Protection of Fish in Project Canals*). The proposed measure also establishes lines and procedures for communication during emergency canal outages to ensure that appropriate resource agencies, stakeholders, and the Commission are notified as soon as possible and that measures are implemented expeditiously to ensure project safety and minimize effects on aquatic resources.

**Deer Creek Project**

**Deer Creek Development**

PG&E proposes (DC-AQR1, Part 2) that when either the South Yuba or Chalk Bluff canals, which supply the Deer Creek powerhouse, are out of service (typically for 2 weeks in late March and early April), there would be no minimum flow releases to the South Fork Deer Creek as measured at gage YB-34. During an outage of the Deer Creek powerhouse or upstream feeder canals, the 5-cfs minimum release (table 3-125) from the Deer Creek powerhouse (section 3.3.2.2.2, *Instream Flows*) would be waived; flows in the short stream reach of the South Fork Deer Creek between the Deer Creek powerhouse and the NID non-project diversion dam would be natural unregulated flows from the upstream watershed of the South Fork Deer Creek. The Forest Service condition 29, BLM condition 4, and California Fish and Wildlife recommendation 2.5 are consistent with this measure.

*Our Analysis*

Separation of the Deer Creek Development (Deer Creek Project) from the Drum-Spaulding Project would not affect operation and maintenance of the South Yuba and Chalk Bluff canals. Consequently, any potential effect on the short project-affected reach of South Fork Deer Creek associated with outages of these two canals would be the same as under the existing license or if the Deer Creek Development remained part of the Drum-Spaulding Project.

**Yuba-Bear Project**

**Dutch Flat No. 2 Development**

Outages of the Bowman-Spaulding conduit and the Drum canal (*Drum Development, Upper Drum-Spaulding Project*) have the potential to affect minimum streamflows in several tributaries to

Canyon Creek and South Yuba River and the Bear River associated with operation of the Dutch Flat No. 2 Development.

Texas (tributary to Canyon Creek), Clear, Trap, Fall, and Rucker Creeks (tributaries to South Yuba River) are transected by the Bowman-Spaulding conduit; flow in each of these tributaries from upstream of the Bowman-Spaulding conduit is diverted or flows directly into the conduit. Under the existing license, water in excess of the capacity of the Bowman-Spaulding conduit can be spilled back to the respective stream channel below the conduit. NID proposes to provide minimum streamflows under the new license in Texas, Clear, Trap, and Rucker Creeks (section 3.3.2.2.2, *Instream Flows*). During outages when the Bowman-Spaulding conduit is drained, it could be difficult depending on the time of year and water year for NID to meet the proposed minimum streamflows below the conduit.

NID proposes specific minimum streamflows during annual outage of the Bowman-Spaulding conduit. During non-outage periods, NID makes the minimum flow releases to these tributaries at five locations: from the Texas Creek diversion dam, Fall Creek diversion dam, and directly from the Bowman-Spaulding conduit into Clear, Trap, and Rucker Creeks. At each of these locations during a Bowman-Spaulding conduit outage of 30 consecutive days or less, NID would ensure that the flow in each of these five creeks downstream of the Bowman-Spaulding conduit is the same as the flow in the creek upstream of the conduit. This would be accomplished by not diverting any water into the Bowman-Spaulding conduit during the outage. In addition, the measure provides that if an outage extends past 30 consecutive days, NID would consult with the Forest Service, California Fish and Wildlife, and the California Water Board regarding interim minimum flow conditions. The Forest Service (condition 28) specifies and California Fish and Wildlife (recommendation 2.3) recommends the same minimum flow conditions for these stream reaches during outage of the Bowman-Spaulding conduit.

The ability of NID to comply with proposed minimum streamflows in Bear River below the Dutch Flat afterbay dam (section 3.3.2.2.2, *Instream Flows*; table 3-175) can be limited during an outage of the Drum-Spaulding Project's Drum canal. When the Drum canal is drained during an outage, augmentation of flows in the Bear River from the Drum canal spillgate and the Drum no. 1 and no. 2 powerhouses is eliminated and flows in the Bear River entering the Dutch Flat afterbay can be significantly reduced. When the Drum canal is out of service, NID and BLM (condition 5) propose to maintain proposed minimum streamflows (table 3-175) below the Dutch Flat afterbay dam until water level in the afterbay drops to 2,700 feet msl (normal maximum water surface elevation is 2,741 ft msl); thereafter, the minimum flow below the Dutch Flat afterbay dam would equal the inflow to the afterbay until the Drum canal returns to service.

*Our Analysis*

The measure proposed by NID and the relicensing stakeholders to adjust proposed minimum streamflows during outages of project canals would ensure that minimum streamflows in the affected stream reaches would at least equal the natural flow in the stream. Five tributaries of Canyon Creek and South Yuba River (Texas, Clear, Fall, Trap, and Rucker Creeks) that are transected by and diverted to the Bowman-Spaulding conduit have no minimum streamflow under the existing license and are generally dry below this conduit during much of the year. NID and the relicensing stakeholders have proposed minimum streamflows for each of these stream reaches below the Bowman-Spaulding conduit, but an outage of the conduit can affect NID's ability to meet these proposed minimum flows. During typical operation in summer and fall when there is no outage during some years there may be no inflow from upstream of the Bowman-Spaulding conduit in these five streams; under the proposed minimum streamflow measure the specified minimum streamflow during these times would be made up from water in the conduit. The canal outage measure proposed by NID ensures that, during an outage of the Bowman-Spaulding conduit, minimum streamflows below the conduit would be no less than the inflow

into the diversion from the upstream reaches of these five creeks. When the Bowman-Spaulding conduit is drained during an outage, no water is available in the conduit to augment flows in the creeks below the conduit to meet higher proposed minimum streamflows, but this measure ensures that no water is diverted from these creeks during the outage and aquatic habitat is protected to the extent possible in these five project-affected stream reaches.

Dutch Flat afterbay is a reregulating reservoir, with relatively small storage capacity (1,359.2 acre-feet), that diverts water to the Chicago Park forebay and powerhouse via the Chicago Park flume. Inflow to Dutch Flat afterbay comes primarily from the Bear River below the Drum afterbay dam, the Drum-Spaulding Project's Dutch Flat no. 1 powerhouse, and the Yuba-Bear Project's Dutch Flat no. 2 powerhouse; a relatively small contribution comes from Little Bear River below the Drum-Spaulding Project's Alta powerhouse. A significant portion of the flow in the Bear River upstream of the Drum afterbay is transferred from Lake Spaulding to the Bear River via the Drum-Spaulding Project's Drum canal. Consequently, during an outage of these canals, flow in the Bear River is limited to the natural flow at that time, which could be significantly less than the minimum streamflows proposed by NID during non-outage periods. The measure proposed by NID and BLM uses the limited storage in the Dutch Flat afterbay and shuts down the Chicago Park flume, curtailing power generation at the Chicago Park powerhouse in order to maintain the proposed minimum flows as long as possible during an outage and ensures that the minimum streamflow in the Bear River below the Dutch Flat afterbay dam during the outage is no less than the natural flow in the Bear River entering the Dutch Flat afterbay.

Proposed minimum streamflows in these six project-affected reaches can be higher than estimated unregulated flows would be in these reaches during natural low-flow periods of the year (late summer and fall) and have been proposed in order to enhance aquatic habitat in these stream reaches. During canal outages it may be difficult to comply with the proposed minimum streamflows in these projected-affected reaches without the water available from the canal to augment natural flow. The proposed measures would ensure that the existing natural flows in the five creeks affected by the Bowman-Spaulding conduit and in the Bear River below the Drum canal and Drum afterbay would not be reduced by project operations during an outage. In the case of the Bear River, NID would use reasonable measures to sustain the required minimum flows as long as possible during an outage including shutdown of the Chicago Park flume and powerhouse.

#### 3.3.2.2.4 Spill Cessation and Minimization of Flow Fluctuations

Sudden reduction in flow following spring snow-melt runoff or following other major spill events can affect aquatic habitat by potentially stranding some life stages of aquatic organisms as water level drops and previously inundated habitat rapidly drains. To minimize these adverse effects, NID and PG&E propose operating measures during spill cessation to mimic a flow recession limb more typical of a natural hydrograph characteristic of unregulated rivers. These operating measures would also reduce rapid flow fluctuations following other major flow events. PG&E and NID negotiated this measure with the relicensing stakeholders; the Forest Service (condition 31) and BLM (Yuba-Bear condition 7) specify and California Fish and Wildlife (recommendations 2.7 and 2.8) recommends the same spill cessation schedules (discussed below for each applicable project development). Spill cessation measures would be implemented for the Drum-Spaulding Project in South Yuba River below Lake Spaulding dam and for the Yuba-Bear Project in Middle Yuba River below Milton diversion dam, Canyon Creek below Bowman-Spaulding diversion dam, and Bear River below Dutch Flat afterbay dam. NID and BLM (condition 8) proposed an additional measure to control spills and flow fluctuation in the Bear River below Rollins dam.

**Upper Drum-Spaulding Project**

**Spaulding No. 1 and No. 2 Development**

To minimize the effects of sudden reductions in flow on aquatic habitat and biota, PG&E proposes (DS-AQR1, Part 7) a two-part spill cessation schedule (tables 3-182 and 3-183) for the South Yuba River at the Lake Spaulding dam following spill events; the proposed schedule would gradually reduce flow to the appropriate proposed minimum streamflow for that month and water year (section 3.3.2.2.2, *Instream Flows*; table 3-121) over a period of up to 21 days. Forest Service condition 31 specifies and California Fish and Wildlife recommendation 2.8 recommends the same spill cessation schedule.

PG&E and the relicensing stakeholders have agreed on this flow-based, two-tiered spill cessation schedule for South Yuba River below Lake Spaulding dam; compliance would be measured at Lang's Crossing, between the confluence of Jordan and Rucker Creeks in the South Yuba River. The higher flow spill cessation schedule (when flows are between 250 and 420 cfs) applies only to wet, above normal, and below normal years (table 3-182; figure 3-83) and is also intended to provide recreational whitewater boating opportunities (section 3.3.5.2, *Recreation Flows*). When flow decreases to 250 cfs or less in the South Yuba River, the lower flow spill cessation schedule (table 3-183) would be implemented in all water years, gradually reducing flow from 250 to 50 cfs (or the proposed minimum flow for that month and water year; table 3-121) over a 21-day period. PG&E has agreed to make a good faith effort to meet the target flows in the lower flow spill cessation schedule given the constraints of head at the radial gates at Lake Spaulding dam. PG&E would also make a good faith effort during the applicable water years to implement the high flow cessation schedule at least once between May 2 and September 30. PG&E would avoid short-term spills that would increase streamflow more than 100 percent in a 12-hour period between the end of the spill cessation and September 30 in years when the spill cessation schedules are implemented.

*Our Analysis*

Rapid changes in streamflow associated with management of spill conditions at dams can have a significant effect on aquatic habitat and the organisms that depend on that habitat. Frequently, dams are operated to sharply curtail flow when inflow decreases to a level at which the dam stops spilling at the end of an uncontrolled spill event; the resulting quick decrease in discharge can rapidly dewater habitat and strand aquatic organisms below the dam. Less mobile early life stages such as eggs and tadpoles of foothill yellow-legged frog are particularly vulnerable to stranding and desiccation at these times. The proposed measure would gradually reduce downstream flow in the South Yuba River below Lake Spaulding dam at a rate more characteristic of natural flow cessation following a major runoff event in unregulated rivers. The proposed spill cessation schedule gradually reduces flow in time steps of several days until the minimum flow in the South Yuba River below Lake Spaulding dam has been reached. The measure potentially provides higher than proposed minimum streamflows (table 3-121) for periods of 21 to 27 days following a major spill event. Because major spill events are associated with snow melt in late spring and early summer, these higher than minimum streamflows could serve as an additional enhancement of habitat for resident rainbow trout spawning. The proposed schedule for flow reduction at Lake Spaulding dam would also have the added benefit of providing predictable whitewater recreational boating opportunities (section 3.3.5.2, *Recreation Flows*).

**Yuba-Bear Project**

**Bowman Development**

*Middle Yuba River below Milton Diversion Dam*

NID proposes to implement a spill cessation schedule at Milton diversion dam (table 3-184) after May 1 of each calendar year or as soon as NID closes the upstream Jackson Meadows dam spill gates, whichever comes later. During the first 6 days of the spill cessation schedule, the flow released at Milton diversion dam would be held at 300 cfs, which would also provide flows adequate for recreational whitewater boating in the reach of Middle Yuba River below the Milton diversion dam (section 3.3.5.2, *Recreation Flows*). During the spill cessation schedule, flows are decreased from 300 to 50 cfs over a 22-day period (figure 3-84); however, the flow cessation schedule would terminate when the target flow in the spill cessation schedule equals the minimum streamflow specified for that month and water year type. Forest Service condition 31 specifies and California Fish and Wildlife recommendation 2.7 recommends the same spill cessation schedule.

NID would avoid short-term spills at Milton diversion dam that would increase flow more than 100 percent in a 12-hour period between the end of spill cessation and September 30 in years when the spill cessation schedule is implemented.

*Canyon Creek below Bowman-Spaulding Diversion Dam*

NID proposes to implement a spill cessation schedule at the Bowman-Spaulding diversion dam (table 3-185) after April 1 of each calendar year. During the spill cessation schedule, flows are decreased from 275 to 45 cfs over a 21-day period (figure 3-85); however, the flow cessation schedule would end when the target flow in the spill cessation schedule equals the required minimum streamflow. Forest Service condition 31 specifies and California Fish and Wildlife recommendation 2.7 recommends the same spill cessation schedule.

NID would avoid short-term spills at Bowman-Spaulding diversion dam that would increase flow more than 100 percent in a 12-hour period between the end of the spill cessation and September 30 in years when the spill cessation schedule is implemented.

**Chicago Park Development**

NID proposes to implement a spill cessation schedule at the Dutch Flat afterbay dam during periods following an outage of the Chicago Park flume and/or powerhouse that causes spilling at the Dutch Flat afterbay dam between May 1 and September 30. During an outage of the Chicago Park flume/powerhouse, NID would release 50 to 100 cfs from the Dutch Flat afterbay dam low-level outlet to Bear River below Dutch Flat afterbay dam; flow would be held as close to 100 cfs as possible to balance inflow to Dutch Flat afterbay and maintain the water surface elevation in the afterbay at or above 2,732 feet msl, the level necessary for reliability of Dutch Flat no. 2 powerhouse. The spill cessation schedules would be implemented when the Chicago Park flume and powerhouse are brought back online and spills would cease at the Dutch Flat afterbay dam ogee-crest spillway; the spill cessation schedule would continue until the required minimum streamflow for that water year type and month is reached. Two spill schedules are proposed: (1) following spills at Dutch Flat afterbay dam lasting 3 day or less (table 3-186); and (2) spills lasting more than 3 days (table 3-187). These spill cessation schedules reduce flow in the Bear River between Dutch Flat afterbay dam and the Chicago Park powerhouse from 75 to 25 cfs over a period of 3 days or 21 days, respectively (figure 3-86). BLM condition 7 and Forest Service condition 31 specify, and Forest Service recommendation 8 and California Fish and Wildlife recommendation 2.7 recommend the same spill cessation schedule.

In combination with this measure to avoid sudden decreases in Bear River flow below the Chicago Park powerhouse, at the beginning of outages at the Chicago Park Development, NID also proposes the *Chicago Park Powerhouse Motoring* measure discussed previously (section 3.3.2.2.2, *Instream Flow*).

**Rollins Development**

In order to minimize rapid flow fluctuation in the Bear River downstream of Rollins dam, NID proposes the *Rollins Reservoir Elevation Control* measure; this measure is consistent with BLM condition 8, Forest Service recommendation 9, and California Fish and Wildlife recommendation 2.7. When the water surface elevation is within the upper 2 to 3 feet of the reservoir full pool (El. 2,171 feet), flow releases from Rollins dam would be managed to balance inflow to Rollins reservoir and downstream water supply demand to minimize rapid changes in flow downstream of the dam. After May 1 of each calendar year, when inflow to Rollins reservoir begins to subside and Rollins dam stops spilling, NID would manage the reduction in downstream releases to keep pool elevation in Rollins reservoir within the top 2 to 3 feet, while also managing flow releases below Rollins dam so that stage (water depth) in the Bear River downstream does not decrease by more than 1 foot total during any 3-week period.

*Our Analysis*

Rapid changes in streamflow associated with management of spill conditions at dams in the Yuba-Bear Project can have a significant effect on aquatic habitat and the organisms that depend on that habitat. Frequently, in order to maximize storage, dams are operated to sharply curtail flow when the dam stops spilling at the end of an uncontrolled spill event; the resulting quick decrease in discharge can rapidly dewater habitat and strand aquatic organisms. Less mobile early life stages such as eggs and tadpoles of foothill yellow-legged frog are particularly vulnerable to stranding and desiccation. The proposed measures would gradually reduce downstream flow in the Middle Yuba River below Milton diversion dam, Canyon Creek below Bowman-Spaulding diversion dam, and Bear River below Dutch Flat afterbay dam at a rate more characteristic of natural flow cessation following major runoff events in unregulated rivers. The proposed spill cessation schedule at each dam is in effect until the required minimum streamflow is attained for these three stream reaches. The proposed measures potentially provide higher flows than the required minimum streamflows for periods of 21 to 22 days below Milton diversion dam and Bowman-Spaulding diversion dam following a spill event, which could benefit spawning habitat for resident rainbow trout. The short- and long-term spill cessation schedules for Dutch Flat afterbay associated with outages of the Chicago Park powerhouse would potentially provide 3 to 21 days, respectively, of flows above the required minimum.

The measure proposed to manage flow fluctuations at Rollins reservoir has been designed to provide operational flexibility while minimizing frequent, rapid fluctuations in reservoir level and in downstream flow associated with fluctuating inflow to the reservoir from the upstream Bear River. NID would use the upper 2 to 3 feet of the reservoir pool to buffer inflow fluctuations and balance downstream releases. Providing flows that are more consistent and more gradual changes in flow and water level (no more than 1 foot over a 3-week period) in Bear River below Rollins dam would provide more reliable aquatic habitat in this stream reach.

In addition to the benefit to aquatic resources, the spill cessation schedule proposed for the Milton diversion dam would also provide a relatively predictable opportunity for recreational whitewater boating in the Middle Yuba River (section 3.3.5.2, *Recreation Flows*). The proposed schedule for flow reduction at Bowman-Spaulding diversion dam would also have the added benefit of providing whitewater boating opportunities that can be predicted on a short-term basis (section 3.3.5.2, *Recreation Flows*).

#### 3.3.2.2.5 Monitoring Compliance With Instream Flow Measures

In order to ensure compliance with required minimum streamflows, PG&E and NID identified specific compliance monitoring locations within each project-affected stream reach for which minimum streamflows are proposed. With the exception of 10 locations in the Upper Drum-Spaulding Project (table 3-188) and 8 locations in the Yuba-Bear Project (table 3-189), all proposed compliance sites have existing gages that would require no modification. Compliance with minimum streamflows would be based on instantaneous (continuous monitoring instrumentation) flow measurement at these gaging locations. Amended revised Forest Service (condition 34) and BLM (condition 9 [Drum-Spaulding Project] and condition 12 [Yuba-Bear Project]) specify implementation of the Gaging Plan filed by Forest Service on April 11, 2014. PG&E (May 11, 2014) and NID (May 20, 2014) agreed to implement the filed Plan. California Fish and Wildlife (recommendation 4), Reclamation (recommendation A.1.b), and FWS (recommendation 5) recommend that a stream gaging plan be developed in coordination with the agencies and implemented within 1 year once approved by the agencies. At remote locations where winter access is unreliable and unsafe, PG&E (DS-AQR1, Part 3) and NID (YB-AQR1, Part 5) propose flow setting measures as part of minimum streamflow compliance; they propose periodic adjustment of outlet works at these remote locations for minimum flow compliance during the rest of the year. Forest Service condition 28 (Drum-Spaulding Project Flow Setting) and 29 and 30 (Yuba-Bear Project Winter Flow adjustment and Wilson Creek Flow Setting), and California Fish and Wildlife recommendations 2.4 and 2.5 are consistent with the PG&E and NID proposals.

**Instantaneous Measurement and Compliance**

PG&E proposes construction of new gages (table 3-188) at two locations in the Spaulding No. 1 and No. 2 Development (below Meadow Lake and White Rock Lake dams). Eight existing gages on Drum-Spaulding Project-affected stream reaches would require capacity upgrades to measure the higher proposed minimum streamflows for the associated stream reaches: (1) Rucker Creek below Rucker Lake (Spaulding No. 3 Development); (2) Lake Creek below Feeley Lake (Spaulding No. 3 Development); (3) South Yuba River at Lang's Crossing (Spaulding No. 1 and No. 2 Development); (4) North Fork of the North Fork American River below Lake Valley reservoir (Drum No. 1 and No. 2 Development); (5) North Fork of the North Fork American River below Lake Valley canal diversion dam (Drum No. 1 and No. 2 Development); (6) Sixmile Creek below Kelly Lake (Drum No. 1 and No. 2 Development); (7) Canyon Creek below Towle canal diversion dam (Alta Development); and (8) Little Bear River below Lower Boardman canal diversion dam (Alta Development).

NID proposes modifications to existing gages at three locations in the Bowman Development (Canyon Creek below French Lake dam, Faucherie Lake dam, and Sawmill Lake dam) to provide for measurement of the higher proposed minimum streamflows, and proposes construction of new gages at five additional locations associated with the Dutch Flat No. 2 Development (below the respective diversion structures on Texas, Clear, Fall, Trap, and Rucker Creeks at the Bowman-Spaulding conduit) (table 3-189).

*Our Analysis*

Forest Service filed a Gaging Plan (April 11, 2014) to monitor compliance with minimum flows in the new licenses and PG&E and NID have agreed to implement the Plan. Under their proposals, continuous monitoring that is ongoing at existing gages under the existing license would continue uninterrupted. Where the gage capacity needs to be upgraded or a new gage would be required, they propose to design and install appropriate gages and implement monitoring within 1 year of license issuance; during the interim, the licensees would make a good faith effort to provide the necessary minimum streamflows. The plan outlines maintenance and quality control programs designed to ensure the accuracy and reliability of the stream gaging network consistent with USGS protocols. The plan also

includes procedures and schedules for submission of monitoring data to the involved agencies. The filed Gaging Plan would appear to be adequate to demonstrate instantaneous compliance with minimum streamflows proposed for the new license and are consistent with the recommendation by California Fish and Wildlife. Operation of the existing streamflow gaging system in compliance with USGS standards, in conjunction with the proposed upgrades to some existing gages and construction of new gages would provide adequate instrumentation in appropriate locations to document compliance by the Yuba-Bear, Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects with proposed minimum streamflows in all major project-affected reaches.

**Minimum Streamflow Compliance at Remote Project Dams**

PG&E proposes to use flow setting protocols for compliance with required minimum streamflows at 16 project-affected stream reaches and NID proposes 1 location for flow setting compliance measures (table 3-190). Given the difficulty and safety issues involved in accessing these remote locations during winter, PG&E and NID propose a measure to set the low-level outlet at each of these dams to provide the respective required minimum streamflows for the duration of the winter, beginning no later than November 1 each year. The act of setting the low-level outlet to release the winter minimum streamflow would meet the license compliance requirement. The winter setting would remain until PG&E and NID can first safely access the low-level outlets at each of these dams again the following spring or early summer.

Once the licensees can safely access these dams the following spring, the outlet works would be checked and reset, as necessary, on the periodic basis specified in table 3-190. Compliance with minimum streamflows at these remote locations would be the act of checking and resetting the low-level outlet as scheduled until the winter setting is made later that year.

*Our Analysis*

Many of the high elevation headwater lakes that capture snowmelt in these projects are very remote and cannot be safely accessed once the roads are closed by snow. Access is necessary because the outlet works at these dams are adjusted manually to meet minimum streamflow requirements. Even when access roads are snow-free and in good maintenance, it requires considerable time to reach many of these locations. Estimated unregulated flows in the affected stream reaches would be relatively low or zero, with the exception of the period of snow melt (section 3.3.2.2.2, *Instream Flows*). The proposed minimum streamflows at these locations are generally 1 cfs or less in most months and water years (section 3.3.2.2.2, *Instream Flows*). Given these conditions, the proposed periodic schedule for setting release flows at these outlet works is a reasonable balance of the need to monitor and ensure compliance with minimum streamflows and operational feasibility.

#### 3.3.2.2.6 Effects on Water Storage and Use

A primary purpose of many of the reservoirs, canals, and conduits that comprise the four proposed projects is for the storage, transfer, and delivery of water for agricultural, domestic, municipal, and commercial users within the NID and PCWA water supply service areas. Relicensing these hydropower generation projects would not alter the existing, legally established water rights, water delivery contracts, or consumptive water demand; however, proposed increases in minimum streamflows to various project-affected stream reaches compared to the existing license would change the balance and seasonal pattern of water storage and transfer within the system and potential for hydropower generation. Changes in minimum streamflows and release schedules at locations throughout the project discussed previously (section 3.3.2.2.2, *Instream Flows*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*) are expected to have a positive effect on aquatic and riparian habitat compared to existing license conditions (no-action alternative). The applicants have performed extensive modeling to evaluate

the effects of various stakeholder conditions and recommendations on system water balance, power generation, water quality (water temperature), and consumptive water delivery deficits under various water year conditions (section 3.3.2.2.1, *Water Years*).

In conjunction with developing the proposed minimum streamflows, PG&E, NID, and the relicensing stakeholders modeled water delivery and power generation using the U.S. Army Corps of Engineers' Hydrologic Engineering Center (HEC) Reservoir Simulation (ResSim) modeling software to evaluate how various flow proposals discussed above could affect the balance of various project uses. This model simulates daily integrated operations of the Yuba-Bear and existing Drum-Spaulding project facilities based on specific operating conditions prioritized in the following order: minimum streamflow by reach, minimum reservoir pool, water delivery, and power generation requirements. The model simulates the integrated and inter-dependent operations of the Yuba-Bear and existing Drum-Spaulding Projects. Estimated mean daily unregulated streamflow for water years 1976 to 2008 was used as the source of water to the projects for simulation of each flow scenario. The applicants modeled three scenarios: existing license conditions (no-action alternative); proposed project using recent water delivery demands; and proposed project using projected future water delivery demands. Optimum flow for aquatic habitat was adjusted, as necessary, to balance power generation and water supply demand. Table 3-191 summarizes the model assumptions for each scenario.

**Our Analysis**

Under the no-action alternative, the model determined that the minimum streamflows and reservoir pool elevation required under the existing license for both the existing Drum-Spaulding and Yuba-Bear Projects were met at all times; however, water deliveries were not met in 2 (1977 and 1978) of the 33 water years of record. The water delivery deficits in water year 1978 were attributed to carryover effects in the early fall from water delivery deficits in water year 1977. Annual average power generation by project powerhouse is summarized in table 3-192. On average, project reservoirs experience moderate drawdowns.

Proposed minimum streamflow and reservoir pool elevation requirements are met under proposed project conditions using recent water delivery demands in all stream reaches and reservoirs for the Yuba-Bear Project. At the existing Drum-Spaulding Project, the following stream reaches in the proposed Lower Drum Project (Wise and Wise No. 2 Development); however, would not meet proposed minimum streamflow requirements during 2 years of the period of record: Dry Creek below Halsey afterbay dam in water year 1977; Auburn Ravine below the South canal release in water years 1976 and 1977; and Rock Creek below Rock Creek reservoir dam in water years 1976 and 1977. PG&E noted in the supplement to the final license application (August 30, 2012) that the model-predicted noncompliance with the proposed minimum streamflow requirements in these stream reaches is likely an artifact of the way the HEC-ResSim model simulates these portions of the watershed. PG&E anticipates that the specified minimum streamflows would, in fact, be met at all times.

Under the proposed project conditions, water delivery deficits would occur in one additional year, 1976, for the Drum-Spaulding Project, and in two additional years, 1976 and 1989, for the Yuba-Bear Project. Both projects exhibit substantially increased water delivery deficits in water years 1977 and 1978 compared to the existing license conditions. Combined, the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects experience a 9.8 and 11.3 percent power generation loss due to the proposed increased minimum streamflow requirements for the Middle Yuba River, Canyon Creek (Bowman Development, Yuba-Bear Project), and South Yuba River (Spaulding No. 1 and No. 2 Development, Upper Drum-Spaulding Project). Generation losses are most evident for the Lower Drum Project powerhouses associated with the Bear River canal (Halsey Development), Wise canals (Wise and Wise No. 2 Developments), and South canal (Newcastle Development). Under the proposed action using

recent water delivery demands, the model predicted some reservoirs with higher winter carryover or early spring water levels. However, by late summer and early fall most reservoirs would be significantly depleted below reservoir elevations under the existing license, potentially having an adverse effect on recreational uses, particularly the use of boat ramps (section 3.3.5.2, *Recreation Flows*).

The proposed projects with future water delivery demands (projected to 2062, 50 years in the future) predict that minimum streamflow requirements are met for the Yuba-Bear Project. The same stream reaches that did not meet proposed minimum streamflow requirements in PG&E's Lower Drum Project using recent water delivery demands did not meet minimum streamflow requirements using projected future water delivery demands. This scenario also projected that water delivery deficits occur in an additional 25 years as compared to the existing license conditions. NID water delivery demands are not met during all of the 25 years of water delivery deficits, while PCWA's water delivery demands supplied by the Upper Drum-Spaulding, Lower Drum, and Deer Creek project operations are met in all but 3 of the 25 years. Power generation losses under this scenario increase to 13.1 and 15.6 percent for the existing Drum-Spaulding and Yuba-Bear Projects, respectively. Similar to the proposed project using recent water demands, some reservoirs had higher winter carryover elevations or early spring water levels, but by late summer and early fall, most of the reservoirs were projected to have more severe drawdown compared to the no-action alternative.

In general, the model predicts that under current water delivery demands, the system-wide flow manipulations under the proposed action are adequately balanced such that: (1) minimum streamflow conditions can be met with the exception of a few stream reaches with natural unregulated low-flows; (2) water delivery deficits are not significantly exacerbated; and (3) power generation is minimally reduced. However, when the proposed action is modeled with water delivery projected at future demand (2062), water delivery deficits and power generation losses increase substantially in magnitude and frequency. The model developed by PG&E and NID does, however, provide the stakeholders a useful tool for long-term planning and evaluation of measures outside of the Commission's jurisdiction to mitigate projected water delivery deficits in balance with other system demands and license requirements.

#### 3.3.2.2.7 Water Quality

**Flow Augmentation for Water Temperature Management**

As discussed previously, PG&E, NID, and the relicensing stakeholders have generally agreed on minimum streamflows that are significantly higher in most project-affected stream reaches (section 3.3.2.2.2, *Instream Flows*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*) to enhance aquatic habitat and provide cooler water temperatures compared to conditions under the existing license (no-action alternative). Even with these proposed minimum streamflow increases, model results indicate that summer water temperatures in some key project-affected stream reaches could approach stressful levels for cold water aquatic species including resident rainbow trout, particularly during warmer years. Middle and South Yuba Rivers are designated as cold water habitat; South Yuba River above Englebright reservoir is listed under CWA section 303(d) as impaired for temperature with completion of a total maximum daily load scheduled for 2021. To address water temperature concerns, several stakeholders filed proposals to augment flow in selected stream reaches during summer that would further reduce water temperatures to benefit aquatic resources.

**Upper Drum-Spaulding Project**

*Spaulding No. 1 and No. 2 Development – South Yuba River below Lake Spaulding Dam*

Daily average water temperatures in South Yuba River below Lake Spaulding dam in the vicinity of the confluence of Canyon Creek and downstream to Poorman Creek occasionally exceed 20°C, and

instantaneous temperatures occasionally approach potentially stressful temperatures for resident rainbow trout. These stream reaches are popular with recreational anglers and are managed for resident trout fishing by California Fish and Wildlife. Two different proposals have been filed to augment flows released from Lake Spaulding dam in order to manage water temperatures to support coldwater habitat in the South Yuba River downstream of Lake Spaulding dam.

Forest Service condition 32 for the Drum-Spaulding Project specifies implementation of *Supplemental Flow* releases intended to improve operational management of cold water releases from Lake Spaulding dam (Spaulding No. 1 and No. 2 Development) for maintenance of cold water temperatures and enhancement of aquatic habitat downstream in the South Yuba River . PG&E proposed (December 20, 2013) *Supplemental Flow* releases the same as the Forest Service *Supplemental Flow* condition for this reach of the South Yuba River. The Forest Service *Supplemental Flow* condition would manage flows during the period of peak temperatures between July 1 and mid-September in order to maintain South Yuba River water temperature at or below 20°C upstream of the Canyon Creek confluence to "enhance habitat of resident rainbow trout without decreasing habitat or otherwise negatively impacting foothill yellow-legged frog or other native species, such as hardhead." The *Supplemental Flow* schedule (table 3-193) specified by the Forest Service would apply during critically dry, dry, and below normal years. *Supplemental Flows* would not be required during normal or wetter water years, as specified minimum streamflow during these periods is 40 cfs and water temperatures are predicted to be consistently less than 20°C at the confluence of Canyon Creek under these hydrologic conditions. During periods when *Supplemental Flows* are implemented the required minimum streamflows would be augmented by 5 to 10 cfs, depending on water year type, up to 30 cfs total (required minimum plus supplement) streamflow in the reach. The maximum flow augmentation would be 5-10 cfs during critically dry water years, 7 cfs in dry water years, and 5 cfs in below normal water years. *Supplemental Flow* releases would be made from the Lake Spaulding cold water pool using the low-level outlet at Lake Spaulding dam.

California Fish and Wildlife (recommendation 2.9) and the Foothills Water Network recommend a similar measure (referred to as the *Block Flow* recommendation) to augment South Yuba River flows for water temperature management during the summer. They recommend allocating a "Block of Water" not to exceed 2,500 acre-feet to maintain South Yuba River water temperature, measured immediately upstream of the Canyon Creek confluence, at 19°C between June 15 and September 15 to benefit coldwater species and enhance coldwater angling opportunities in areas that are more accessible downstream of Canyon Creek. The *Block Flow* recommendation has a water temperature management objective that is 1°C colder at the Canyon Creek confluence (RM 32.4) and begins 15 days earlier than the Forest Service condition. Because flows released from the Yuba-Bear Project's Bowman Lake and at the Bowman-Spaulding diversion dam into Canyon Creek affect flow and water temperature in the South Yuba River downstream of the confluence of Canyon Creek, California Fish and Wildlife recommends maintenance of a 19°C or less target temperature in the Upper Drum-Spaulding Project-affected reach above Canyon Creek by implementation of the *Block Flow* measure, which could also result in maintenance of 20°C downstream at Poorman Creek, thus enhancing coldwater habitat in the stream reach between Canyon Creek and Poorman Creek. California Fish and Wildlife predicts that their *Block Flow* recommendation would, therefore, enhance coldwater habitat farther downstream than the Forest Service *Supplemental Flow* condition.

During exceptionally hot periods, this proposed measure includes an additional requirement to further augment flows when air temperatures are forecasted to exceed 32°C for 2 or more days during the subsequent 7-day period (referred to as a heat storm). Flow adjustments to counter heat storm effects would be made at 8-hour intervals as necessary to maintain the water temperature objective of 19°C at Canyon Creek. The *Block Flow* proposal would require additional releases above the proposed minimum streamflow at Lake Spaulding dam in 5- to 10-cfs increments up to a total instream flow of 60 cfs to

maintain the target 19°C water temperature at Canyon Creek. The *Block Flow* recommendation includes creation of the South Yuba River Water Temperature Operations Group composed of representatives of PG&E, NID, the Forest Service, California Fish and Wildlife, BLM, California Water Board, and two non-governmental organizations to be identified. This Operations Group would provide real-time review and recommendations on a weekly basis or more frequent, if necessary, for water temperature management during the flow augmentation period, and would meet at least once annually in May to review and discuss program information. The Foothills Water Network recommendation also proposes to reduce winter minimum streamflows (February and March) to 25 cfs during dry, below normal, above normal, and wet years to partially offset the reduced power generation that would result from implementation of the *Block Flow* measure.

There are two important differences between the California Fish and Wildlife and Forest Service measures for temperature management to protect and enhance aquatic resources: (1) the objective: 1°C difference in the temperature objective immediately above Canyon Creek; and (2) the implementation process: difference in frequency of management intervention to adjust operational flow releases.

In order to implement the *Block Flow*, California Fish and Wildlife recommends that PG&E consult with the agencies within 24 hours whenever water temperature in South Yuba River immediately above the confluence of Canyon Creek exceeds 19°C and initiate additional flows in 10 cfs increments above the required minimum flow. The 10 cfs increments would be made at no less than 8-hr intervals until water temperatures are maintained at 19°C or less immediately above Canyon Creek. If the 19°C target water temperature is not achieved within 3 days PG&E would again consult with the agencies to determine if further changes in flow should be implemented. Once the temperature objective has been achieved and maintained, PG&E could return to minimum streamflow releases for South Yuba River below Spaulding dam. The *Block Flow* recommendation could require ongoing consultation and flow adjustments as often as twice weekly throughout the period from June 15 through September 15.

Forest Service condition 2 would instead create the Consultation Group specific to the Upper Drum-Spaulding Project which would be instrumental in management of flow and water temperature in South Yuba River between Spaulding dam and the confluence of Canyon Creek required under the Forest Service *Supplemental Flow* condition. The Consultation Group would review annual monitoring data for water temperature, resident fish populations, and foothill yellow legged frog and provide supplemental flow recommendations to Forest Service; Forest Service would notify PG&E prior to June 1 of the supplemental flow schedule for July 1 through September 15. With 10-days notice, Forest Service could request 2 additional adjustments to the supplemental flow during this period each year. The *Supplemental Flow* conditions give the Forest Service clear decision-making authority and criteria regarding if and when the supplemental flows would be implemented, and provides the Forest Service with reasonable flexibility to select supplemental flows within a specified range of flows; flow adjustments could be made monthly, as necessary. The *Supplemental Flow* condition also gives PG&E a relatively predictable expectation of flows necessary to comply with specified water temperature objectives.

PCWA asked the Commission to reject the *Block Flow* recommendation proposed by California Fish and Wildlife and the Foothills Water Network because: (1) the proposed temperature criteria are inappropriate and would potentially reduce preferred habitat and jeopardize special-status species including foothill yellow-legged frog and hardhead; and (2) increased discharges would increase power generation losses and water supply deficits. PCWA recommends adoption of the Forest Service's South Yuba River *Supplemental Flow* condition because it would provide a better balance of power generation, water supply, and benefits to environmental resources.

Forest Service (condition 51) and BLM (condition 7) require implementation of the *Water Temperature and Stage Monitoring Plan* (filed April 11, 2014) that includes seven monitoring locations

on South Yuba River (three locations upstream of Canyon Creek and four locations downstream) beginning within 1 year of license issuance. Water temperature and stage would be recorded year-round at 15- minute intervals by loggers installed at the five upstream monitoring locations on South Yuba River; at the two most downstream locations monitoring instrumentation would be installed between April 1 and November 1 during each monitoring year. Water temperature would also be spot checked at locations specified during fish population and foothill yellow-legged frog monitoring.

Our Analysis

Cold water habitat in the South Yuba River is maintained by low-level releases from Lake Spaulding dam (Spaulding No. 1 and No. 2 Development) and supports a recreational fishery for resident rainbow trout and brown trout. Water temperature data collected upstream of Lake Spaulding indicate that without the cold water pool in Lake Spaulding, water temperatures in the vicinity of Canyon Creek and downstream would be considerably higher than under the existing license or proposed flow conditions. During the summer, when minimum flows would be augmented by the *Supplemental Flow* or *Block Flow*, the temperature of water released from Spaulding dam is typically less than 8°C in June, less than 11°C in July, less than 14°C in August, and about 16.5°C in September as the cold water pool of Lake Spaulding becomes depleted. During summer, water temperatures increase as much as 6-12°C in the 8-mile reach from Lake Spaulding downstream to Canyon Creek.

Inflow from major tributaries to the South Yuba River below Spaulding dam provides some small additional, but transient cooling of the mainstem of the South Yuba River. The influence of tributary discharges on water temperature is more apparent (figure 3-92) between Spaulding dam and Canyon Creek. Between Canyon Creek and Lake Englebright, tributary inflow reduces water temperature in South Yuba River by less than 1°C. Under lower discharges from Lake Spaulding dam (10 to 20 cfs), tributary inflow between Lake Spaulding dam and Canyon Creek reduces water temperature, but at higher discharges (30 to 60 cfs) from Lake Spaulding, inflow from Canyon Creek increases water temperature in South Yuba River.

To assess the effects of proposed releases from Lake Spaulding in conjunction with accretion of water from major tributaries and incremental sub-watersheds on water flow and temperature in South Yuba River, PG&E and relicensing stakeholders modeled flow characteristics through multiple stream sub-reaches of South Yuba River between Lake Spaulding dam and Englebright reservoir: (1) below Jordan Creek; (2) below Rucker Creek; (3) below Fall Creek; (4) below Canyon Creek; (5) below Poorman Creek; (6) below Humbug Creek; and (7) above Englebright reservoir. Minimum streamflow compliance for releases to South Yuba River from Lake Spaulding dam is measured at Lang's Crossing below the confluence of Jordan Creek (at gage YB-29). Flows at this location are an aggregate of all releases from Lake Spaulding including the low-level outlet at Lake Spaulding dam, flows through Spaulding no. 1 powerhouse, releases through the spill channel to Jordan Creek, spills from Lake Spaulding dam, and other incremental accretion.

During summer PG&E proposes minimum streamflows of 10 to 90 cfs depending on water year type in South Yuba River downstream of Lake Spaulding dam (table 3-121). These proposed minimum streamflows (L061812-EBFSC model run) would support cooler temperatures downstream extending further into the warm summer period as compared to the flows under the existing license (base case-EBF model run) (figure 3-89 [2008] and figure 3-90 [2009]). These model runs indicate that under the proposed minimum streamflows, daily average water temperatures in South Yuba River above the Canyon Creek confluence would rarely have exceeded 20°C under relatively warm meteorological conditions represented by 2008-2009. Immediately above Canyon Creek the specified minimum streamflows would achieve water temperatures about 4-5°C cooler than under existing license conditions between early June and the end of July; water temperatures would be about 2-3°C cooler in August.

While water temperatures under the existing license would have exceeded 20°C for most of the summer at Canyon Creek, water temperatures under the specified minimum streamflows for the new license would have only exceeded 20°C slightly on a few days during each year (figures 3-89 and 3-90). During particularly warm periods, however, water temperatures below the confluence of Canyon Creek could still increase to levels potentially stressful to resident rainbow trout.

The *Supplemental Flow* and *Block Flow* proposals both have the objective of maintaining and enhancing (over and above the benefit of proposed increased minimum instream flows compared to the existing license) coldwater habitat for resident rainbow trout in the stream reach between Spaulding dam and the confluence of Canyon Creek. This stream reach supports a quality coldwater recreational fishery under existing license conditions that would be enhanced and expanded farther downstream to stream reaches that would be more accessible to recreational anglers between Canyon Creek and Poorman Creek. Both proposals would augment the required minimum streamflows of the South Yuba River below Lake Spaulding dam providing an additional tool for water temperature management to support resident rainbow trout and other aquatic species.

Temperature modeling results presented by PG&E for the South Yuba River (amended license application supplement 4, attachment 2b [January 23, 2013]) provide analysis of the relative effects of different flow releases at Lake Spaulding dam on downstream water temperatures in the South Yuba River based on weather conditions that occurred during 2008 and 2009, which were warm, dry years. During summer, water temperatures in the South Yuba River gradually increase with distance downstream as a result of heating by warmer ambient air temperatures (figure 3-87 [2008] and figure 3-88 [2009]).

The applicant's modeling of the relationship between flow and water temperature is extensive, with bi-weekly model output from June through September. To evaluate the effectiveness of the various flow proposals under worst case conditions, we evaluate results presented for the warmest periods (July 20, 2008, and July 20, 2009) in PG&E's model results. PG&E indicates that both 2008 and 2009 were relatively hot, dry weather years. Although the low-level outlet is used to meet minimum streamflow requirements, discharging water that is generally between 10°C and 20°C from the cold water pool in Lake Spaulding, the water temperature model clearly demonstrates the responsiveness of water temperature in South Yuba River below Lake Spaulding dam to short-term fluctuations in air temperature (figure 3-89 and figure 3-90).

The modeling results shows that augmented flows of 10 cfs or 20 cfs would have resulted in water temperatures above Canyon Creek in excess of 20°C on July 20 in 2009; in 2008, a flow of 20 cfs would have maintained temperatures below 20°C. The 30-cfs maximum augmented flow under the Forest Service *Supplemental Flow* schedule would have ensured a water temperature of about 18°C in 2008 and about 20°C in July 2009 (figure 3-91 and figure 3-92) in the South Yuba River above Canyon Creek. Comparison of water temperatures above Canyon Creek associated with 10-cfs increments in discharge from Lake Spaulding dam between June and September (figure 3-93 and figure 3-94) indicates that at 30 cfs (maximum Forest Service *Supplemental Flow*), water temperatures in 2008 would not have exceeded 20°C (figure 3-93), but would have exceeded 20°C for several days in July 2009 (figure 3-94). For perspective, under estimated unregulated (unimpaired) flows in 2008, water temperatures in South Yuba River above Canyon Creek would have exceeded 22°C for most of the months of July and August (figure 3-95); associated estimated unregulated flows for this period would have been about 16 cfs at the beginning of July, decreasing to about 11 cfs at the beginning of August through the end of September (figure 3-95).

Based on the filed model results, it would have required about 10 cfs additional augmented flow throughout the summer of 2009 to maintain water temperatures immediately above Canyon Creek (RM

33.25) at the *Block Flow* objective of 19°C as compared to the *Supplemental Flow* objective of 20°C (figure 3-90 and 3-91). The relative difference between the *Block Flow* and *Supplemental Flow* effect on water temperature decreases steadily with distance downstream from Canyon Creek. This additional 10 cfs under the Block Flow would result in about 0.6°C additional cooling at Poorman Creek (RM 28.15) and about 0.3°C cooling at Humbug Creek (RM 19.6). Under the Block Flow proposal, daily average water temperatures at these two downstream locations in late July would still be in the range of 23-25°C that could be stressful to resident rainbow trout. Additional flows up to the maximum 60 cfs under the Block Flow would only achieve water temperatures of 21°C at Poorman Creek and 23°C at Humbug Creek.

To evaluate the influence of flow on water temperature in the South Yuba River, PG&E modeled discharges in the range of the *Block Flow* recommendation, 10, 20, 30, 40, and 60 cfs at Lake Spaulding dam. The model indicates that the confluence of Canyon Creek is a breakpoint in the longitudinal increase in water temperature along the South Yuba River below Lake Spaulding dam. The rate of increase in water temperature with equilibration to air temperature is greatest in the stream reach between Lake Spaulding dam and the Canyon Creek confluence, then decreases with distance downstream of Canyon Creek as water temperatures associated with the different modeled flows converge (figure 3-91and figure 92). In the 2009 model results, South Yuba River water temperatures at Jordan Creek (RM 40) are about 10°C at all five Lake Spaulding dam discharge scenarios; downstream in the vicinity of Rucker Creek (RM 37) and Fall Creek (RM 35.6), water temperatures at a 10-cfs discharge increase about 6°C more than at the 60-cfs discharge. Below Canyon Creek, the water temperature differential between 10 and 60 cfs is about 3°C and gradually decreases to about 1°C at Lake Englebright (figure 3-91 and figure 3-92) with water temperatures of 23-24°C. With the additional 10 cfs augmented flow required to achieve the *Block Flow* temperature objective compared to the *Supplemental Flow* temperature objective discussed above, the temperature difference at Englebright reservoir would be negligible.

The 60-cfs maximum flow under the *Block Flow* recommended by California Fish and Wildlife and the Foothills Water Network would have produced water temperatures in mid-July at Canyon Creek in the range of 16 to 17°C, based upon modeling results. At a maximum *Block Flow* of 60 cfs, water temperatures would have rarely reached 18°C during either year. While these temperatures could benefit resident trout, they are likely to inhibit development of foothill yellow-legged frog tadpoles in this stream reach. PCWA points out that the proposed change in water temperature regime associated with the *Block Flow* proposal has the potential to alter the periphyton algae-based food web on which foothill yellow-legged frog rely. Seasonal blooms of periphyton are dependent on stable flow conditions, increasing day light, and warming temperatures during the mid-summer dry season. PCWA indicates that slowing or delaying the seasonal increase in water temperature in the stream reach above Canyon Creek could affect seasonal succession and species composition of the algae, particularly diatoms, in the periphyton community, which in turn determines the food quality for consumers (Furey et al., 2012) such as foothill yellow-legged frog tadpoles. Water temperatures under the Block Flow measure could be 2-3°C cooler in this stream reach than under the Supplemental Flow condition and about 6°C less than under the existing license during June and early July potentially affecting this feeding relationship and tadpole development. Migration of adult frogs from more sheltered, shaded tributaries to larger streams with more open canopy and sunlight assures habitat more suited for development and growth of eggs and tadpoles and synchrony of tadpole development and metamorphosis with seasonal availability of key diatom food resources. The potential risk of low temperatures to foothill yellow-legged frog is indicated by laboratory and field studies (Catenazzi and Kupferberg, 2013; Kupferberg et al., 2013) that reported the optimal temperature for egg and tadpole development in foothill yellow-legged frog is at least 19°C and may extend as high as 22 to 23°C. As temperatures decrease below optimum, the duration of the lifestages is extended with an associated increase in risk of predation, loss of synchrony with specific algal food resources, and failure to reach metamorphosis by the time that metamorphosed frogs migrate back to more protected tributary habitat in the fall. At temperatures below 17°C development, growth, and survival are likely inhibited.

Based on temperature modeling, the maximum 60-cfs augmented flow recommended by California Fish and Wildlife and the Foothills Water Network in the *Block Flow* measure released under the 2008-2009 meteorological conditions, would have produced water temperatures in the range of 16 to 17°C in mid-July at Canyon Creek. While these temperatures could benefit resident trout, they are likely to inhibit development and ultimate survival of foothill yellow-legged frog tadpoles in this stream reach. Relicensing studies located foothill yellow-legged frogs including all lifestages in South Yuba River upstream of the confluence of Canyon Creek. With a maximum augmented release of 60 cfs at Lake Spaulding dam water temperatures would have rarely reached 18°C at Canyon Creek during either year while optimum temperatures for development and growth of early lifestages and metamorphosis of tadpoles has been reported to be 19°C and higher.

This analysis indicates that the Forest Service *Supplemental Flow* proposal provides a mechanism for management and maintenance of water temperature at less than 20°C between Lake Spaulding dam and the confluence of Canyon Creek to enhance coldwater habitat and benefit resident rainbow trout without jeopardizing the population of foothill yellow-legged frog in this stream reach directly affected by the Drum-Spaulding Project's Lake Spaulding Development. PG&E's model results indicate that maintaining the target 19°C at Canyon Creek, as proposed in the California Fish and Wildlife/Foothills Water Network *Block Flow* recommendation, rather than the target of 20°C in the Forest Service *Supplemental Flow* condition would have the potential to adversely affect foothill yellow-legged frog as water temperatures in reaches where these species potentially reside would be reduced to a level that could inhibit natural development rates of early life stages. Temperature modeling predicts (amended license application supplement 4, attachment 2B [January 23, 2013]) that in July and August during warm years, the temperature differential between Canyon Creek confluence and Poorman Creek confluence could be as high as 2 to 4°C (figure 3-94). The model predicts that to achieve the ultimate management objective of 20°C water temperature in South Yuba River at Poorman Creek expressed in the California Fish and Wildlife *Block Flow* recommendation, would require a discharge at Lake Spaulding dam greater than 60 cfs. A flow release of this magnitude would result in water temperatures less than 17°C at the Canyon Creek confluence (figure 3-94), a temperature range likely to adversely affect development of foothill yellow-legged frog populations upstream of Canyon Creek. The *Supplemental Flow* temperature objective of 20°C at Canyon Creek would ensure temperatures in the optimum range for resident rainbow trout, but would not be likely to have such an adverse effect on these frog populations. Commenting on the draft EIS, California Fish and Wildlife (August 22, 2013) points out that observed conditions from temperature monitoring during pre-licensing studies show only a 1 to 2°C differential between Canyon Creek and Poorman Creek and argue that the empirical temperature data provide a better measure of stream conditions than the model. While temperatures measured *in situ* may provide the best indication of habitat conditions in a given location under specific meteorological and hydraulic conditions, the model serves as a useful tool for predictive evaluation of alternative flow scenarios over a wide range of conditions. Review of the model calibration estimates of statistical error indicates relatively good simulation of water temperature within the modeled stream reaches. The calibration study indicates that the model can be used as an effective analytical tool.

In addition to the effects of temperature on early development of foothill yellow-legged frog, the increase in flow could result in reduced habitat availability. The two-dimensional habitat model for the Jordan Creek reach below Spaulding dam indicates that the WUA for foothill yellow-legged frog egg masses would decrease by 48 percent with a change in flow similar to the *Block Flow* proposal, from 6 to 50 cfs. Similarly, model-predicted WUA for tadpoles would decrease by about 60 percent for the same increase in flow.

Under natural unregulated conditions, interannual variability in flow and meteorological conditions result in habitat conditions, including water temperature, that vary within a stream reach from year to year. At a given location or stream reach, variation in flows may result in cooler water

temperatures one year and warmer temperatures in another, which may favor different species or groups of species from year to year. This variability favors more diversity in the aquatic community. The *Block Flow* recommendation would manage flows to provide a consistent water temperature of 19°C during summer in South Yuba River at Canyon Creek, effectively reducing the level of variability in favor of coldwater habitat for resident rainbow trout.

The California Fish and Wildlife *Block Flow* recommendation includes short-term (flow manipulations (5 to 10 cfs at 8-hour intervals) to counter the effects of severe heat waves (heat storms) and maintain the 19°C water temperature objective at Canyon Creek. Once water temperatures stabilize at the 19°C water temperature objective flows could be reduced to levels prior to the beginning of the heat storm. These flow manipulations could result in flow pulses with the potential to increase and decrease water levels over short time periods, particularly in shallow near shore habitat, critical for foothill yellow-legged frog early development. Technical memorandum 3-2 provides channel profiles, wetted width, wetted area, and average depth for 3 transects in the South Yuba River below Spaulding no. 2 powerhouse. During these studies increasing flow from about 5 cfs to 17 cfs resulted in 10-100 percent changes in depth, 24-117 percent in wetted area, 4-53 percent in wetted width, and 5-52 percent in wetted perimeter. Further increasing flow to about 35 cfs, resulted in an additional increase of 7-35 percent changes in depth, 17-40 percent in wetted area, 9-11 percent in wetted width, and 9-12 percent in wetted perimeter. These data indicate a significant increase in inundation of the stream channel over a 30 cfs change in flow through this reach of the South Yuba River, which could occur under the *Block Flow* measure at 8-hr intervals over a period of 1-2 days during a heat storm. Once water temperatures stabilize, the depth, wetted perimeter, and wetted area could be reduced over a similar short period. These increases and decreases in depth and area inundated over a few days could result in stranding of egg masses and tadpoles of foothill yellow-legged frog or flushing of these lifestages downstream.

PG&E and NID filed additional operations analysis (January 23, 2013) that assessed the effect of the *Supplemental Flow* and *Block Flow* proposals on power generation and the ability of NID and PCWA to meet water delivery obligations. The analysis modeled four scenarios using proposed minimum streamflows with combinations of *Supplemental Flow* or *Block Flow* releases from Lake Spaulding dam to the South Yuba River and proposed *Block Flow* releases from Milton diversion dam to the Middle Yuba River (see next section):

- Scenario 1 − *Supplemental Flow* in South Yuba River
- Scenario 2 − *Supplemental Flow* in South Yuba River and *Block Flow* in Middle Yuba River
- Scenario 3 – *Block Flow* in South Yuba River and *Block Flow* in Middle Yuba River
- Scenario 4 – *Block Flow* in South Yuba River.

Implementing either of these flow augmentation proposals for the South Yuba River would result in a similar reduction in power generation compared to the existing license conditions; the difference between the two proposals is estimated to be less than 0.5 percent depending on water year type (table 3-194). PG&E (September 23, 2013) estimates an average annual decrease in power generation of 0.2 percent for the *Supplemental Flow* condition in South Yuba River and 0.4 percent for the *Block Flow* recommendation in South Yuba River. Under these four scenarios, there were 4 years between 1976 and 2008 in which NID and/or PCWA would have been unable to meet water delivery targets: 1976, 1977, 1978, and 1989. The effects of implementing either flow augmentation proposal in the South Yuba River (scenarios 1 and 4) were greater for NID than for PCWA (table 3-195). This was particularly apparent in 1977, an extreme critically dry year. During 1977, both NID and PCWA would have been better able to meet water delivery targets under the *Supplemental Flow* condition than under the *Block Flow* condition.

The modeling results indicate that the Forest Service *Supplemental Flow* condition in combination with proposed minimum streamflows would enhance cold water aquatic habitat, maintaining water temperatures in the South Yuba River at or below 20°C at Canyon Creek, a temperature about 2 to 3°C cooler than under the existing license conditions and 3 to 5°C below what might be expected under unregulated conditions (figures 3-93 to 3-95). The *Block Flow* proposal from California Fish and Wildlife and Foothill Water Network would provide water temperatures several degrees cooler in portions of this reach than would the *Supplemental Flow* condition, which would further enhance aquatic habitat for resident trout farther downstream, but would have the potential to adversely affect development and abundance of the special-status species foothill yellow-legged frog. Our analysis indicates that the *Block Flow* recommendation would typically require about 10 cfs higher flows to achieve the 19°C water temperature objective at Canyon Creek (RM 33.2) compared to the *Supplemental Flow* 20°C objective. The benefit of cooler water temperatures from this additional 10 cfs would be diminished relatively quickly moving downstream with about a 0.6°C difference between the two measures at Poorman Creek (RM 28.1) and only 0.3°C at Humbug Creek (RM 19.6). While the temperature goal of both proposals at the confluence of Canyon Creek are only 1°C different, the complexity of the coordination, consultation, and management effort necessary to implement the *Block Flow* recommendation is considerably greater than the *Supplemental Flow* condition. We find that implementation of the *Supplemental Flow* condition better balances the benefits and risks to coldwater and transitional aquatic resources overall, whereas the *Block Flow* recommendation is likely to enhance conditions for coldwater resident trout (which are ubiquitous in project-affected reaches) and the recreational anglers further downstream, but has the potential to put populations of foothill yellow-legged frog at risk in this stream reach of the South Yuba River.

To verify that Supplemental Flows provide the predicted enhancement of resident rainbow trout habitat and protection for foothill yellow-legged frog, PG&E (section 3.3.2.2.8, *Aquatic Biota*) proposed and Forest Service and BLM specified implementation of monitoring plans for fish populations, foothill yellow-legged frog, water temperature and stage, and channel morphology in South Yuba River below Spaulding dam. The results of annual monitoring would provide population and temperature data for review by the Consultation Group to evaluate the effectiveness of the *Supplemental Flow* condition for meeting the 20°C management goal and to determine the effects of flow increases on foothill yellow-legged frog population abundance and distribution, as well as, resident rainbow trout. The *Supplemental Flow* condition specifies that after 3 years of monitoring the *Supplemental Flow* condition may be modified, if necessary. If the 20°C daily average temperature objective immediately above the confluence of Canyon Creek is exceeded on two consecutive days a year, then PG&E, in consultation with the agencies, would be required to develop a plan to modify the *Supplemental Flow* condition, potentially increasing the maximum Supplemental Flow to 40 cfs while still protecting foothill yellow-legged frog. Once approved by the Forest Service and filed with the Commission the new plan would be implemented and reevaluated again after another 3 years.

**Yuba-Bear Project**

*Bowman Development – Middle Yuba River below Milton Diversion Dam*

NID proposes significant increases in minimum streamflows for the Middle Yuba River below the Milton diversion dam (section 3.3.2.2.2, *Instream Flows*) compared to the existing license; the proposed minimum flows are higher than flows estimated under unregulated conditions from mid-summer through fall. California Fish and Wildlife (recommendation 2.8) and the Foothills Water Network recommend measures (referred to as the *Block Flow* recommendation) that would further augment flow above proposed minimum streamflows during summer to manage water temperatures and enhance aquatic habitat in Middle Yuba River below Milton diversion dam. Their recommendation also includes installation of water temperature telemetry and data logging equipment in Middle Yuba River in

the vicinity of Wolf Creek and National Gulch to monitor the response of water temperature to *Block Flow* releases. NID does not propose a measure to manage water temperatures with flow augmentation above minimum streamflows proposed for Middle Yuba River.

California Fish and Wildlife recommended that, during all water year types, NID allocate a "Block of Water" not to exceed 2,500 acre-feet to maintain Middle Yuba River water temperature at RM 26.9 immediately upstream of the Wolf Creek confluence (about 18 miles downstream from Milton diversion dam) at 19°C between June 15 and September 15. The measure includes a condition to further augment flows when air temperatures are forecasted to exceed 32°C for 2 or more days during the following 7 days. *Block Flow* releases from Jackson Meadows dam and/or Milton diversion dam would be made in 5- to 10-cfs increments at least 8 hours apart up to a total flow (specified minimum streamflow plus augmentation flow) of 30 cfs to manage water temperature. In addition to these *Block Flow* releases, Foothills Water Network proposes a reduction of minimum streamflows by 5 to 10 cfs in April and May during below normal and above normal years to offset the effect of the *Block Flow* increase on project power generation. Foothills Water Network estimates that this change would yield an overall annual increase in power generation compared to the NID and Forest Service minimum streamflow measure. The *Block Flow* recommendation establishes a management goal to maintain water temperature above the Wolf Creek confluence at 19°C or less to benefit coldwater species and increase coldwater angling opportunities in more accessible areas farther downstream in Middle Yuba River.

The maximum flow under this *Block Flow* schedule would be similar to the range of flows recommended by NMFS (table 3-152) to support reintroduction of Central Valley steelhead to Middle Yuba River (section 3.3.2.2.2, *Instream Flow*). During the summer, the minimum streamflows proposed by NID would range from 6 to 15 cfs in critically dry years to 15 to 40 cfs in wet years, depending on month; the *Block Flow* recommendation would have the potential to increase flows by 2 to 5 times the proposed minimum streamflows in August and September during drier periods. The *Block Flow* measure also proposes that NID create a Water Temperature Operations Group composed of representatives of NID, PG&E, the Forest Service, California Fish and Wildlife, BLM, California Water Board, and two non-governmental organizations to be determined. This Operations Group would provide recommendations for water temperature management on a monthly basis during the *Block Flow* period and would meet at least once annually in May to review and discuss program results and information.

In order to implement the *Block Flows*, California Fish and Wildlife recommends that NID consult with the agencies within 24 hours whenever water temperature in Middle Yuba River immediately above the confluence of Wolf Creek exceeds 19°C and initiate additional flows in 5 to10 cfs increments above the required minimum flow. The 10 cfs increments would be made at no less than 8-hr intervals until water temperatures are maintained at 19°C or less immediately above Wolf Creek. If the 19°C target water temperature is not achieved within 3 days NID would again consult with the agencies to determine if further changes in flow should be implemented. Once the temperature objective has been achieved and maintained, NID could return to minimum streamflow releases for Middle Yuba River below Milton diversion dam. During a heat storm (when air temperatures are predicted to exceed 90°C on consecutive days during a 7-day period) additional consultation and flow augmentation would be required. The *Block Flow* recommendation could require ongoing consultation and flow adjustments as often as twice weekly throughout the period from June 15 through September 15. California Fish and Wildlife also recommends establishment of an Operations Group to consult with NID for implementation and management of flow and water temperature related project operations.

Forest Service (condition 51) requires NID to implement the *Water Temperature and Stage Monitoring Plan* (filed April 11, 2014) that includes four monitoring locations on Middle Yuba River (one location between Jackson Meadows dam and Milton diversion dam, and three locations downstream of Milton diversion dam) beginning within 1 year of license issuance. Water temperature and stage

would be recorded year-round at 15-minute intervals between April and November and hourly from November through March at each monitoring location. The most downstream location on Middle Yuba River would only be monitored between April and November. Water temperature would also be spot checked at locations specified in the monitoring plan during fish population and yellow-legged frog monitoring. Forest Service condition 2 requires establishment of a Consultation Group specific to the Yuba-Bear Project which among various purposes would review these monitoring results and make recommendations to Forest Service and BLM relative to conditions of resident aquatic resources and aquatic habitat to protect and enhance these resources.

Our Analysis

Cold water habitat in the Middle Yuba River is maintained by releases from the low-level outlets at Jackson Meadows Lake dam and Milton diversion dam (Bowman Development) and supports coldwater habitat for resident rainbow trout. California Fish and Wildlife manages this stream reach as a recreational fishery for resident rainbow trout. Temperature modeling results presented by NID for the Middle Yuba River (amended license application supplement 3, attachment 2B [August 17, 2012]; Longitudinal Temperature attachment [January 23, 2013]) provide analysis of the relative effects of different flow releases at Milton diversion dam on downstream water temperatures in the Middle Yuba River based on weather conditions that occurred during 2008 and 2009, which were warm, dry years. During summer, water temperatures in the Middle Yuba River gradually increase with distance downstream and equilibration with ambient air temperatures (figure 3-96 [2008] and figure 3-97 [2009]). Daily average water temperature data at Wolf Creek (RM 26.9) exceeded 20°C for a few days in mid-July and mid-August in 2008 and a few days in late July in 2009; at East Fork Creek (RM 34.6), water temperatures did not exceed 15°C in either year. Flows during these monitoring periods were generally about 5 to 7 cfs (figure 3-96 and figure 3-97), similar to the specified minimum streamflows proposed for the new license during extreme critically dry, critically dry, and dry water years.

NID rejects the need for *Block Flow* augmentation in Middle Yuba River given the proposed minimum streamflows, which are significantly higher (4 to 6 cfs in extreme critically dry years; 6 to 20 cfs in critically dry years; up to 10 to 70 cfs in wet years) than existing conditions (3 cfs year round in all years). NID also indicated that the higher flows and associated colder water temperatures of 19°C at Wolf Creek have the potential to adversely affect habitat for foothill yellow-legged frog between Milton diversion dam and Wolf Creek.

NID's modeling of the relationship between flow and water temperature is extensive, with bi-weekly model output from June through September. To evaluate the effectiveness of the various flow proposals under worst case conditions, we evaluate results presented for the warmest periods (July 20, 2008, and July 20, 2009) in NID's model results. Because storage and residence time in the Milton diversion dam impoundment is very small, increased releases to Middle Yuba River below the diversion dam would be accomplished primarily by increasing releases from Jackson Meadows dam. Minimum streamflow requirements are met in the Middle Yuba River by releases through the low-level outlet at Jackson Meadows dam and Milton diversion dam. Water released from the cold water pool in Jackson Meadows reservoir is generally between 10 and 20°C. The water temperature model clearly demonstrates the responsiveness of water temperature in the Middle Yuba River below Milton diversion dam to short-term fluctuations in air temperature

Several significant tributaries between Milton diversion dam and the non-project Our House diversion dam increase flows and influence water temperatures in the Middle Yuba River. To assess the effects of proposed releases from Jackson Meadows dam and Milton diversion dam in conjunction with accretion of water from major tributaries and incremental sub-watersheds on water flow and temperature in the Middle Yuba River, NID and relicensing stakeholders modeled flow characteristics through

multiple stream sub-reaches of the Middle Yuba River between Jackson Meadows dam and Our House diversion impoundment (non-project): (1) below Jackson Meadows dam; (2) below Milton diversion dam; (3) below East Fork Creek; (4) below Wolf Creek; (5) below Kanaka Creek; and (6) above Our House diversion impoundment. Tributary discharges can result in increases or decreases in Middle Yuba River temperatures depending on location and magnitude of Middle Yuba River flows (figure 3-98 and figure 3-99). At a release of 3 cfs to the Middle Yuba River below Milton diversion dam, tributary inflow reduces water temperature in Middle Yuba River by about 1°C at East Fork, Wolf, and Kanaka Creeks. However, when flow releases below Milton diversion dam exceed 25 cfs, inflows from East Fork Creek increase water temperature in the Middle Yuba River near the confluence. A slight decrease in Middle Yuba River water temperatures is predicted in the vicinity of Wolf and Kanaka Creeks at 25 cfs releases from Milton diversion dam; when releases from Milton diversion dam are greater than 25 cfs, inflows from Wolf and Kanaka Creeks have negligible effect on Middle Yuba River temperatures.

To evaluate the influence of flow on water temperature in this stream reach, NID modeled discharges of 3, 25, 50, 75, 100, and 150 cfs at Jackson Meadow dam and below Milton diversion dam similar to the *Block Flow* recommendation. The model predicts that the increase in water temperature in the Middle Yuba River between Milton diversion dam and Our House diversion impoundment is virtually linear at flows of 50 cfs or greater; at lower flows (3 to 25 cfs), the rate of temperature increase is greater in the upstream portion of the stream reach, with a breakpoint between East Fork Creek and Wolf Creek (figure 3-98 and figure 3-99). The potential effect of incremental flow augmentation indicates that the largest temperature differential between a 3-cfs and 50-cfs discharge from Milton diversion dam occurs in the vicinity of the East Fork Creek confluence (figure 3-98 and figure 3-99). A streamflow of 3 cfs (less than the specified minimum streamflow in extreme critically dry years) would have resulted in water temperatures of 20 to 22°C above Wolf Creek (figure 3-100) during mid-July to early August 2009 and generally below 18°C above East Fork Creek (figure 3-101) during the same period. In 2008, a flow of 25 cfs would have maintained temperatures below 20°C at Wolf Creek. A 25-cfs discharge from Milton diversion dam would result in a water temperature generally below 18°C at Wolf Creek and 15°C at East Fork Creek under 2009 weather conditions (figure 3-100 and figure 3-101). The potential 30-cfs total *Block Flow* proposed by California Fish and Wildlife and the Foothills Water Network would further reduce water temperatures in this stream reach in mid-July.

Although the water temperatures associated with *Block Flow* releases estimated by the model could enhance aquatic habitat conditions for resident trout in the Middle Yuba River below Wolf Creek, they have the potential to adversely affect development of foothill yellow-legged frog tadpoles in the stream reach between East Fork Creek and Wolf Creek. Foothill yellow-legged frogs were observed during relicensing surveys upstream from Our House diversion impoundment to National Gulch at about RM 30, between Wolf Creek and East Fork Creek. Model results indicates that the release at Milton diversion dam would need to be about 25 cfs in order to maintain the 19°C water temperature objective at Wolf Creek between mid-July and mid-August under warm dry weather conditions representative of 2009; the 25 cfs release during this period would be 5-19 cfs higher than the specified minimum streamflow depending on water year type. Under these conditions, water temperatures downstream of East Fork Creek would be about 15°C, significantly less than the range adequate for growth and metamorphosis of foothill yellow-legged frog tadpoles. Between June and late September in 2008 and 2009, flows below Milton diversion dam were typically about 4-5 cfs (figure 3-96 and figure 3-97). These flows resulted in observed water temperatures typically less than 14°C at East Fork Creek and less than 20°C at Wolf Creek. Specified minimum streamflows under the new license would be 6 cfs during critically dry year, higher than the 2008-2009 flows. Under the existing license, the minimum streamflow is 3 cfs and historical median flows have been 3.5-4 cfs. Based on the model results, a 3cfs flow would have maintained temperatures during July and August below Wolf Creek at 19.6°C to 21°C and 15.7°C to 17.4°C below East Fork Creek. A release of 25 cfs at Milton diversion dam is predicted to result in temperatures about 2 to 2.5°C cooler at East Fork Creek than a 3 cfs release. The water temperature

difference at Wolf Creek associated with releases from Milton diversion dam of 3 and 25 cfs decreases to about 1.5°C to 2°C in July and August. Above the Our House diversion dam impoundment the difference decreases to about 1°C; water temperatures above the Our House diversion dam impoundment are predicted to be 23°C to 25°C at 3 cfs and 21.3°C to 23.4°C at 25 cfs.

PCWA (September 14, 2012) asked the Commission to reject the *Block Flow* recommendation proposed by California Fish and Wildlife and the Foothills Water Network because (1) the proposed temperature criteria are inappropriate and would potentially reduce preferred habitat and jeopardize special-status species including foothill yellow-legged frog and hardhead; and (2) increased discharges would also increase power generation losses and water supply deficits. According to the model results presented by PCWA, the *Block Flow* recommendation would adversely affect the distribution and persistence of special-status resident aquatic species, foothill yellow-legged frog in particular. PCWA (September 14, 2012) presents an analysis that indicates that about 4 miles of the Middle Yuba River above Wolf Creek would be lost as foothill yellow-legged frog habitat as a result of reduced water temperatures in this stream reach (figure 3-102) if the *Block Flow* proposal (with a 19°C water temperature objective above the confluence of Wolf Creek) were implemented.

PCWA points out that the proposed change in water temperature regime associated with the *Block Flow* proposal has the potential to alter the periphyton algae-based food web on which foothill yellow-legged frog rely. Seasonal blooms of periphyton are dependent on stable flow conditions, increasing day light, and warming temperatures during the mid-summer dry season. PCWA indicates that slowing or delaying the seasonal increase in water temperature in the stream reach above Canyon Creek could affect seasonal succession and species composition of the algae, particularly diatoms, in the periphyton community, which in turn determines the food quality for consumers (Furey et al., 2012) such as foothill yellow-legged frog tadpoles. Migration of adult frogs from more sheltered, shaded tributaries to larger streams with more open canopy and sunlight assures habitat more suited for development and growth of eggs and tadpoles and synchrony of tadpole development and metamorphosis with seasonal availability of key diatom food resources. The potential risk of low temperatures to foothill yellow-legged frog is indicated by laboratory and field studies (Catenazzi and Kupferberg, 2013; Kupferberg et al., 2013) that reported the optimal temperature for egg and tadpole development in foothill yellow-legged frog is at least 19°C and may extend as high as 22 to 23°C. As temperatures decrease below optimum, the duration of the lifestages is extended with an associated increase in risk of predation, loss of synchrony with specific algal food resources, and failure to reach metamorphosis by the time that metamorphosed frogs migrate back to more protected tributary habitat in the fall. At temperatures below 17°C which would exist in the vicinity of foothill yellow-legged frog populations upstream of Wolf Creek, development, growth, and survival are likely inhibited.

In addition to the effects of temperature on early development of foothill yellow-legged frog, the increase in flow could result in reduced habitat availability. The area of available suitable habitat (WUA) for foothill yellow-legged frog is greatest at the lowest modeled flow (11 cfs) and least at the highest (475 cfs) modeled flow. The two-dimensional habitat model for observed frog habitat in Middle Yuba River upstream of Wolf Creek prepared by NID and the relicensing participants indicates that the WUA for foothill yellow-legged frog egg masses would decrease by about 30 percent with a change in flow similar to the Block Flow proposal, from 11 to 29 cfs. Similarly, model-predicted WUA for tadpoles would decrease by about 28 percent for the same change in flow.

Under natural unregulated conditions, interannual variability in flow and meteorological conditions result in habitat conditions including water temperature that vary within a stream reach from year to year. At a given location or stream reach variation in flows may result in cooler water temperatures one year and warmer temperatures in another, which may favor different species or groups of species from year to year. This variability favors more diversity in the aquatic community. The *Block*

*Flow* recommendation would manage flows to provide a consistent water temperature of 19°C during summer in Middle Yuba River at Wolf Creek, effectively reducing the level of variability in favor of coldwater habitat for resident rainbow trout.

PG&E and NID filed additional operations analysis (January 23, 2013) that assessed the effect of the *Supplemental Flow* and *Block Flow* proposals on power generation and the ability of NID and PCWA to meet water delivery obligations. The analysis modeled four scenarios using proposed minimum streamflows with combinations of *Supplemental Flow* or *Block Flow* releases from Lake Spaulding dam to the South Yuba River and proposed *Block Flow* releases from Milton diversion dam to the Middle Yuba River (see next section):

- Scenario 1 − *Supplemental Flow* in South Yuba River
- Scenario 2 − *Supplemental Flow* in South Yuba River and *Block Flow* in Middle Yuba River
- Scenario 3 – *Block Flow* in South Yuba River and *Block Flow* in Middle Yuba River
- Scenario 4 – *Block Flow* in South Yuba River.

The rationales presented for the *Block Flow* recommendation and 19°C target water temperature by California Fish and Wildlife and the Foothills Water Network contain assumptions and associated estimates of the potential effect of the additional coldwater releases on foothill yellow-legged frog populations in the Middle Yuba River that are not consistent with model results provided by NID and PCWA. The additional flows dedicated to further reducing water temperature in the stream reach from 20°C to 19°C above Wolf Creek confluence would result in an uncertain and potentially adverse effect on special-status foothill yellow-legged frog populations in order to further benefit the resident rainbow trout population. According to the stakeholders, the existing trout fishery is of "remarkably good quality" under the existing license conditions and proposed increased minimum streamflows are likely to improve and enhance existing conditions. While the *Block Flow* condition further benefits resident rainbow trout in reaches farther downstream decreasing temperatures by about 1°C compared to the specified minimum streamflow, temperatures in the vicinity of Kanaka Creek (RM 16.6) and downstream could still exceed 22°C and approach 25°C in mid-summer. The Block Flow recommendation could adversely affect foothill yellow-legged frog in stream reaches where viable populations have been identified. To verify that proposed increased minimum streamflows provide the predicted enhancement of resident rainbow trout habitat and protection for foothill yellow-legged frog, NID (section 3.3.2.2.8, *Aquatic Biota*) proposed and Forest Service and BLM specified implementation of monitoring plans which would include fish populations, foothill yellow-legged frog, continuous monitoring of water temperature and stage, and channel morphology in Middle Yuba River. A monitoring plan for aquatic benthic macroinvertebrates would also be developed and implemented within 1 year of license issuance.

Monitoring of the effects on resident species of concern, if the NID and Forest Service proposed minimum streamflows are implemented, would provide data necessary to evaluate and document the benefits of increased minimum streamflows and ensure that foothill yellow-legged frog populations are not adversely affected and that coldwater habitat for resident rainbow trout is also protected. The results of annual monitoring would provide population and temperature data for review by the Consultation Group to evaluate the effectiveness of the minimum streamflow condition for meeting the 20°C management objective and to determine the effects of these flow modifications on foothill yellow-legged frog population abundance and distribution, as well as, resident rainbow trout. Three years after implementation of new minimum streamflows and monitoring program, NID should prepare a report evaluating the effects of flow and temperature on populations of foothill yellow-legged frog and resident

rainbow trout; the report should be filed with the Commission following review and approval by the Consultation Group

**Effect of Increased Releases for Minimum Flows on Reservoir Coldwater Storage**

Cold water is a limited, managed resource within project-affected stream reaches. Most of the water stored and transferred through project infrastructure is accumulated as snowfall during the winter. The amount of snowpack and the rate and timing of snowmelt affect the amount of cold water retained in storage, available for release downstream, and diversion across sub-basins for other consumptive uses. The ability to comply with minimum streamflows and meet water temperature objectives for coldwater habitat in project-affected stream reaches requires careful balancing of storage, release, and diversion across both projects, which has been simulated by the operations and temperature models developed by PG&E and NID.

**Upper Drum-Spaulding Project**

PG&E, the Forest Service, BLM, and California Fish and Wildlife have proposed conditions that would significantly increase the release of water from the coldwater pool of several project reservoirs (section 3.3.2.2.2, *Instream Flow*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*; section 3.3.2.2.2, *Instream Flow*, *Fordyce Lake Drawdown*). The timing and rate of the increased releases would affect the volume and temperature of available stored cold water in project reservoirs and the potential for project-affected stream reaches to remain in compliance with water temperature criteria.

*Our Analysis*

PG&E modeled water temperature using the CE-QUAL-W2 model for Fordyce Lake and Lake Spaulding in the Upper Drum-Spaulding Project (Spaulding No. 1 and No. 2 Development). The models were compared to observed data collected during water temperature monitoring surveys conducted in summer and fall of 2008 and 2009 (figure 3-96 and 3-97), which were relatively warm, dry years.

The majority of project reservoirs and project-affected stream reaches have good water quality and temperatures that generally meet coldwater habitat temperature criteria and support coldwater fisheries, particularly in portions of the project at higher elevations. South Yuba River upstream of Englebright Lake is designated as cold freshwater habitat and is listed under §303(d) of the CWA as impaired due to water temperature. Under existing license conditions water temperatures in the South Yuba River below Poorman Creek and below Canyon Creek in drier years can be stressful to resident rainbow trout and do not meet criteria for the cold freshwater habitat use designation. Under unregulated hydrologic conditions in the lower elevation reaches of South Yuba River above Englebright Lake, it is unlikely that natural flows would support coldwater habitat in many years. Cold water storage and management in project lakes and reservoirs provide the capacity and water resources to manage these stream reaches as coldwater habitat to protect and enhance resident coldwater fishery resources, including rainbow trout. Larger project lakes and reservoirs (e.g., Fordyce Lake and Lake Spaulding) exhibit strong seasonal stratification; the hypolimnetic cold water pool in these reservoirs and low-level release structures maintain coldwater habitat in downstream reaches throughout the summer in most years, particularly compared to model-predicted unregulated conditions. Smaller diversion impoundments and powerhouse forebays and afterbays typically have much smaller storage capacity, shorter residence times, and weak to no thermal structure during summer months (technical memorandum 2-2), thus limiting their utility for downstream water temperature management. Project-affected stream reaches at lower elevations, including the South Yuba River below Canyon Creek and the Deer Creek sub-basin, have daily average and maximum water temperatures that routinely exceed 20°C in mid-summer (technical memorandum 2-2) under the existing license, which can provide transitional habitat supporting a mix of cold and cool water species.

PG&E conducted a study (*Spaulding Power Intakes Variable Operations Analysis*, technical memorandum 2-2) to evaluate how the depth at which Spaulding no. 1 and no. 2 powerhouses withdraw water affects water temperatures in the South Yuba and Drum canals and temperature stratification in Lake Spaulding (the largest project storage facility). The effects of associated changes in coldwater storage extend to downstream reaches in Deer Creek (Deer Creek Project), South Yuba River, Bear River (Upper Drum-Spaulding Project), Auburn Ravine (Lower Drum Project), and Mormon Ravine (Lower Drum Project). During normal operations under the existing license, water withdrawal to supply the Spaulding no. 1 and no. 2 powerhouses is distributed and balanced between the upper and lower intake towers. The study demonstrated that water withdrawal from only the shallow powerhouse intake preserves the hypolimnetic cold water pool, but sends warmer water to Deer Creek via the South Yuba and Chalk Bluff canals and to the Bear River via the Drum and South Yuba canals. Primary use of the low level powerhouse intakes releases water about 2°C cooler to these canals, but depletes the Lake Spaulding cold water pool more rapidly.

Coldwater releases to meet proposed minimum streamflows in South Yuba River would be made from the cold water pool via the low-level outlet (elevation about 8,775 feet msl, about 65 feet deeper than the low-level powerhouse intake); *Supplemental Flow* releases could also be made through the low-level outlet, but could be partially made via the Spaulding no. 2 powerhouse. Water temperature profiles in mid-August to early September indicate that the low-level outlet is about 60 to 70 feet deeper than the thermocline and would release water to South Yuba River at a temperature range of 6 to 7°C (technical memorandum 2-2).

Based on field characterization of the thermal structure of Lake Spaulding and temperature modeling of flow releases to South Yuba River from the Lake Spaulding cold water pool, the cold water pool is generally adequate to maintain temperatures less than 20°C through the summer in South Yuba River to the confluence of Canyon Creek and to meet the goals for management of coldwater habitat (figures 3-103 through 3-106). As the summer season progresses, the cold water pool is reduced, water in the vicinity of the low-level outlet in Lake Spaulding becomes warmer, and downstream water temperatures above Canyon Creek begin to approach 20°C, particularly during extended periods with high regional air temperatures.

Model results indicate that the proposed measure to drawdown Fordyce Lake more rapidly in late spring and summer with higher flows to Fordyce Creek would help maintain higher water surface elevations in Lake Spaulding longer into the summer than under the existing license. The seasonal reduction in coldwater storage in Fordyce Lake and Lake Spaulding and seasonal variation in outlet water temperatures associated with the proposed minimum streamflows is demonstrated by model results based on water years 2008 to 2009 (figures 3-103 through 3-106). This model run did not include the proposed *Supplemental Flows* above the proposed minimum streamflows to South Yuba River, but did include a buffer of 2 cfs to ensure minimum streamflow compliance. Water cooler than 10°C in Lake Spaulding is depleted at the low-level outlet by the beginning of August, and the majority of remaining storage is between 15 and 20°C by September 1. The proposed *Supplemental Flows* would likely accelerate the depletion of the coldwater pool in Lake Spaulding, which could affect the ability to maintain late season downstream water temperatures at Canyon Creek below 20°C, particularly during drier water years. Implementation of California Fish and Wildlife's *Block Flow* recommendation would further exacerbate the depletion of the coldwater pool in Lake Spaulding and potentially limit the ability to meet the water temperature management goal of 20°C at Canyon Creek in some years.

The model indicates that implementation of *Supplemental Flow* releases during 2008 and 2009 would have maintained water temperatures within 1 mile below Lake Spaulding dam below 15°C until about September 1; water temperatures would have peaked at about 16 to 17°C in mid-September (figures 3-103 and 3-104). About 8 miles downstream, above the Canyon Creek confluence, mean daily

water temperatures would have remained below 20°C for both 2008 and 2009 water year conditions. The model predicts that implementation of the South Yuba River *Supplemental Flows* condition in addition to the proposed minimum flow schedule would result in reduction of the cold water pool earlier in the season, but would support the management objective of maintaining summer water temperatures at or below 20°C in the vicinity of Canyon Creek.

**Yuba-Bear Project**

NID and the Forest Service proposed measures and conditions that would significantly increase the release of water from the coldwater pool of several project reservoirs (section 3.3.2.2.2, *Instream Flow*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*). The timing and rate of the increased releases would affect the volume and temperature of available stored cold water in project reservoirs and the potential for project-affected stream reaches to remain in compliance with water temperature criteria.

*Our Analysis*

NID modeled water temperature using the CE-QUAL-W2 model for Jackson Meadows reservoir, Bowman Lake, and Rollins reservoir in the Yuba-Bear Project to assess the effect of proposed increased minimum streamflows on coldwater storage and the ability to meet downstream water temperature management objects. NID used the Hydrocomp Forecast and Analysis Modeling (HFAM) water temperature model for Middle Yuba River downstream of Jackson Meadows dam and Milton diversion dam and for Canyon Creek downstream of Bowman-Spaulding diversion dam and the confluence with Texas Creek. NID also used the USGS Stream Segment Temperature (SSTEMP) to model the Bear River downstream of Drum afterbay, Dutch Flat afterbay, and the Bear River canal diversion dam. The models were compared to observed data collected during the water temperature monitoring surveys conducted by the applicants in summer and fall of 2008 and 2009 (both relatively warm, dry years).

The majority of project reservoirs and project-affected stream reaches have good water quality and temperatures that meet coldwater habitat temperature criteria and support coldwater fisheries, particularly in portions of the project at higher elevations and compared to model-predicted unregulated conditions. Larger lakes and reservoirs (e.g., Jackson Meadows reservoir and Bowman Lake [Bowman Development] and Rollins reservoir [Rollins Development]) exhibit strong seasonal stratification; the hypolimnetic cold water pool in these lakes and low-level release structures maintain coldwater habitat in downstream reaches throughout the summer in most years. Smaller diversion impoundments and powerhouse forebays and afterbays typically have much smaller storage capacity, shorter residence times, and weak to no thermal structure during summer months (technical memorandum 2-2). Consequently, these smaller project facilities generally have less flexibility for flow and temperature management in downstream reaches. Project-affected stream reaches at lower elevations, including the Middle Yuba River below the Wolf Creek confluence and Canyon Creek upstream of the South Yuba River, have summer daily average water temperatures that can exceed 20°C in mid-summer (technical memorandum 2-2) under the existing license and may provide transitional habitat supporting a mix of cold and cool water species.

Water temperature in Middle Yuba River below Milton diversion dam is essentially controlled by coldwater storage in Jackson Meadows reservoir and flow release to Milton diversion dam, which has negligible storage capacity. Modeling based on the 2008 and 2009 water years indicates that water temperature at the low-level outlet at Jackson Meadows dam would be less than 10°C through September 1 (figures 3-105 and 3-106). Water temperatures in Middle Yuba River downstream of the Milton diversion dam are responsive to fluctuations in air temperature, but would remain below 15°C until mid-September and below 20°C above the Wolf Creek confluence through the summer, except for short periods, under NID's proposed minimum streamflows.

Coldwater releases from Bowman-Spaulding diversion dam to Canyon Creek would be made from the coldwater pool of Bowman Lake via the low-level outlet at 5,400 feet msl to comply with minimum streamflows, flow cessation, and flow augmentation, as necessary. The thermocline in Bowman Lake is relatively broad in August, with water temperature decreasing from 18°C to 10°C over 100 feet (i.e., from a depth of 60 to 160 feet) (technical memorandum 2-2, *Water Temperature Monitoring*). Water temperatures at the low-level outlet during August varied among years sampled (2004, 2007, 2008, and 2009) between 10°C and 13°C. Water temperatures in Canyon Creek below the Bowman-Spaulding diversion dam are generally below 15°C most of the year except from mid-August to mid-September when temperatures increase to 16 to 17°C (technical memorandum 2-2). Above the confluence with South Yuba River 10.5 miles downstream, the model predicts that water temperatures would be 3 to 12°C warmer than temperatures immediately below Bowman-Spaulding diversion dam from early May to early September. Model-estimated peak daily average water temperatures at the downstream location exceed 20°C for a portion of the time between early July and early September.

Water temperatures in lower Canyon Creek are controlled by flow release from Bowman Lake dam into the Bowman-Spaulding diversion dam. Under the proposed minimum flows, the low-level outlet at Bowman Lake dam would release water less than 10°C until the beginning of August; after mid-August, the cold water pool would be reduced and water temperature in Bowman Lake in the vicinity of the low-level outlet would be 15 to 20°C (figures 3-107 and 3-108). Any additional supplemental releases in excess of minimum streamflow requirements and spill cessation flows would further reduce the cold water pool resulting in warmer releases earlier in the summer to Canyon Creek. Water temperatures in the downstream reach of Canyon Creek to the South Yuba River would remain below 20°C for most of the summer (figures 3-107 and 3-108).

Water temperatures in lower Bear River are controlled by flow release from Rollins reservoir dam into the Bear River canal diversion dam. Under the proposed minimum streamflows, the model indicates that the low-level outlet at Rollins reservoir dam would release water from 10 to 15°C until the beginning of August; thereafter, the cold water pool would be reduced, and water temperature in Rollins reservoir in the vicinity of the low-level outlet would be 15 to 20°C (figures 3-109 and 3-110). Water temperatures in the 10.5-mile downstream reach of Bear River from Rollins dam to Lake Combie would remain below 20°C for most of the summer (figures 3-109 and 3-110).

The Forest Service condition requires that a LWD Management Plan that includes the components specified in the condition be completed in consultation with the agencies and submitted to the Commission for approval within 1 year of license issuance. The agencies have indicated that agreement on a Plan has been reached, but a final plan has not been submitted to the Commission at this time. The schedule for implementation of the Forest Service LWD condition would result in introduction of LWD below project impoundments (where a need is identified during the survey phase) before reintroduction of anadromous salmonids is likely to occur. Proposed monitoring of the condition of stream fish assemblages (resident rainbow trout in particular) in the South Yuba River would also provide insight into the response of habitat conditions as a result of implementation of proposed LWD measures and streamflow measures and associated changes in water temperatures in these stream reaches as they might apply to anadromous fish species. Monitoring of conditions in stream reaches where LWD is introduced would provide information to evaluate whether additional measures would be necessary to support anadromous salmonids when reintroduction begins.

**Effect of Project Operations on Mercury Transport and Bioaccumulation**

Many Sierra Nevada streams, including some project-affected stream reaches, have a legacy of mercury contamination in stream sediment and fish tissue. Elevated methylmercury concentrations in fish tissue have been reported throughout the Sierra Nevada region, typically linked to historical gold mining

activities. Forest Service revised condition 35specifies and California Fish and Wildlife recommendation 8 recommend development of a plan for periodic monitoring of mercury bioaccumulation in fish tissue from stream reaches of interest in all four projects. The agencies do not identify the objectives of this monitoring effort, monitoring frequency, or stream reaches to be monitored. The Forest Service does not include a final 4(e) condition for monitoring mercury bioaccumulation instead deferring to the California Water Board water quality certification process. PG&E and NID observed that the relicensing bioaccumulation study confirmed what numerous studies performed by university and state researchers found previously: mercury is present in the subwatersheds and bioaccumulates through the food chain. Based on the existing high water quality and sufficient existing bioaccumulation data, PG&E and NID state that additional monitoring of mercury bioaccumulation would provide no useful new information.

In comments on the draft EIS, the Forest Service and California Fish and Wildlife indicated that they have continued to negotiate with the licensees relative to a monitoring plan for mercury contamination in fish tissue in project-affected waters, but have not reached an agreement on the scope of such monitoring.

**Our Analysis**

PG&E and NID collected information on the frequency and magnitude of mercury contamination in fish tissue in project-affected stream reaches. Of the 66 fish collected for relicensing studies, 52 had mercury concentrations in fillet tissue greater than the California Office of Environmental Health Hazard Assessment (OEHHA) Advisory Tissue Level (ATL) of 0.07 parts per million (ppm) methylmercury wet-weight: (1) 19 of the 31 rainbow trout; (2) 24 of the 26 brown trout; and (3) all of the kokanee and Chinook salmon. Fish tissue was collected for analysis of methylmercury concentrations in five reservoirs: Jackson Meadows reservoir and Bowman Lake in the Bowman Development of the Yuba-Bear Project and Faucherie Lake, Fordyce Lake, and Lake Spaulding in the Spaulding No. 1 and No. 2 Development of the Drum-Spaulding Project. Of the five reservoirs and four species (rainbow and brown trout, kokanee, and Chinook salmon) sampled, tissue concentrations were below the ATL only for rainbow trout collected from Bowman Lake. A majority of individual fish in all other reservoir-species combinations had methylmercury concentrations greater than the ATL, as well as average tissue concentrations greater than the ATL.

The Bear River from Rollins reservoir to Lake Combie, including Rollins reservoir and South Yuba River below Lake Spaulding, are listed under §303(d) for mercury impairment (technical memorandum 2-1), and OEHHA issued fish ingestion advisories Rollins reservoir and Lake Combie (OEHHA, 2003; California Water Board, 2006; OEHHA, 2009). Fish ingestion advisories for South Yuba River below Lake Spaulding and for the section of the Bear River downstream of Rollins reservoir were subsequently retracted (OEHHA, 2009) because the data were inadequate for a determination of risk.

While elevated methylmercury levels in fish tissue associated with historical mining activities have been reported throughout the Sierra Nevada region, PG&E and NID propose no significant changes to project operations that would affect methylmercury distribution or concentrations in sediment, water, or fish tissue in the project area. It is unlikely that project operations cause or facilitate bioaccumulation of mercury in fish tissue. No programs to mitigate widespread historical mercury sources in these watersheds are anticipated. Methylmercury concentrations in fish tissue are likely to remain high in the future with all other factors affecting uptake remaining unchanged. Therefore, we do not expect any changes in methylmercury concentrations in the environment or in the tissue of target sportfish as a result of project operations. Although monitoring fish tissue from selected stream reaches (e.g., where specific historical mining concerns have been identified and heavy recreational fishing pressure exists) could

provide data useful to OEHHA for determining the need for consumption advisories, such efforts would not be warranted by project operations. Given the ubiquitous nature of elevated mercury in sediment and fish tissue from streams, lakes, and reservoirs in the region and the existing consumption advisories, additional monitoring of fish from project lakes/reservoirs would likely provide little new information to guide decisions relative to consumption advisories.

#### 3.3.2.2.8 Aquatic Biota

**Upper Drum-Spaulding Project**

**Protection of Fish in Project Canals**

The existing project canal intakes are not screened to exclude entry by resident fish and any fish that enter the canals are at risk when the canals are drained during an outage. When a canal is dewatered during routine planned and unplanned maintenance and emergency outages, fish can become stranded in the canal as water levels drop. To minimize potential mortality to fish during outages, PG&E proposes (DS-AQR2) to implement a canal fish rescue plan, the *Fish Protection and Management During Canal Outages Plan*. PG&E filed their *Fish Protection and Management During Canal Outages Plan* (dated February 2013) on November 21, 2013. The plan affects facilities associated with the Drum No. 1 and No. 2 Development and Alta Development. The Forest Service (condition 33) and BLM (condition 5) specify that PG&E would implement the plan filed (November 2013) with the Commission.

California Fish and Wildlife (recommendation 3) initially recommended that PG&E develop a plan in coordination with the agencies within the first year following license issuance. In comments on the draft EIS, the agency indicated that they are also in agreement with the filed plan.

PG&E's plan describes the canal facilities (table 3-196) and locations where fish management and response actions would be implemented at the time of an outage; maps identify the type of facility (e.g., flume, canal, and tunnel) and access points. The plan also describes the periods when outages are most likely to occur at each facility and outlines the procedures that would be implemented for drawdown of these water conveyance structures and for fish management and protection. The plan also includes protocols for agency notification and consultation during these events and for annual planning.

*Our Analysis*

The plan submitted by PG&E provides a comprehensive approach for communication and planning and for implementation of protocols to collect and relocate, as necessary, fish that are stranded in a canal when the canal is taken out of service for maintenance or in the event of an emergency. The plan as filed describes effective measures that would be protective of aquatic resources within the project canals. The filed plan would be included in the license and implemented within 90 days of license issuance.

**Reservoir Management Effects on Aquatic Biota**

The increased minimum streamflows, spill cessation schedules, and supplemental flows for water temperature management and recreational boating (section 3.3.2.2.2, *Instream Flow*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*; section 3.3.2.2.7, *Flow Augmentation for Water Temperature Management;* section 3.3.5.2, *Recreation Resources)* could result in earlier and larger drawdown of some project lakes/reservoirs, potentially affecting shallow water lake habitat, important juvenile-rearing habitat for many species, as well as recreational access and use of reservoir facilities. Many of the larger lakes/reservoirs are managed for and receive heavy recreational fishing pressure; annual stocking is a key component of California Fish and Wildlife's recreational fishery management

program. Although natural reproduction occurs in some of these project waters, stocking is necessary to sustain populations of game fish in waters with high angler usage.

PG&E proposes (DS-AQR3) to stock Lake Spaulding. Forest Service recommendation 8 and California Fish and Wildlife recommendation 17 recommend a fish stocking program to support recreational fishing that includes 16 lakes that are part of the Upper Drum-Spaulding Project in addition to Lake Spaulding. Many of these additional lakes are small, more remote, high elevation waters. We analyze these conflicting stocking proposals in more detail in section 3.3.5.2, *Recreational Resources*.

**Monitoring of Fish Populations in Project-affected Stream Reaches**

PG&E proposes several measures to improve flows and maintain water temperatures in project-affected stream reaches below project dams and diversions to improve aquatic habitat and enhance aquatic resources (section 3.3.2.2.2, *Instream Flow*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*; section 3.3.2.2.7, *Flow Augmentation for Water Temperature Management*). PG&E did not propose continued monitoring in these project stream reaches in its final license application.

Amended revised Forest Service condition 51 specifies implementation of the Fish Population Monitoring Plan filed with the Commission by PG&E on November 21, 2013. California Fish and Wildlife (recommendation 8) initially recommended monitoring the stream fish community in large rivers and streams and small, higher elevation headwater streams; species composition, abundance, biomass, size and age structure, and relative stock density would be analyzed. In comments on the draft EIS (August 2013), California Fish and Wildlife indicated that considerable progress had been made on the scope of the Fish Population Monitoring Plan, but agreement had not been achieved at that time.

The Fish Population Monitoring Plan filed (November 2013) by PG&E for the Drum-Spaulding Project includes two levels of sampling: qualitative (Level I) using single pass electroshocking, and quantitative (Level II) using multiple pass electroshocking and snorkeling. For Level I sampling fish population analysis would be limited to a summary of species composition, size, relative abundance, CPUE comparison, and distribution. Accurate size measurements would allow for length frequencies to be developed and determination of age class. Level II sampling would allow statistical analysis of age structure, fish population and biomass, and fish size and condition. Table 1 in the filed plan identifies 14 stream reaches to be sampled using Level I methods following any year in which the minimum flow setting measure[16] cannot be met. Table 1 also identifies seven stream reaches that would be sampled using Level II methods in years 3, 4, 9, 10, 14, 15, 19, 20, 24, and 25 with sampling after year 25 assumed to be handled during the next relicensing process for a 30-year license. One additional stream reach, South Yuba River between Fall and Canyon Creeks, would be sampled at Level II annually for the first 10 years of the license and thereafter during years 14, 15, 19, 20, 24, and 25.

[16] Many small project reservoirs are in remote areas at high elevation that typically develop deep snow pack during the winter; roads to access these sites are not maintained during the winter and access can be difficult and hazardous. Forest Service condition 28 stipulates that the release valve at the dam headworks at 16 of the remote reservoirs would be set to the appropriate minimum streamflow in November before weather and road closures prevent access; the release valve would be set again the following spring as soon as access to the sites is possible.

*Our Analysis*

Changes in monthly minimum streamflows, spill cessation schedules, and supplemental South Yuba River releases, which we discuss in depth previously, are key measures designed to protect, maintain, and enhance aquatic habitat for resident species in project-affected stream reaches. The flow enhancements in many stream reaches vary seasonally and are based on water year type. The specified minimum streamflows have been selected to balance the flow and temperature requirements of various aquatic species (e.g., resident rainbow trout, hardhead, foothill yellow-legged frog) and to balance associated costs in reduced power generation and risk to water delivery, particularly during exceptionally dry conditions. An aquatic monitoring program would provide a mechanism for evaluating the benefit of the project's operational changes and assessing if they are accomplishing the intended objectives predicted by the habitat, temperature, and operations models.

Annual review of program results by the Consultation Group would involve the resource agencies in assessing the success of the proposed flow conditions and provide a process for adjusting the monitoring program, if needed.

The stream fish monitoring plan proposed by PG&E targets several stream reaches most likely to benefit from proposed increased minimum streamflows and anticipated decreases in water temperature and improvements in aquatic habitat. The proposed stream reaches were previously surveyed during the relicensing studies; use of the same methods would provide a before and after comparison of stream populations. The proposed plan would provide intermittent surveys throughout the first 25 years following license issuance, which should be adequate to depict community changes and trends in these stream reaches. At the end of this period, an evaluation of the population trends and habitat conditions would provide a basis for assessing the adequacy and benefits of the environmental measures.

**Effect of Operations on Aquatic Habitat in Project-affected Stream Reaches**

The quantity and quality of aquatic habitat are affected by project operations, including the influence of flow, wetted perimeter, magnitude and frequency of inundation, availability and dispersal of LWD, the diversity and persistence of riparian vegetation and distribution and characteristics of sediment/substrate. The objectives of various measures proposed by PG&E and recommended by relicensing stakeholders are to improve aquatic habitat conditions for resident aquatic biota compared to existing conditions. We discuss the anticipated enhancements of aquatic habitat as a result of proposed minimum streamflows and flow management previously (section 3.3.2.2.2, *Instream Flow*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*; section 3.3.2.2.7, *Flow Augmentation for Water Temperature Management*).

Reservoir operations and regulated flows have the potential to alter two key components of habitat for aquatic resources: (1) the availability of LWD in downstream reaches; and (2) the characteristics and distribution of substrate material in streams. In addition, rapid fluctuations and high flows have the potential to scour riparian vegetation that can provide bank stability and cover during periods of inundation. LWD can provide cover, affect habitat diversity, and contribute to diversity of channel morphology and substrate; under the existing license, this material is removed from reservoirs as needed and stockpiled or burned. The Forest Service (condition 52) specifies and California Fish and Wildlife (recommendation 9) recommends a project-wide LWD management program, including survey of locations and quantity of LWD collected under the existing license and identification of appropriate locations downstream of project dams for reintroduction of LWD that would be mobilized during 2- and 5-year flow events. PG&E's alternatives (December 21, 2013) to Forest Service conditions indicate its concurrence with the revised Forest Service condition for development and implementation of an LWD management plan. In comments on the draft EIS (August 22, 2013) Forest Service and California Fish

and Wildlife indicated that agreement had been reached on the LWD Plan, but a plan was not submitted with final conditions as anticipated.

A Channel Morphology Monitoring Plan was filed with the Commission on November 21, 2013 and PG&E has agreed to implement that plan. The plan describes sampling methods to be implemented at Fordyce Creek below Fordyce dam and South Yuba River upstream of the confluence of Canyon Creek. Monitoring would be conducted during the first year following license issuance and then 3 years following spill events over the next 9 years of the license. A spill at Fordyce dam would be defined and an instantaneous flow greater than 3,000 cfs at the minimum streamflow compliance gage downstream of the dam. A spill event on the South Yuba River would be an instantaneous flow of 5,000 cfs at Lang's Crossing downstream of Spaulding dam. Field measurements would provide information to document and characterize substrate, channel and bank stability, and channel shape at multiple fixed transects in each stream reach. Data would be used to generate scale maps for each reach for comparison among monitoring years.

NMFS 10(j) (recommendations 4.2.1 and 4.2.2) and FWS (recommendation 5) propose an LWD management plan for the South Yuba River below Lake Spaulding (Spaulding No. 1 and No. 2 Development) to support natural ecosystem processes and the proposed reintroductions of anadromous salmonids to the upper Yuba River above Englebright dam. NMFS also recommends an interim measure for passage of LWD in South Yuba River at Lake Spaulding dam beginning at license issuance until a LWD Management Plan can be developed and implemented when reintroduction occurs.

NMFS 10(j) recommendation 4.3 and FWS recommendation 5 also include a coarse substrate management plan for the South Yuba River below Lake Spaulding dam to support natural ecosystem processes and the proposed reintroductions of anadromous salmonids to the upper Yuba River above Englebright dam.

A Riparian Vegetation Monitoring Plan was filed with the Commission by Forest Service and BLM on April 11, 2014 and PG&E agreed to implement that Plan (May 12,2014). The plan describes the monitoring methods, data analysis, and reporting requirements to be implemented in Fordyce Creek, South Yuba River upstream of Canyon Creek, and the North Fork of the North Fork American River below Lake Valley reservoir. Three to six monitoring transects would be co-located in each stream reach with cross sections measured under the Channel Morphology Monitoring Plan. Monitoring would be conducted during the first year following license issuance, years 5 and 10 of the new license, and one additional year between year 1 and year 10 following a spill event. The need for continued monitoring beyond year 10 would be determined based on the review of the monitoring results by the agencies in coordination with PG&E.

*Our Analysis*

Considerable flow and habitat modeling performed by PG&E in coordination with other relicensing stakeholders demonstrates that the proposed flow measures should significantly improve the quantity and quality of aquatic habitat in project-affected stream reaches as compared to the existing license. LWD can be an important component of aquatic habitat structure in some watersheds; the quantity and type of LWD depends on characteristics of the watershed (e.g., vegetation, slope, soil depth) and stream channel (e.g., sinuosity, entrenchment, stability, gradient, riparian connectivity).

The LWD management plan specified by the Forest Service, to which PG&E has agreed, requires an initial survey of LWD during the first license year and periodic follow-up surveys at 5-year intervals. The proposed surveys would identify: (1) project reservoirs/lakes where LWD is trapped and accumulates in impoundments; (2) stream reaches where, as a result of project operations, the quantity and distribution of LWD is less than would be expected given the watershed and channel characteristics;

(3) sites with access and hydraulic characteristics that could serve as appropriate locations for reintroduction of LWD below impoundments; (4) appropriate quantities of LWD to introduce; and (5) whether reintroduced LWD is being adequately redistributed through the stream reach. The scope of the LWD management plan should be adequate to identify stream reaches with limited LWD as a result of project operations that would benefit from reintroduction of LWD below project dams.

Relicensing studies (technical memorandum 1-1, *Channel Morphology*) generally indicated that stream channels in project-affected stream reaches are stable, and substrate was typically composed of medium to coarse material. Specifically, these studies concluded that poor substrate quality and diversity observed in some stream reaches are typically relic conditions associated with historic hydraulic mining operations. Historic and current mining activities destabilize fledgling riparian growth and bed and banks. Historic mining created huge sediment reservoirs through which many channels continue to work. These deposits are noncohesive, do not retain water well, and are not conducive to strong riparian growth. The *Channel Morphology* study found the mobility of spawning gravels in the stream reaches below Lake Spaulding dam is no different than would exist under unregulated conditions. PG&E and the relicensing stakeholders did not identify any stream reaches where substrate conditions associated with project operations were of concern for resident aquatic species.

Available information suggests that some existing habitat conditions associated with LWD would likely support anadromous salmonids. Relicensing studies indicated that the amount of LWD observed in project-affected stream reaches (technical memorandum 1-1, *Channel Morphology, Attachment 1-1I*) is less than observed in other Sierra Nevada streams (Ruediger and Ward, 1996) and is frequently not immersed (or wetted) within the stream channel. Ruediger and Ward (1996) and Berg et al. (1998) reported that LWD was stable with little movement and played a limited role in aquatic habitat; less than 6 percent was involved in pool formation or sediment retention. PG&E reported that the volume of LWD transported to and removed from project reservoirs is also relatively low and that LWD passes over most small project dams and diversion dams during periods of high flow. The scope of the Forest Service condition and the LWD Plan to be developed in consultation with the agencies would assure that LWD is transferred past project dams in reservoirs where LWD is trapped, collected, and removed from the watershed as part of existing routine maintenance procedures. Proposed LWD surveys would document the quantity of LWD that is passively transferred from above impoundments to the stream reach below the project dam.

NMFS recommended an interim LWD measure that calls for specific volumes of LWD to be introduced to the South Yuba River. These recommended LWD volumes for South Yuba River are based on higher LWD volume, mobility, and recruitment estimates from East Fork Creek, a tributary to Middle Yuba River about 11 miles downstream of Milton diversion dam (Yuba-Bear Project). Riparian conditions and channel characteristics play an important role in the quantity and mobility of LWD within a watershed (Ruediger and Ward, 1996). Given the low volume of LWD generated in higher elevation, upstream project-affected reaches, East Fork Creek may not be representative of conditions that generate and transport LWD in much of the upper watersheds affected by project operations.

The reintroduction of anadromous salmonids to the upper Yuba River above Englebright dam is not imminent. The LWD surveys specified by the Forest Service would provide information for developing LWD management plans which would be implemented for specific stream reaches, as appropriate. This information would be used to evaluate the need for introduction of LWD in project-affected stream reaches and is appropriate for resident aquatic resources in the South Yuba River.

The Forest Service condition requires that a LWD Management Plan meeting the specification provided be completed in consultation with the agencies and submitted to the Commission for approval within 1 year of license issuance. The agencies have indicated that agreement on a Plan has been reached,

but a final plan has not been submitted to the Commission at this time. The schedule for implementation of the Forest Service LWD condition would result in introduction of LWD below project impoundments (where a need is identified during the survey phase) before reintroduction of anadromous salmonids is likely to occur.

The filed Channel Morphology Monitoring Plan agreed to by PG&E and the agencies would provide detailed data to characterize channel and substrate conditions, stability, and response to high flow events in Fordyce Creek and South Yuba River. Data generated during monitoring surveys can be used to assess spawning substrate quality and quantity for resident rainbow trout and future reintroduction of anadromous salmonids in the upper Yuba River watershed.

Proposed monitoring of the condition of stream fish assemblages (resident rainbow trout in particular) and channel morphology in the South Yuba River would also provide insight into the response of habitat conditions as a result of implementation of proposed LWD measures and streamflow measures and associated changes in water temperatures in these stream reaches as they might apply to anadromous fish species. Monitoring of conditions in stream reaches where LWD is introduced would provide information to evaluate whether additional measures would be necessary to support anadromous salmonids when reintroduction begins.

The filed Riparian Vegetation Monitoring Plan agreed to by PG&E and the agencies would provide detailed data related to the diversity and persistence of herbaceous and woody vegetation in riparian habitat and response to high-flow events in Fordyce Creek, South Yuba River, and North Fork of the North Fork American River. Sediment deposits associated with historic and current mining activities are susceptible to scouring that can destabilize bed and banks and adversely affect growth of fledgling riparian vegetation. License conditions have been proposed to protect and enhance aquatic habitat conditions through management of the frequency of spills and the rate of recession of flow following spills. The proposed Lake Fordyce drawdown condition would also affect high flows in Fordyce Creek below Lake Fordyce dam. The proposed Riparian Vegetation Monitoring Plan in conjunction with the Channel Morphology and LWD Monitoring Plans would provide data to evaluate the effectiveness of these license conditions.

**Effects of Project Operations on Benthic Macroinvertebrates**

Benthic macroinvertebrate communities can be highly influenced by a variety of naturally occurring and human-induced factors, including: (1) annual hydrologic cycle; (2) timing and magnitude of spring outflows; (3) streambed substrate composition; (4) channel gradient; (5) bank erosion and sediment deposition; (6) pollution; (7) riparian habitat degradation; (8) hydraulic mining; and (9) recreational activities. PG&E's *Channel Morphology* studies indicate that project operations have minimal effect on substrate conditions in project-affected stream reaches.

California Fish and Wildlife (recommendation 8) recommends monitoring the benthic macroinvertebrate community in large rivers and streams and small, upper elevation streams; diversity, biomass, and various unspecified community metrics would be analyzed. The Forest Service (condition 51) specifies monitoring of benthic macroinvertebrates at 6 sites on South Yuba River, Fordyce Creek, and North Fork of the North Fork American River. PG&E's alternative (December 20, 2013) to the Forest Service condition proposes to conduct monitoring for aquatic benthic macroinvertebrates in the same stream reaches proposed by Forest Service, but at fewer sites within each reach. PG&E indicates that the benthic macroinvertebrate monitoring proposed in the Forest Service condition would use the Surface Water Ambient Monitoring Program methods used during the relicensing studies, which demonstrated that benthic macroinvertebrate resources were adequate for maintenance of healthy fish populations and do not demonstrate effects of project operations. As specified by Forest Service, PG&E

agrees to develop an aquatic benthic macroinvertebrate monitoring plan in consultation with the agencies to be filed for Commission approval within 1 year of license issuance.

*Our Analysis*

Benthic macroinvertebrates are an important component of stream ecosystems and a primary food source for fish communities in project-affected stream reaches. For this reason, PG&E's relicensing studies included *Aquatic Macroinvertebrates* (technical memorandum 3-10). Sampling and analysis conformed to the targeted riffle composite protocol used to describe benthic macroinvertebrate assemblages and physical habitat in the California Water Board's Surface Water Ambient Monitoring Program (February 2007). Eighteen common macroinvertebrate metrics and two multi-metric indexes were used to evaluate each site. The multi-metric indexes included the index of biotic integrity (IBI) and the multi-metric index (MMI). Both of these multi-metric indexes were designed to evaluate the impacts of hydropower operations on stream condition as reflected by the benthic community; the MMI calculated by PG&E is specific to the west slope of the Sierra Nevada. Rehn (2009) developed a benthic macroinvertebrate-based IBI metric for use in evaluating effects of hydroelectric projects; all other factors being equal, this metric is generally lowest immediately downstream of dams and diversions and increases with distance below these structures. However, stream characteristics, such as substrate type and riparian vegetation composition, can exercise a greater effect on benthic macroinvertebrate community metrics, regardless of distance from dams or diversion structures (Bahuguna et al. 2004).

In general, IBI and MMI scores from the relicensing studies were slightly higher at middle elevation sites (i.e., 2,501 to 6,500 feet msl) and at sites classified as montane compared to foothill sites (i.e., 900 to 2,500 feet msl). Lower scores were more common in the low elevation western Placer County stream reaches. The IBI and MMI scores for multiple sites within watersheds did not show consistent trends with distance downstream from project reservoir or diversion dams. Other habitat factors (e.g., ecoregion, riparian vegetation, substrate conditions not affected by project operations, historic non-project uses) appeared to exercise a stronger influence on the benthic macroinvertebrate community. Metrics for a reference site in the upper North Yuba River were in the same range as higher elevation sites in Middle Yuba River and South Yuba River Basins.

The benthic macroinvertebrate community appears to be adequate to support the stream fish community in these stream reaches. Given that relicensing studies could not distinguish project-related influences on the benthic macroinvertebrate community, it does not appear likely that flow changes related to new minimum flow regimes would be discernible with continued project-wide benthic macroinvertebrate survey methods. Consequently, we do not find that continued project-wide benthic macroinvertebrate monitoring recommended by California Fish and Wildlife would generate data adequate to evaluate the effects of flow change in project-affected stream reaches or inform future decisions related to project impacts, minimum streamflow needs, or fishery management in these stream reaches. However, the monitoring plan that would be developed as specified by Forest Service and proposed by PG&E would provide more focused data to evaluate the effects of significant changes in flow characteristics proposed under the new license conditions for South Yuba River below Spaulding dam, Fordyce Creek below Fordyce Lake, and North Fork of the North Fork American River below Lake Valley reservoir dam.

**Effects of Project Operations on Special-status Species**

Increased flows, reduced flow fluctuations, and cooler water temperatures that would result from flow measures (section 3.3.2.2.2, *Instream Flows*; 3.3.2.2.4, *Recession from Peak Flows and Flow Fluctuations*; and section 3.3.2.2.7, *Flow Augmentation for Management of Water Temperature*) proposed by PG&E and the relicensing stakeholders to enhance aquatic habitat, also have the potential to affect habitat for special-status species in some project-affected reaches.

*Our Analysis*

Only one special-status fish species occurs in the vicinity of the projects, hardhead (*Mylopharodon conocephalus*), which is listed by the Forest Service as a Sensitive Species and by California Fish and Wildlife as a California Species of Special Concern. Hardhead may occur in lower elevation sections of the South Yuba River and in lower Auburn Ravine (proposed Lower Drum Project); however, hardhead was not found in any reservoirs or stream reaches during PG&E's studies. In comments on the draft EIS, PCWA reported that surveys during 2012 collected hardhead in South Yuba River between RM 8 and RM 20.2 near Humbug Creek; potential hardhead in mixed minnow aggregations were observed upstream to RM 30.6 near Scotchman Creek. Hardhead inhabit areas that have clear, deep pools with sandy, gravel/boulder substrates and slow water velocities. Hardhead generally prefer warmwater, occurring in streams that reach summer water temperatures greater than 20°C. Under laboratory conditions, their reported optimum water temperature range is 24°C to 28°C (Moyle, 2002).

The benthic macroinvertebrate community is used by the Forest Service as a Management Indicator Species. In comments on the draft EIS, Forest Service indicated that the black Juga snail (*Juga nigrina*) has been added to the list of Forest Service Sensitive Species; however, this species was not found during the special-status mollusks survey conducted by the licensees (Technical Memorandum 3-11).

Increased flows as a result of flow measures proposed by PG&E and the relicensing stakeholders for the South Yuba River have the management objective of enhancing aquatic habitat for resident rainbow trout. These measures would extend areas of South Yuba River that generally remain below 20°C year-round farther downstream than under the existing license; the Supplemental Flow condition has a management objective of maintaining water temperatures above the confluence of Canyon Creek at 20°C. While this would expand optimal habitat for trout, it has the potential to displace optimal habitat for hardhead farther downstream to stream reaches closer to Englebright Lake; temperature modeling indicates that water temperatures in the South Yuba River above Englebright reservoir under the proposed license conditions would be 1 to 2°C cooler than under the existing license. Temperature modeling (section 3.3.2.2.7, *Flow Augmentation for Management of Water Temperature*) indicates that the effect of higher flows on reducing water temperature is dissipated with distance downstream by the warming effect of air temperature. Given that no hardhead were observed in the reaches of the South Yuba River between Lake Spaulding dam and Poorman Creek[17] and the interaction of air and water temperatures over distance, it is not likely that the higher proposed flows and Forest Service *Supplemental Flows* in the South Yuba River would have a significant adverse effect on hardhead habitat.

**Implementation of Monitoring Plans and Annual Review of Monitoring Results**

The agencies involved in the relicensing process have management responsibilities for aquatic resources in project-affected stream reaches and have proposed a variety of conditions and recommendations through their authority under sections of the FPA. These agencies and PG&E have recommended and proposed measures designed to enhance aquatic habitat for target resident species and have proposed plans of different scales for monitoring the effects of flow-related changes on aquatic resources under the new license. Periodic review of the results of the monitoring plans would assess the

[17] PCWA reported collecting hardhead from South Yuba River between Englebright reservoir and Humbug Creek (RM 19.6).

effectiveness of proposed protection and enhancement measures and provide recommendations to enhance the value of the monitoring program.

The Forest Service (condition 51) specifies that PG&E implement monitoring plans filed with the Commission (November 21, 2013) for fish populations, foothill yellow-legged frog, and channel morphology. The Water Temperature and Stage Monitoring Plan filed April 11, 2014 would also be implemented. Procedures for documentation and reporting of incidental observations of western pond turtle made in conjunction with monitoring for other resources would also be required. PG&E and the agencies have also negotiated the scope of monitoring programs for aquatic benthic macroinvertebrates, aquatic invasive species management, and LWD management, but have not finalized plans; Forest Service conditions would require development of monitoring and management plans for these resources in consultation with the agencies for approval by the Commission within 1 year of license issuance.

California Fish and Wildlife recommends (recommendation 8) that PG&E develop and implement a comprehensive monitoring program that encompasses aquatic, terrestrial, recreational, aesthetic, cultural, and historic resources. PG&E made an alternative proposal to implement monitoring plans specific to selected aquatic resources in specific project-affected stream reaches that could potentially be affected by changes in minimum streamflows and water temperature as a result of proposed conditions in the new license. PG&E's rationale for their aquatic monitoring plans points out that appropriate monitoring of other resources (e.g., terrestrial, recreation, cultural and historic) are covered by focused resource-specific monitoring plans.

California Fish and Wildlife proposed establishment of an Ecological Group to "assist the Licensee in the project-wide implementation of Monitoring Plans and review and evaluation of monitoring data." The proposed Ecological Group would include representatives of the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other interested stakeholders. PG&E filed an alternative to the Ecological Group which points out that responsibility for implementation of any monitoring plans following final approval by the Commission is the sole responsibility of PG&E and that review and evaluation of monitoring results is intended to be one component of the annual consultation process.

Forest Service condition 1 would require PG&E to hold an annual consultation meeting with the Forest Service by April 15 to review project operation and maintenance schedules and monitoring results. At least 30 days in advance of the meeting, PG&E would notify NID, Forest Service, BLM, Reclamation, FWS, National Park Service, California Fish and Wildlife, California Water Board, NMFS, and other stakeholders. Prior to the meeting PG&E would distribute an operations and maintenance plan for the upcoming year. At the meeting PG&E would present results from current year monitoring of noxious weeds and special-status species as well as any additional information that has been compiled for the project area, including progress reports on other resource measures. The purpose of this meeting is to share information, mutually agree upon planned maintenance activities and schedules, identify concerns that Forest Service may have regarding operation and maintenance activities and their potential effects on sensitive resources, and any measures required to avoid or mitigate potential effects. During the meeting PG&E would review and discuss the results of implementation of the streamflow and reservoir-related conditions, results of resource monitoring programs, and other issues related to preserving and protecting natural resources affected by the project. The meeting agenda would include, but not be limited to:

- A status report regarding implementation of license conditions.
- Results of any monitoring studies performed over the previous year in formats agreed to by FS and Licensee during development of implementation plans.

- Review of any non-routine maintenance.
- Discussion of any foreseeable changes to project facilities or features.
- Discussion of any necessary revisions or modifications to implementation plans approved as part of this license.
- Discussion of needed protection measures for species newly listed as threatened, endangered, or sensitive, or changes to existing management plans that may no longer be warranted due to delisting of species or, to incorporate new knowledge about a species requiring protection.
- Discussion of needed protection measures for newly discovered cultural resource sites.
- Discussion of elements of current year maintenance plans, e.g. road and trail maintenance.
- Discussion of any planned pesticide use.

In addition to the annual consultation meeting, PG&E proposes and Forest Service condition 2 requires establishment of the Consultation Group Specific to the Upper Drum-Spaulding Project that would have a more focused scope. The role of the Consultation Group would be to review and evaluate specific monitoring data associated with the proposed South Yuba River *Supplemental Flow* condition and provide recommendations for the ongoing implementation and evaluation of that program and associated monitoring plans.

Forest Services final 4(e) condition 2, *Consultation Group Specific to the Drum-Spaulding Project*, requires PG&E to establish a Consultation Group composed of Forest Service, BLM, Reclamation, California Fish and Wildlife, and California Water Board within 3 months of license issuance. Meetings would be open to other interested organizations and individuals. Initially meetings would be held four times per year, although the Consultation Group could agree to meet more frequently as needed. The Group would primarily be responsible for review and evaluation of monitoring data related to the South Yuba River *Supplemental Flow* condition 32. The Consultation Group would also review plans developed as required by the new license or that require specific consultation during implementation and proposed temporary or permanent modifications to the license conditions.

*Our Analysis*

Implementation of appropriate monitoring plans and review of the results of these surveys are essential for determining if flow-related modifications in project operations included in the new license provide the benefits anticipated by the relicensing stakeholders. Development and implementation of monitoring plans for each resource area allows a more focused process for review of the plans and subsequent implementation, data collection, and analysis. Effective review of monitoring results and project operations and maintenance schedules would be accomplished during the annual consultation meeting, while review and evaluation of implementation of South Yuba River flow measures and monitoring data would be conducted by the Consultation Group throughout the year, as necessary. Attendance at Consultation Group quarterly meetings (or more frequent as required) can be adjusted by the participants to assure involvement of the most appropriate stakeholders and resource experts and managers for individual affected resources.

The Consultation Group would address concerns expressed by PG&E in their alternative to the Ecological Group relative to the responsibility of the licensee for implementation and conducting monitoring plans and surveys and the role of resource agencies and other stakeholders in review of monitoring data and plans. Inclusion of PG&E, NID, agencies responsible for project and resource

management, and representatives of relicensing stakeholders would ensure that all responsible and interested parties that have been involved in the relicensing of the Upper Drum-Spaulding Project continue to be involved in the implementation, review, and evaluation of measures included in the license for protection and enhancement of natural resources of the South Yuba River below Lake Spaulding dam. Participants in the annual consultation meeting would be involved in project-wide review of operations and maintenance, and implementation of license conditions for protection and enhancement of project-affected resources.

Annual consultation meetings would ensure that agencies and stakeholders are routinely updated on the status and results of license conditions implemented to protect and enhance project-affected resources and are able to plan their management agendas around schedules for project operation and management.

Given some uncertainty relative to the environmental benefits of the South Yuba River *Supplemental Flow* Program (section 3.3.2.2.7, *Flow Augmentation for Management of Water Temperature*), the Consultation Group required by Forest Service condition 2 would provide a reasonable mechanism, particularly during the initial years of implementation, for ongoing evaluation not otherwise provided by annual consultation, on the effectiveness of the *Supplemental Flow* releases from the cold water pool in Lake Spaulding to manage water temperature downstream of Lake Spaulding dam for resident rainbow trout and special-status species such as foothill yellow-legged frog. The Consultation Group would be involved in the routine evaluation of water temperature data to assess: (1) the effectiveness of supplemental coldwater release on maintaining coldwater habitat in the South Yuba River below Lake Spaulding dam; (2) the rate of drawdown of the cold water pool in Lake Spaulding; (3) the need to increase or decrease supplemental releases; and (4) the effectiveness of monitoring plans implemented to evaluate the benefits of these measures to aquatic resources.

**Effect of Recreation Flows on Aquatic Biota**

PG&E and involved agencies have proposed several flow modifications integrated into the spill cessation schedule (section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuation*) that would provide additional and predictable opportunities for recreational whitewater boating. Following negotiation among relicensing stakeholders, PG&E proposes (DS-AQR1, Part 7) a gradual cessation of spills to the South Yuba River at Lake Spaulding dam (proposed Drum-Spaulding Project, Spaulding No. 1 and No. 2 Development); the two-tier schedule provides up to 6 days at higher flows when spills begin to decline that would accommodate recreational whitewater boating. PG&E also proposes (DS-AQR1, Part 5) to provide high target flows in Fordyce Creek when spills at Fordyce Lake dam and Lake Spaulding dam end in the late spring, which would provide recreational boating opportunities in Fordyce Creek between Fordyce Lake and Lake Spaulding. These measures are consistent with Forest Service conditions 30 and 31 and California Fish and Wildlife recommendations 2.6 and 2.8.

*Our Analysis*

The sustained high flows under the spill cessation and Fordyce Lake drawdown proposals would provide recreational boating opportunities during periods that would naturally experience high flows under unregulated flow conditions. The range of flows proposed is within that typical of estimated unregulated flow conditions in Fordyce Creek below Fordyce Lake dam and South Yuba River below Lake Spaulding dam. Aquatic monitoring programs discussed previously (Forest Service condition 51) would provide data to evaluate the effectiveness of these spill cessation measures and recreational flow measures to protect and enhance aquatic resources in the affected stream reaches. The Channel Morphology Monitoring Plan would provide information to evaluate the effects of high flows on aquatic habitat quality and stability in these reaches.

The Spill Cessation measure for the South Yuba River (section 3.3.2.2.4) and Fordyce Lake drawdown (section 3.3.2.2.2) as discussed previously would ensure that flow reductions following high flow events more naturally mimic the rate of flow decrease typical of those waters in an unregulated condition. An additional benefit of this measure would be to provide predictable high flow opportunities for recreational whitewater boating. Because these high recreational flows are in a range and duration typical of unregulated waters, we would not expect any adverse effects on aquatic habitat and biota. The filed monitoring plans for aquatic resources would provide data for evaluating the effects of high flows and flow cessation on aquatic resources.

**Control of Non-native Aquatic Invasive Species**

The spread of non-native invasive species and their impact on aquatic communities and native species has become more common and of concern to resources managers. Prevention of further introductions and control of existing populations of non-native invasive species is of particular concern in areas with heavy recreational use and inter-basin transfers of water.

Forest Service condition 37 requires and California Fish and Wildlife recommendation 6 recommends development of an aquatic invasive species management plan in consultation with the agencies within 1 year of license issuance. The Forest Service and California Fish and Wildlife identified four aquatic invasive species of specific concern: (1) New Zealand mudsnail (*Potamopyrgus antipodarum*); (2) Quagga mussel (*Dreissena bugensis*); (3) zebra mussel (*Dreissena polymorpha*); and (4) invasive algae, rock snot (*Didymosphenia geminata*). The agencies require that a plan be submitted within 1 year for management of these invasive species and prevention of their spread within the project boundaries. The plan would identify aquatic invasive species BMPs, including user education and measures to prevent transfer of aquatic invasive species between waterbodies.

The Forest Service's comments on the draft EIS and modified revised 4(e) condition 37 specify a similar plan that would include three different levels of monitoring following California Fish and Wildlife protocol at project reservoirs with boat launches or identified as have boat access:

- Surface surveys for Quagga and zebra mussel within 100 feet of boat launches and any new launch facilities annually at the end of the recreation season;
- Monitoring in spring and fall for mussel veligers using vertical tows;
- Monitoring for zebra/Quagga mussels using artificial substrate protocol (California Fish and Wildlife).

PG&E (May 12, 2014) agrees to develop a non-native aquatic invasive species monitoring plan in consultation with the agencies consistent with Forest Service amended revised condition 37 (*Aquatic Invasive Species Management and Monitoring Plan*). PG&E also proposes to provide annual training to staff performing monitoring program tasks to record incidental observations of aquatic invasive species in study reaches and to implement BMPs to prevent transfer and spread of aquatic invasive species between waterbodies as a consequence of the aquatic monitoring plan surveys.

*Our Analysis*

Some aquatic invasive species have been identified in project-affected water. An effective management plan for these species could help prevent, delay, or limit expansion of their ranges and associated regional and waterbody-specific impacts. California Fish and Wildlife risk assessment criteria indicate that most project waters are at low risk for establishment of Quagga and zebra mussel given the very low calcium concentrations observed in this region. However, intense recreational use of many

project reservoirs has the potential to introduce non-native aquatic invasive species into project reservoirs despite the best efforts at user education. Once introduced, eradication of these species Is generally infeasible and can be nearly impossible. Although it may be difficult for populations of these invasive mussels to become established in project reservoirs due to limitations of water chemistry, dispersal downstream to non-project aquatic habitat with more amenable conditions would be possible. Monitoring would provide early warning of the potential risk to downstream waters.

Implementation of an Aquatic Invasive Species Management and Monitoring Plan should be an effective tool for reducing the risk of dispersal of aquatic invasive species across project boundaries in conjunction with project operations and monitoring, and should reduce the risk of dispersal by recreational users. Eradication of aquatic invasive species once established is extremely difficult; consequently, effective programs to educate users to prevent the introduction of aquatic invasive species into waters in which they do not occur are an important component of the plan. In comments on the draft EIS the agencies express concern that although most project reservoirs have a low risk for establishment of Quagga and zebra mussel, given the level of recreational usage in many of these reservoirs, if introduced, veligers in particular could be carried downstream to reservoirs with water quality conditions more amenable to establishment of these invasive species. Consequently, they have specified and recommended more intensive monitoring as a mechanism for early detection of invasive aquatic species and a trigger for implementation of stronger management controls. In addition, recording of incidental observations of aquatic invasive species as part of the proposed Aquatic Monitoring Plan (discussed previously) would provide another mechanism for identifying new incidences of invasive species in project waters.

PG&E would submit to the Commission a final plan reviewed and approved by the agencies; The Aquatic Invasive Species Management and Monitoring Plan would be implemented upon Commission approval.

**Lower Drum Project**

**Protection of Fish in Project Canals**

The existing project canal intakes are not screened to exclude entry by resident fish, and any fish that enter the canals are at risk when the canals are drained during an outage. When a canal is dewatered during routine planned and unplanned maintenance and emergency outages, fish can become stranded in the canal as water levels drop. To minimize potential mortality to fish during outages, PG&E proposes (DS-AQR2) to implement a canal fish rescue plan, the *Fish Protection and Management During Canal Outages Plan*. PG&E filed their *Fish Protection and Management During Canal Outages Plan* (dated February 2013) on November 21, 2013. The plan addresses facilities associated with the Lower Drum Project (Halsey Development, Wise and Wise No. 2 Developments, and Newcastle Development including the Bear River canal, Upper and Lower Wise canals, and South canal).

The Forest Service (condition 33) and BLM (condition 5) specify that PG&E would implement the plan filed (November 2013) with the Commission. California Fish and Wildlife (recommendation 3) initially recommended that PG&E develop a plan in coordination with the agencies within the first year following license issuance. In comments on the draft EIS, the agency indicated that they are also in agreement with the filed plan.

PG&E's plan for the Drum-Spaulding Project includes the Lower Drum Project canal facilities (table 3-196) and locations where fish management and response actions would be implemented at the time of an outage; maps identify the type of facility (e.g., flume, canal, and tunnel) and access points. The plan also describes the periods when outages are most likely to occur at each facility and outlines the procedures that would be implemented for drawdown of these water conveyance structures and for fish

management and protection. The plan also includes protocols for agency notification and consultation during these events and for annual planning.

*Our Analysis*

The plan submitted by PG&E for the existing Drum-Spaulding Project provides a comprehensive approach for communication and planning and for implementation of protocols to collect and relocate, as necessary, fish that are stranded in a canal when the canal is taken out of service for maintenance or in the event of an emergency. The plan as filed describes effective measures that would be protective of aquatic resources within the project canals, including those of the Lower Drum Project. The filed plan would be included in the license and implemented within 90 days of license issuance.

**Monitoring of Fish Populations in Project-affected Stream Reaches**

PG&E proposes minimum streamflows in portions of the proposed Lower Drum Project, including Dry Creek below Halsey afterbay dam, Rock Creek below Rock Creek reservoir dam, Auburn Ravine below the South canal release gate, and Mormon Ravine below the Newcastle Development intended to enhance aquatic habitat and protect aquatic resources in these proposed Lower Drum project-affected stream reaches. PG&E did not propose continued monitoring in these project stream reaches in its final license application.

California Fish and Wildlife (recommendation 8) initially recommended monitoring the stream fish community in large rivers and streams and small, higher elevation headwater streams; species composition, abundance, biomass, size and age structure, and relative stock density would be analyzed.

The November 2013 Fish Population Monitoring Plan filed by PG&E would include two levels of sampling: qualitative (Level I) using single pass electroshocking; and quantitative (Level II) using multiple pass electroshocking and snorkeling. For Level I sampling, fish population analysis would be limited to a summary of species composition, size, relative abundance, CPUE comparison, and distribution. Accurate size measurements would allow for length frequencies to be developed and determination of age class. Level II sampling would allow statistical analysis of age structure, fish population and biomass, and fish size and condition. Table 1 in the plan designates Rock Creek below Rock Creek dam to be sampled using Level I methods during years 4, 10, 15, 20, and 25 following license issuance. Table 1 also specifies the use of Level II methods to sample Dry Creek below Halsey afterbay dam during years 5 and 10 following issuance of the license. Auburn Ravine would be sampled below the South canal release point using Level II protocol in years 3, 4, 9, 10, 14, 15, 19, 20, 24, and 25 following license issuance. Mormon Ravine would be sampled during the first critically dry or dry year that occurs before year 5, or year 5 and year 10.

*Our Analysis*

Changes in monthly minimum streamflows are a key measure designed to protect, maintain, and enhance aquatic habitat for resident species in project-affected stream reaches. The flow enhancements in many stream reaches vary seasonally and are based on water year type, and they are balanced against associated costs in reduced power generation and risk to water delivery, particularly during exceptionally dry conditions. The Fish Population Monitoring Plan would provide a mechanism for evaluating the benefit of the project's operational changes and assessing if they are accomplishing the intended objectives predicted by the habitat and operations models used to inform the selection of those minimum streamflows.

Review of monitoring results during the annual consultation process would involve the resource agencies in assessing the success of the proposed flow conditions, effects of canal outages, and provide a process for adjusting the monitoring program, if needed.

The November 2013 Fish Population Monitoring Plan proposed by PG&E and recommended by Forest Service targets several stream reaches affected by the Lower Drum Project that are most likely to benefit from proposed increased minimum streamflows and associated improvements in aquatic habitat. The proposed stream reaches were previously surveyed during the relicensing studies; use of the same methods would provide a before and after comparison of stream populations. The proposed plan would provide intermittent surveys throughout the first 25 years following license issuance, which should be adequate to depict community changes and trends in these stream reaches. Evaluation of the population trends and habitat conditions during the license period would provide a basis for assessing the adequacy and benefits of the environmental measures.

**Effects of Project Operations on Aquatic Benthic Macroinvertebrates**

Benthic macroinvertebrate communities can be highly influenced by a variety of naturally occurring and human-induced factors, including: (1) annual hydrologic cycle; (2) timing and magnitude of spring outflows; (3) streambed substrate composition; (4) channel gradient; (5) bank erosion and sediment deposition; (6) pollution; (7) riparian habitat degradation; (8) hydraulic mining; and (9) recreational activities. PG&E's *Channel Morphology* studies indicate that project operations have minimal effect on substrate conditions in project-affected stream reaches.

California Fish and Wildlife (recommendation 8) recommends monitoring the aquatic benthic macroinvertebrate community in large rivers and streams and small, upper elevation streams; diversity, biomass, and various unspecified community metrics would be analyzed. None of the large rivers and streams recommended by California Fish and Wildlife for monitoring benthic macroinvertebrates are located within the proposed Lower Drum Project. California Fish and wildlife does not identify specific small, high elevation stream for benthic macroinvertebrate monitoring. PG&E agreed to develop in consultation with the agencies a monitoring plan for aquatic benthic macroinvertebrates in specified stream reaches that are located in the Upper Drum-Spaulding Project, but has not agreed to benthic macroinvertebrate monitoring in any Lower Drum Project stream reaches. PG&E indicates that the aquatic benthic macroinvertebrate monitoring included in the Forest Service and California Fish and Wildlife recommendation would use the same Surface Water Ambient Monitoring Program methods used during the relicensing studies, which demonstrated that benthic macroinvertebrate resources were adequate for maintenance of healthy fish populations and do not demonstrate effects of project operations. PG&E also suggests that particularly for lower elevation streams in western Placer County, such monitoring data would not be useful for evaluating the effects of the new license conditions, because benthic macroinvertebrate species composition and community diversity can exhibit considerable natural spatial variation depending on site-specific habitat metrics related more to substrate characteristics than to flow and water temperature.

*Our Analysis*

Aquatic benthic macroinvertebrates are an important component of stream ecosystems and a primary food source for fish communities in project-affected stream reaches (Dry Creek, Rock Creek, and Auburn Ravine) of the Lower Drum Project. Relicensing sampling and analysis conformed to the targeted riffle composite protocol used to describe benthic macroinvertebrate assemblages and physical habitat in the California Water Board's Surface Water Ambient Monitoring Program (February 2007). Eighteen common macroinvertebrate metrics and two multi-metric indexes were used to evaluate each site. The multi-metric indexes included the index of biotic integrity (IBI) and the multi-metric index (MMI). Both of these multi-metric indexes are designed to evaluate the impacts of hydropower

operations on stream condition as reflected by the benthic community; the MMI is specific to the west slope of the Sierra Nevada. Rehn (2009) developed a benthic macroinvertebrate-based IBI metric for use in evaluating effects of hydroelectric projects; all other factors being equal, Rehn found that this metric tends to be lowest immediately downstream of dams and diversions, but normally increases with distance below these structures. However, stream characteristics, such as substrate type and riparian vegetation composition, can exercise a greater effect on benthic macroinvertebrate community metrics, regardless of distance from dams or diversion structures (Bahuguna et al., 2004).

In general, IBI and MMI scores from the relicensing studies were slightly higher at middle elevation sites (i.e., 2,501 to 6,500 feet msl), and at sites classified as montane compared to sites in the foothill ecozone (i.e., 900 to 2,500 feet msl) where the Lower Drum Project is located. Lower scores were more common in the low elevation western Placer County sampling sites located in proposed Lower Drum Project-affected reaches. The Rock Creek below Rock Creek reservoir dam, Dry Creek below Halsey afterbay dam, and Auburn Ravine below the South canal spill channel are located in the foothill ecozone downstream of, and in relatively close proximity to, project features. Overall, these sites had lower IBI and MMI scores than sites in montane ecozone watersheds; scores were 32 to 36 for Auburn Ravine and Rock Creek and 21 to 24 in Dry Creek. In addition to their relative close proximity to project features, human influences tended to be greater in the foothill ecozone (i.e., there were greater and cumulative impacts resulting from rural and suburban development and land uses, road and surface runoff and water quality issues, channel disturbance, and recreation). Substrate composition at the Rock Creek and Dry Creek sites was dominated by fine sediment and bedrock, which could possibly contributed to the lower IBI and MMI scores at these sites. The low IBI and MMI scores at the Auburn Ravine may have been related to the close proximity to the South canal spill channel. IBI scores were below the 95 percentile range for reference reaches presented in Rehn (2009); however, the applicability of those reference values to benthic macroinvertebrate communities in foothill elevation streams may not be valid, since Rehn's (2009) reference sites were mostly from montane elevation streams in the Sierra Nevada mountain range.

The IBI and MMI scores for multiple sites within watersheds did not show consistent trends with distance downstream from project reservoir or diversion dams. Other habitat factors (e.g., ecoregion, riparian vegetation, substrate conditions not affected by project operations, historic non-project uses) appeared to exercise a stronger influence on the benthic macroinvertebrate community. Substrate is dominated by fine material and bedrock in Dry Creek below Halsey afterbay dam and Rock Creek below Rock Creek reservoir dam; coarse gravel and cobble are the dominant substrate in Auburn Ravine between the South canal spill channel and the City of Auburn wastewater treatment plant outfall.

Given the importance of aquatic benthic macroinvertebrates as forage for resident trout, monitoring this community in conjunction with the Fish Population Monitoring Plan would provide data to evaluate the effects of flow and operational changes in these three Lower Drum Project-affected stream reaches and inform future decisions related to project impacts, minimum streamflow needs, or fishery management in these stream reaches. Annual reporting and review of monitoring results by the licensee and the agencies would also provide an opportunity to assess the effectiveness of the monitoring studies and recommend modifications as necessary.

**Water Temperature and Stage Monitoring**

PG&E did not propose to monitor water temperature, except in conjunction with fish survey events, in any projected-affected reaches of the Lower Drum Project. Forest Service recommended (recommendation 2) development of a Water Temperature and Stage Monitoring Plan within 1 year of license issuance to include one site, co-located with fish population monitoring sites in Dry creek below Halsey afterbay dam, Rock Creek below Rock Creek reservoir dam, and Auburn Ravine below PG&E's

release point from South canal, and in Mormon Ravine below Newcastle powerhouse. Monitoring would be implemented upon Commission approval and would be performed during the first 2 years following implementation of new minimum streamflows; monitoring would occur between April 1 and November 1.

The plan would describe sampling locations, methods, and schedule. The plan would also describe data handling and analysis, and reporting requirements. A draft annual report would be submitted for agency review and agency comments would be addressed in the final report. Final report would be available at least 30 day prior to the Annual Consultation Meeting and would be filed with the Commission.

*Our Analysis*

Minimum streamflows and operational changes in the Lower Drum Project have the potential to affect aquatic habitat and resources through effects on water temperature. The proposed monitoring would provide 2 years of water temperature data for key project-affected stream reaches during the summer period when increased water temperatures could be most stressful to aquatic resources. Due to contractual obligation for water deliveries in Auburn Ravine and from Bear River canal, upper and lower Wise canal and South canal, operations of the Lower Drum Project are relatively consistent from year to year, which ensures consistent reliable flows to project-affected reaches. Thus, the 2 years proposed for monitoring water temperature should be adequate to evaluate water temperature conditions in these reaches. Annual reporting and review of temperature monitoring results by the licensee and the agencies would also provide an opportunity to assess the effectiveness of increased minimum streamflows and project operations to enhance and protect aquatic resources.

**Effects of Project Operations on Special-status Species**

Increased flows, reduced flow fluctuations, and cooler water temperatures that would result from flow measures (sections 3.3.2.2.2, *Instream Flows*; 3.3.2.2.4, *Recession from Peak Flows and Flow Fluctuations*; and 3.3.2.2.7, *Flow Augmentation for Management of Water Temperature*) proposed by PG&E and the relicensing stakeholders to enhance aquatic habitat also have the potential to affect habitat for special-status species in some project-affected reaches.

*Our Analysis*

Only one special-status fish species occurs in the vicinity of the projects: hardhead (*Mylopharodon conocephalus*), which is listed by the Forest Service as a Sensitive Species and by California Fish and Wildlife as a California Species of Special Concern. Although hardhead habitat is available in lower Auburn Ravine, no hardhead were collected in reservoirs or stream reaches during PG&E's studies in the proposed Lower Drum Project-affected stream reaches. Hardhead inhabit areas that have clear, deep pools with sandy, gravel/boulder substrates and slow water velocities. Hardhead generally prefer warm water, occurring in streams that reach summer water temperatures greater than 20°C. Under laboratory conditions, their reported optimum water temperature range is 24 to 28°C (Moyle, 2002).

The Forest Service identifies the benthic macroinvertebrate community as a Management Indicator Species. In comments on the draft EIS, the Forest Service indicated that the black Juga snail (*Juga nigrina*) has been added to the list of Forest Service Sensitive Species; however, this species was not found during the special-status mollusk survey conducted by PG&E in proposed Lower Drum Project-affected reaches (PG&E and NID, 2010m).

Increased minimum streamflows have been proposed for Auburn Ravine to enhance aquatic habitat for resident rainbow trout in the stream reach immediately downstream of PG&E's release point from South canal. No hardhead were collected upstream of the Auburn Ravine 1 diversion dam, about 4 miles downstream of the release point from South canal. In the lower reaches of Auburn Ravine below the Auburn Ravine 1 diversion dam which might be inhabited by hardhead, numerous diversions, withdrawals, and discharges cumulatively affect flow and water temperature to such a point that it is not possible to assess individual effects form PG&E's operations of the Wise powerhouses and the South canal (section 3.3.2.3, *Cumulative Effects*).

**Control of Non-native Aquatic Invasive Species**

The spread of non-native invasive species and their impact on aquatic communities and native species has become more common and of concern to resources managers. Prevention of further introductions and control of existing populations of non-native invasive species is of particular concern in areas with heavy recreational use and inter-basin transfers of water.

California Fish and Wildlife recommendation 6 recommends development of an aquatic invasive species management plan in consultation with the agencies within 1 year of license issuance. California Fish and Wildlife identified four aquatic invasive species of specific concern: (1) New Zealand mudsnail (*Potamopyrgus antipodarum*); (2) Quagga mussel (*Dreissena bugensis*); (3) zebra mussel (*Dreissena polymorpha*); and (4) invasive algae, rock snot (*Didymosphenia geminata*). The agencies require that a plan be submitted within 1 year for management of these invasive species and prevention of their spread within the project boundaries. The plan would identify aquatic invasive species BMPs, including user education and measures to prevent transfer of aquatic invasive species between waterbodies. The Forest Service's comments on the draft EIS and modified revised 4(e) condition 37 specify a similar plan that should include three different levels of monitoring following California Fish and Wildlife protocol at project reservoirs with boat launches or identified as have boat access:

- Surface surveys for Quagga and zebra mussel within 100 feet of boat launches and any new launch facilities annually at the end of the recreation season;
- Monitoring in spring and fall for mussel veligers using vertical tows;
- Monitoring for zebra/Quagga mussels using artificial substrate protocol (California Fish and Wildlife).

PG&E (May 12, 2014) agrees to develop a non-native aquatic invasive species monitoring plan in consultation with the agencies consistent with Forest Service amended revised condition 37 (*Aquatic Invasive Species Management and Monitoring Plan*). PG&E also proposes to provide annual training to staff performing monitoring program tasks to record incidental observations of aquatic invasive species in study reaches and to implement BMPs to prevent transfer and spread of aquatic invasive species between waterbodies as a consequence of the aquatic monitoring plan surveys.

*Our Analysis*

Some aquatic invasive species have been identified in project-affected water. An effective management plan for these species could help prevent, delay, or limit expansion of their ranges and associated regional and waterbody-specific impacts. California Fish and Wildlife risk assessment criteria indicate that most project waters are at low risk for establishment of Quagga and zebra mussel given the very low calcium concentrations observed in this region. However, intense recreational use of many project reservoirs has the potential to introduce non-native aquatic invasive species into project reservoirs despite the best efforts at user education. Once introduced, eradication of these species Is generally

infeasible and can be nearly impossible. Although it may be difficult for populations of these invasive mussels to become established in project reservoirs due to limitations of water chemistry, dispersal downstream to non-project aquatic habitat with more amenable conditions would be possible. Monitoring would provide early warning of the potential risk to downstream waters.

In comments on the draft EIS the agencies express concern that although most project reservoirs have a low risk for establishment of Quagga and zebra mussel, given the level of recreational usage in many of these reservoirs, if introduced, veligers in particular could be carried downstream to reservoirs with water quality conditions more amenable to establishment of these invasive species. Consequently, they have specified and recommended more intensive monitoring as a mechanism for early detection of invasive aquatic species and a trigger for implementation of stronger management controls. In addition, recording of incidental observations of aquatic invasive species as part of monitoring surveys for other aquatic resources would provide another mechanism for identifying new incidences of invasive species in project waters.

Implementation of an Aquatic Invasive Species Management and Monitoring Plan should be an effective tool for reducing the risk of dispersal of aquatic invasive species across project boundaries in conjunction with project operations and monitoring, and should reduce the risk of dispersal by recreational users. Eradication of aquatic invasive species once established is extremely difficult; consequently, effective programs to educate users to prevent the introduction of aquatic invasive species into waters in which they do not occur are an important component of the plan. In comments on the draft EIS the agencies express concern that although most project reservoirs have a low risk for establishment of Quagga and zebra mussel, given the level of recreational usage in many of these reservoirs, if introduced, veligers in particular could be carried downstream to reservoirs with water quality conditions more amenable to establishment of these invasive species. Consequently, they have specified and recommended more intensive monitoring as a mechanism for early detection of invasive aquatic species and a trigger for implementation of stronger management controls. In addition, recording of incidental observations of aquatic invasive species as part of the proposed Aquatic Monitoring Plan (discussed previously) would provide another mechanism for identifying new incidences of invasive species in project waters.

PG&E would submit to the Commission a final plan reviewed and approved by the agencies; The Aquatic Invasive Species Management and Monitoring Plan would be implemented upon Commission approval.

**Deer Creek Project**

**Protection of Fish in Project Canals**

The existing project canal intakes are not screened to exclude entry by resident fish, and any fish that enter the canals are at risk when the canals are drained during an outage. When a canal is dewatered during routine planned and unplanned maintenance and emergency outages, fish can become stranded in the canal as water levels drop. To minimize potential mortality to fish during outages, PG&E proposes (DC-AQR1, Part 2, *Canal Outages*) to implement a canal fish rescue plan, the *Fish Protection and Management During Canal Outages Plan*. The plan affects the South Yuba and Chalk Bluff canals that carry water to the Deer Creek powerhouse. The Forest Service (condition 33) and BLM (condition 5) specify that PG&E would implement the agreed to Plan filed (November 2013) with the Commission. California Fish and Wildlife (recommendation 3) initially recommended that PG&E develop a plan in coordination with the agencies within the first year following license issuance. In comments on the draft EIS the agency indicated that they are also in agreement on the filed plan.

PG&E's plan (November 21, 2013) describes the canal facilities (table 3-196) and locations where fish management and response actions would be implemented at the time of an outage; maps identify the type of facility (e.g., flume, canal, tunnel) and access points. The plan also describes the periods when outages are most likely to occur at each facility and outlines the procedures that would be implemented for drawdown of these water conveyance structures and for fish management and protection. The plan also includes protocols for agency notification and consultation during these events and for annual planning.

*Our Analysis*

The *Canal Outages Fish Rescue Plan* submitted (November 2013) by PG&E for the Drum-Spaulding project provides a comprehensive approach for communication and planning and for implementation of protocols to collect and relocate, as necessary, fish that are stranded in a canal when the canal is taken out of service for maintenance or in the event of an emergency. The plan as filed describes effective measures that would be protective of aquatic resources within the project canals, including those of the proposed Deer Creek Project. The filed plan would be included in the license and implemented within 90 days of license issuance.

**Yuba-Bear Project**

**Fish Entrainment**

Entrainment into project canals, powerhouses and low-level reservoir outlets of various life stages of fish has been identified as a potential adverse impact on fish populations in project-affected waters. The intakes to Yuba-Bear Project canals are not screened under existing project operations, however, a number of screening technologies have been developed and refined to prevent or minimize the entrainment of fish, particularly early life stages, into water diversion canals. NMFS and California Fish and Wildlife have developed guidelines for screening devices to reduce entrainment at diversions on rivers and in reservoirs and lakes. Relicensing studies evaluated the magnitude of fish entrainment at several project canal diversions with limited success. Resource agencies have expressed concern specifically related to entrainment of juvenile resident trout at the Milton diversion dam on Middle Yuba River.

In the final license application, NID proposed (YB-ARQ6) to monitor fish entrainment into the Milton Bowman conduit on a weekly basis between April 15 and August 15 beginning the first full year after license issuance. Following the first year of monitoring NID proposed to file a report summarizing the results and proposing measures, as necessary to reduce fish entrainment. Forest Service condition 32 specifies and California Fish and Wildlife recommendation 2.12 recommends design and construction of a cylindrical narrow-slot fish screen at the entrance to the Milton-Bowman conduit. In response, NID proposes a Fish Entrainment Protection Plan to include a fish screen installed at the entrance to Milton-Bowman conduit, designed using guidelines and specifications from *Fish Screening Criteria for Anadromous Salmonids* (NMFS, 1997) and *Fish Screening Criteria* (California Fish and Wildlife, 2002). The Fish Entrainment Protection Plan would identify local, state, and federal permits required for construction and operation of this screen; specify design information for a facility with design capacity of 170 cfs; develop a construction implementation schedule; develop design, construction, and operation and maintenance costs; and outline an agency (Forest Service, California Fish and Wildlife, and California Water Board) consultation process/schedule for planning, permitting, and construction of the screens.

NID proposed to complete the plan and applications for all permits within 1 year of license issuance and to complete construction within 2 years of receiving the necessary permits and approvals.

*Our Analysis*

Relicensing entrainment studies indicated relatively low numbers of entrained juvenile or adult fish at several project powerhouses and low level outlets; however, data generated at the Milton-Bowman conduit intake were inconclusive as a result of sampling artifacts. While NID proposed to continue to monitor this location, the agencies proposed that NID implement measures for design and construction of an intake screening device to reduce entrainment, particularly of young trout lifestages. NID subsequently indicated its concurrence (August 30, 2012) with this measure. Construction and operation of the proposed canal intake screens consistent with the design criteria recommended by the agencies would minimize entrainment losses into the Milton-Bowman conduit of most key aquatic species during their early life stages. Although entrainment of juveniles and adults appears to be limited based on relicensing studies, rescue of fish during a conduit outage that have been entrained into the Milton-Bowman conduit is not feasible due to the tunnel design. Entrainment would be eliminated by screens operated during late spring and summer when juvenile fish would be most susceptible to entrainment, thus minimizing the risk of mortality during conduit outages. The plan provides operational flexibility for occasional removal of the screens during periods when high debris loading threatens project operations and efficiency and screen integrity.

**Protection of Fish in Project Canals**

The existing project canal intakes are not screened to exclude entry by resident fish and fish that enter the canals are at risk of mortality when the canals are drained during an outage. When a canal is dewatered during scheduled or unscheduled maintenance and emergency outages, fish can become stranded in the canal as water levels drop. To minimize potential mortality to fish during outages, NID proposes (YB-AQR5) to implement a Canal Fish Rescue Plan. The plan affects facilities in the Spaulding No. 3 Development, Dutch Flat No. 2 Development, and Chicago Park Development; the Milton-Bowman conduit is completely enclosed, inaccessible for fish rescue operations, and would be screened to minimize fish entrainment under the condition described above. The Canal Fish Rescue Plan was designed to protect fish trapped in the project canals when the canals are taken out of service for scheduled or unscheduled maintenance or emergencies. California Fish and Wildlife (recommendation 3) recommends that NID develop a plan in coordination with the agencies within the first year of the license. On October 22, 2013, NID filed a contingent withdrawal of an alternative plan because an agreement was reached between NID, the Forest Service, and BLM on the final Canal Fish Rescue Plan (attachment A of enclosure 1 of the October 22, 2013, filing). The Forest Service filed a copy of NID's Canal Fish Rescue Plan on November 21, 2013. On December 20, 2013, NID confirmed its concurrence with the filed Canal Fish Rescue Plan (November 21, 2013).

The filed Canal Fish Rescue Plan describes the canal facilities (table 3-197) and locations where fish management and response actions would be implemented at the time of an outage; maps identify the type of facility (e.g., flume, canal, and tunnel) and access points. The plan also describes the periods when outages are most likely to occur and the procedures that would be implemented for drawdown of these water conveyance structures and for fish management and protection. The plan also includes protocols for agency notification and consultation during outage events and for annual planning.

*Our Analysis*

The plan submitted by NID provides a comprehensive approach for communication and planning and for implementation of protocols to collect and relocate, as necessary, fish that are stranded in canals when the canal is taken out of service for maintenance or in the event of an emergency. The January 2013 plan (filed November 21, 2013) describes effective measures that would be protective of aquatic resources within the project canals. The filed plan would be included in the license and implemented within 90 days of license issuance.

**Reservoir Management Effects on Aquatic Biota**

The proposed increased minimum streamflows, spill cessation schedules, and supplemental flows for water temperature management and recreational boating (section 3.3.2.2.2, *Instream Flow*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*; section 3.3.2.2.7, *Flow Augmentation for Water Temperature Management*; section 3.3.5.2, *Recreation Resources)* could result in earlier and larger drawdown of some project lakes/reservoirs, potentially affecting shallow water lake habitat, important juvenile-rearing habitat for many species as well as access and use of recreation facilities. Many of the larger lakes/reservoirs are managed for and receive heavy recreational fishing pressure; annual stocking is a key component of California Fish and Wildlife's recreational fishery management program. Although natural reproduction occurs in some of these project waters, stocking is necessary to sustain populations of game fish in waters with high angler usage.

NID proposes (YB-AQR2 and YB-AQR3) to stock Bowman Lake and Rollins reservoir. Forest Service recommendation 12 also proposed a fish stocking program to support recreational fishing in these two project waters, but at different stocking rates. We analyze these conflicting stocking proposals in more detail in section 3.3.5.2, *Recreational Resources*.

**Monitoring of Fish Populations in Project-affected Stream Reaches**

NID proposes several measures to improve flows and maintain water temperatures in project-affected stream reaches below project dams and diversions to improve aquatic habitat and enhance aquatic resources (section 3.3.2.2.2, *Instream Flow*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations*; section 3.3.2.2.7, *Flow Augmentation for Water Temperature Management*).

The Forest Service (condition 51) and BLM (condition 22) specify implementation of the Fish Population Monitoring Plan filed with the Commission by NID on November 21, 2013. California Fish and Wildlife (recommendation 8) initially recommended monitoring the stream fish community in large rivers and streams and small, higher elevation headwater streams; species composition, abundance, biomass, size and age structure, and relative stock density would be analyzed. In comments on the draft EIS (August 2013) California Fish and Wildlife indicated that considerable progress had been made on the scope of the Fish Population Monitoring Plan, but agreement had not been achieved at that time.

The Fish Population Monitoring Plan filed November 21, 2013 by NID would include two levels of sampling: qualitative (Level I) using single pass electroshocking; and quantitative (Level II) using multiple pass electroshocking and snorkeling (where electroshocking efficiency may be low). For Level I sampling, fish population analysis would be limited to a summary of species composition, size, relative abundance, CPUE comparison, and distribution. Accurate size measurements would allow for length frequencies to be developed and determination of age class. Level II sampling would allow statistical analysis of age structure, fish population and biomass, and fish size and condition. Table 1 in the plan specifies that the diversion stream reaches of Texas Creek, Clear Creek, Trap Creek, and Rucker Creek would be sampled using Level I methods during years 3 and 4 following license issuance or after channel stabilization activities are completed and subsequently, during any year with an emergency release from the Bowman-Spaulding conduit. If no emergency releases occur between year 5 and 14, these stream reaches would be sampled in year 15. Table 1 also identifies eight stream reaches in Middle Yuba River, Canyon Creek, and Bear River that would be sampled using Level II methods in years 3, 4, 9, 10, 14, 15, 19, 20, 24, and 25 with sampling after year 25 assumed to be handled during the next relicensing process. Middle Yuba River immediately below Milton diversion dam and Canyon Creek about 1.3 miles upstream from the confluence with South Yuba River would be sampled using Level II methods annually in years 1 through 10, then in years 14, 15, 19, 20, 24, and 25.

*Our Analysis*

Changes in monthly minimum streamflows, spill cessation schedules, and supplemental South Yuba River releases, which we discussed in depth previously, are key measures designed to protect, maintain, and enhance aquatic habitat for resident species in project-affected stream reaches. The flow enhancements in many stream reaches vary seasonally and are based on water year type, and they are balanced against associated costs in reduced power generation and risk to water delivery, particularly during exceptionally dry conditions. The results from the Fish Population Monitoring Plan would provide data to evaluate the benefit of the project's operational changes and assess if they are accomplishing the intended objectives predicted by the habitat and operations models.

Ongoing review of monitoring results by the Consultation Group and during the annual consultation meeting would involve the resource agencies in assessing the success of the proposed flow conditions and provide a process for adjusting the monitoring program, if needed.

The stream fish monitoring plan proposed by NID targets several stream reaches most likely to benefit from proposed increased minimum streamflows and anticipated decreases in water temperature and improvements in aquatic habitat. The proposed stream reaches were previously surveyed during the relicensing studies; use of the same methods would provide a before and after comparison of stream populations. The proposed plan would provide intermittent surveys throughout the first 25 years following license issuance, which should be adequate to depict community changes and trends in these stream reaches. Ongoing evaluation of the population trends and habitat conditions would provide a basis for assessing the adequacy and benefits of the environmental measures.

**Effect of Operations on Aquatic Habitat in Project-affected Stream Reaches**

The quantity and quality of aquatic habitat are affected by project operations, including the influence of flow, wetted perimeter, magnitude and frequency of inundation, availability and dispersal of LWD, the diversity and persistence of riparian vegetation, and distribution and characteristics of sediment/substrate. The objectives of various measures proposed by NID and recommended by the relicensing stakeholders are to improve aquatic habitat conditions for resident aquatic biota compared to existing conditions. We discuss the anticipated enhancements of aquatic habitat as a result of proposed minimum streamflows and flow management previously (section 3.3.2.2.2, *Instream Flow*; section 3.3.2.2.4, *Recession From Peak Flows and Flow Fluctuations;* section 3.3.2.2.7, *Flow Augmentation for Water Temperature Management*).

Reservoir operations and regulated flows have the potential to alter two key components of habitat for aquatic resources: (1) the availability of LWD in downstream reaches; and (2) the characteristics and distribution of substrate material in streams. In addition, rapid fluctuations and high flows have the potential to scour riparian vegetation that can provide bank stability and cover during periods of inundation. LWD can provide cover, affect habitat diversity, and contribute to diversity of channel morphology and substrate; under the existing license, this material is removed from reservoirs as needed and stockpiled or burned. NID proposes (YB-AQR7) a management plan for LWD at Rollins dam. NID proposes to periodically move LWD blocked by the log boom upstream of Rollins dam (Rollins Development) to the downstream side of the boom and allow this material to pass over the dam during spill events.

BLM (condition 9) specifies and California Fish and Wildlife (recommendation 2.10) recommends that LWD in Rollins reservoir be allowed to pass over the spillway and that NID survey the quantity and distribution of LWD over the 10-mile reach of the Bear River downstream from Rollins dam during the fifth year following issuance of the license and at 5-year intervals thereafter; as needed, LWD would be anchored in the channel. BLM condition 23 specifies that within 1 year of license issuance NID

would prepare an LWD Management Plan for the Dutch Flat afterbay dam (Chicago Park Development) to describe procedures for transfer of LWD past the Dutch Flat afterbay dam and locations to place LWD downstream for mobilization by 2- and 5-year high flow events. NID (December 20, 2013) indicates that it concurs with the BLM conditions for LWD management at Rollins dam and the Dutch Flat afterbay.

On May 20, 2014, NID confirmed its concurrence with the revised Forest Service condition 52, *Large Woody Material* filed November 21, 2013. Forest Service condition 52 specifies that NID would make a good faith effort, as safety allows, to transfer LWD downstream from Bowman Development impoundments at Jackson Meadows dam, Milton diversion dam, Sawmill dam, French dam, Faucherie dam, and Bowman dam. The condition specifies the maximum size of LWD to be passed downstream at each dam. The specified management program would be initiated within the first year following license issuance; the condition does not require development of a formal written plan.

A Channel Morphology Monitoring Plan was filed with the Commission on November 21, 2013 and NID has agreed to implement that Plan (May 20, 2014). The plan describes sampling methods to be implemented upstream of Wolf Creek in Middle Yuba River and downstream of the Bear River canal diversion dam on the Bear River. Monitoring would be conducted during the first year following license issuance and then 3 years following spill events over the next 9 years of the license. A spill at Milton diversion dam and Bear River canal diversion dam would be defined and an instantaneous flow greater than 3,000 cfs at the minimum streamflow compliance gage downstream of the respective dams. Field measurements would provide information to document and characterize substrate, channel and bank stability, and channel shape at multiple fixed transects in each stream reach. Data would be used to generate scale maps for each reach for comparison among monitoring years.

NMFS 10(j) (recommendation 3.3 and 4.3) and FWS (recommendation 5) propose development of an LWD management plan for future implementation in Middle Yuba River below the Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam to support natural ecosystem processes and the proposed future reintroductions of anadromous salmonids to the upper Yuba River above Englebright dam. NMFS also recommends an interim measure for passage of LWD in Middle Yuba River at Milton diversion dam and in Canyon Creek at Bowman-Spaulding diversion dam beginning at license issuance until a LWD Management Plan can be developed and implemented when reintroduction occurs.

NMFS 10(j) (recommendation 3.3 and 4.3) and FWS (recommendation 5) propose development of a coarse substrate management plan for the Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam to support natural ecosystem processes and the proposed future reintroductions of anadromous salmonids to the upper Yuba River above Englebright dam.

A Riparian Vegetation Monitoring Plan was filed with the Commission by Forest Service and BLM on April 11, 2014 and NID agreed to implement that plan (May 20,2014). The plan describes the monitoring methods, data analysis, and reporting requirements to be implemented in the Middle Yuba River upstream of Wolf Creek and the Bear River downstream of the Bear River canal diversion dam. Three to six monitoring transects would be co-located in each stream reach with cross sections measured under the Channel Morphology Monitoring Plan. Monitoring would be conducted during the first year following license issuance, years 5 and 10 of the new license, and one additional year between year 1 and year 10 following a spill event. The need for continued monitoring beyond year 10 would be determined based on the review of the monitoring results by the agencies in coordination with NID.

*Our Analysis*

Considerable flow and habitat modeling performed by NID in coordination with other relicensing stakeholders demonstrates that the proposed flow measures should significantly improve the quantity and quality of aquatic habitat in project-affected stream reaches as compared to the existing license. LWD can be an important component of aquatic habitat structure in some watersheds; the quantity and type of LWD depends on characteristics of the watershed (e.g., vegetation, slope, soil depth) and stream channel (e.g., sinuosity, entrenchment, stability, gradient, riparian connectivity).

The LWD management plan specified by BLM and agreed to by NID would ensure that LWD in the Bear River is not trapped upstream of Dutch Flat afterbay dam and Rollins dam. BLM proposed surveys of LWD in the lower Bear River below Rollins dam at 5-year intervals that would provide information on the movement of LWD in and through this stream reach following passive release over Rollins dam and the Bear River canal diversion dam. The results of these periodic surveys could guide adjustments to LWD management, if necessary, to create a more natural distribution and anchoring of LWD to enhance aquatic habitat in the lower Bear River.

Forest Service condition 52 would ensure the movement and more natural distribution of LWD in project-affected stream reaches below project facilities on the Middle Yuba River and Canyon Creek. LWD would be resized, as necessary, to facilitate passage and transport by high flow events through these project-affected reaches. Available information suggests that some existing habitat conditions associated with LWD would likely support anadromous salmonids. Relicensing studies indicated that the amount of LWD observed in project-affected stream reaches (technical memorandum 1-1, *Channel Morphology, Attachment 1-1I*) is less than observed in other Sierra Nevada streams (Ruediger and Ward, 1996) and is frequently not immersed (or wetted) within the stream channel. Ruediger and Ward (1996) and Berg et al. (1998) reported that LWD was stable with little movement and played a limited role in aquatic habitat; less than 6 percent was involved in pool formation or sediment retention. NID also reported that the volume of LWD transported to and removed from project reservoirs is also relatively low and that LWD passes over most project dams and diversion dams during periods of high flow. The scope of the Forest Service condition would assure that LWD is transferred past project dams in reservoirs where LWD is trapped, collected, and removed from the watershed as part of existing routine maintenance procedures. Proposed LWD surveys would document the quantity of LWD that is passively transferred from project impoundments to the stream reach below the project dam. The Forest Service condition does not require development of a formal written monitoring plan. LWD surveys would be conducted within 1 year of license issuance. Results would be presented to the agencies and reviewed at the annual consultation meeting.

NMFS recommends an interim LWD measure that calls for specific volumes of LWD to be introduced in Middle Yuba River at Milton diversion dam and in Canyon Creek at Bowman-Spaulding diversion dam. These recommended LWD volumes for Middle Yuba River and Canyon Creek are based on higher LWD volume, mobility, and recruitment estimates from East Fork Creek, a tributary to Middle Yuba River about 11 miles downstream of Milton diversion dam. Riparian conditions and channel characteristics play an important role in the quantity and mobility of LWD within a watershed (Ruediger and Ward, 1996). Given the low volume of LWD generated in higher elevation, upstream project-affected reaches, East Fork Creek may not be representative of conditions that generate and transport LWD in much of the upper watersheds affected by project operations. The Forest Service and BLM conditions would ensure that LWD generated within the upstream watersheds is transported below project dams and should be equivalent to what would be expected in these watersheds under unregulated conditions.

The reintroduction of anadromous salmonids to the upper Yuba River above Englebright dam is not imminent. The LWD surveys specified by BLM would provide information for developing LWD management plans which would be implemented for specific Bear River stream reaches, as appropriate. This information would be used to evaluate the need for introduction of LWD in project-affected stream reaches and is appropriate for resident aquatic resources in the Middle Yuba River and Canyon Creek. The schedule for implementation of the Forest Service and BLM LWD conditions would result in introduction of LWD below project impoundments before reintroduction of anadromous salmonids is likely to occur. Documentation of the quantity of LWD passed downstream of project dams on Middle Yuba River and Canyon Creek would provide information to evaluate the quantity of LWD generated and transported in these watersheds relative to the habitat requirements of anadromous that may eventually be reintroduced above Englebright dam. Proposed monitoring of the condition of stream fish assemblages (resident rainbow trout in particular) in Middle Yuba River and Canyon Creek would also provide insight into the response of habitat conditions as a result of implementation of proposed LWD measures and streamflow measures and associated changes in water temperatures in these stream reaches as they might apply to anadromous fish species.

The filed Channel Morphology Monitoring Plan agreed to by NID and the agencies would provide detailed data to characterize channel and substrate conditions, stability, and response to high-flow events in Middle Yuba River and Bear River. Data generated during monitoring surveys can be used to assess spawning substrate quality and quantity for resident rainbow trout and future reintroduction of anadromous salmonids in the upper Yuba River watershed.

Relicensing studies (technical memorandum 1-1, *Channel Morphology*) generally indicated that stream channels in project-affected stream reaches are stable, and substrate was typically composed of medium to coarse material. Specifically, these studies concluded that poor substrate quality and diversity observed in some stream reaches are typically relic conditions associated with historic hydraulic mining operations. Historic mining created huge sediment reservoirs through which many channels continue to work. These deposits are non-cohesive, do not retain water well, and are not conducive to strong riparian growth. The *Channel Morphology* study found that mobility of spawning gravels in stream reaches below Milton diversion dam and Bowman-Spaulding diversion dam is no different under existing project operations than would exist under unregulated conditions. NID and the relicensing stakeholders did not identify any stream reaches where substrate conditions associated with project operations were of concern for resident aquatic species.

The filed Riparian Vegetation Monitoring Plan agreed to by NID and the agencies would provide detailed data related to the diversity and persistence of herbaceous and woody vegetation in riparian habitat and response to high-flow events in Middle Yuba River and Bear River. Sediment deposits associated with historic and current mining activities are susceptible to scouring that can destabilize bed and banks and adversely affect growth of fledgling riparian vegetation. License conditions have been proposed to protect and enhance aquatic habitat conditions through management of the frequency of spills and the rate of recession of flow following spills. The proposed Riparian Vegetation Monitoring Plan in conjunction with the Channel Morphology and LWD Monitoring Plans would provide data to evaluate the effectiveness of these license conditions.

**Effects of Project Operations on Aquatic Benthic Macroinvertebrates**

Aquatic benthic macroinvertebrate communities can be highly influenced by a variety of naturally occurring and human-induced factors, including: (1) annual hydrologic cycle; (2) timing and magnitude of spring outflows; (3) streambed substrate composition; (4) channel gradient; (5) bank erosion and sediment deposition; (6) pollution; (7) riparian habitat degradation; (8) hydraulic mining; and

(9) recreational activities. NID's *Channel Morphology* studies indicate that project operations have minimal effect on substrate conditions in project-affected stream reaches.

California Fish and Wildlife (recommendation 8) recommends monitoring the benthic macroinvertebrate community in large rivers and streams and small, upper elevation streams; diversity, biomass, and various unspecified community metrics would be analyzed. NID's alternative to a preliminary Forest Service condition proposes to implement an Aquatic Monitoring Plan (August 29, 2012), which does not include monitoring benthic macroinvertebrates. NID's rationale indicates that the benthic macroinvertebrate monitoring in the proposed Forest Service condition would use the same Surface Water Ambient Monitoring Program methods used during the relicensing studies, which demonstrated that benthic macroinvertebrate resources were adequate for maintenance of healthy fish populations in project-affected stream reaches.

Forest Service (condition 51) and BLM (condition 22) final conditions specify preparation and filing with the Commission of an aquatic benthic macroinvertebrate monitoring plan within 1 year of license issuance. Benthic macroinvertebrate samples would be co-located with fish monitoring sites including: three Middle Yuba River locations below Milton diversion dam, one Canyon Creek location below Bowman diversion dam, one location on Texas Creek below the Bowman-Spaulding conduit, and one Bear River location below Rollins dam. Annual sampling would begin at one location on Clear Creek and Trap Creek below the Bowman-Spaulding conduit after channel stabilization activities are completed. Sampling would be conducted once annually during the first 10 years after license issuance and subsequently in conjunction with the fish population sampling schedule.

On August 29, 2012, NID filed alternatives to Forest Service and BLM revised conditions and an implementation plan for aquatic monitoring that excluded monitoring for aquatic benthic macroinvertebrates in project-affected reaches. NID reiterated (May 20, 2014) in their response to the April 2014 modified revised agency conditions, that their proposal does not include aquatic benthic macroinvertebrate monitoring consistent with their August 2012 alternative filing. NID contends that results from relicensing studies do not support a need for continued monitoring of aquatic benthic macroinvertebrates.

*Our Analysis*

Aquatic benthic macroinvertebrates are an important component of stream ecosystems and a primary food source for fish communities in project-affected stream reaches of the Yuba-Bear Project. For this reason, NID's relicensing studies included *Aquatic Macroinvertebrates* (technical memorandum 3-10). Relicensing sampling and analysis conformed to the targeted riffle composite protocol used to describe aquatic benthic macroinvertebrate assemblages and physical habitat in the California Water Board's Surface Water Ambient Monitoring Program (February 2007). Eighteen common macroinvertebrate metrics and two multi-metric indexes were used to evaluate each site. The multi-metric indexes included the IBI and the MMI. Both of these multi-metric indexes are designed to evaluate the impacts of hydropower operations on stream condition as reflected by the benthic community; the MMI calculated by NID is specific to the west slope of the Sierra Nevada. Rehn (2009) developed a benthic macroinvertebrate-based IBI metric for use in evaluating effects of hydroelectric projects; all other factors being equal, this metric is generally lowest immediately downstream of dams and diversions and increases with distance below these structures. However, stream characteristics, such as substrate type and riparian vegetation composition, can exercise a greater effect on benthic macroinvertebrate community metrics, regardless of distance from dams or diversion structures (Bahuguna et al., 2004).

In general, IBI and MMI scores were slightly higher at middle elevation sites (i.e., 2,501 to 6,500 feet msl) and at sites classified as montane compared to foothill (i.e., 900 to 2,500 feet msl). Lower

scores were more common in the low elevation western Placer County stream reaches. The IBI and MMI scores for multiple sites within watersheds did not show consistent trends with distance downstream from project reservoir or diversion dams. Other habitat factors (e.g., ecoregion, riparian vegetation, substrate conditions not affected by project operations, historic non-project uses) appeared to exercise a stronger influence on benthic macroinvertebrate community. Metrics for a reference site in the upper North Yuba River were in the same range as higher elevation sites in Middle Yuba River and South Yuba River Basins.

NID suggests that such monitoring data would not be useful for evaluating the effects of the new license conditions because benthic macroinvertebrate species composition and community diversity can exhibit considerable natural spatial variation depending on site-specific habitat metrics related more to substrate characteristics than to flow and water temperature. Although some shifts in the benthic macroinvertebrate community could occur as a result of changes in project operations, NID concludes that these changes would expand aquatic habitat and provide more persistent inundated channel in seasonal waters, benefiting benthic macroinvertebrate communities in project-affected stream reaches. The aquatic benthic macroinvertebrate community appears to be adequate to support the stream fish community in these stream reaches. Given that relicensing studies could not distinguish project-related influences on the aquatic benthic macroinvertebrate community it does not appear likely that flow changes related to new minimum flow regimes would be discernible as a result of continued project-wide benthic macroinvertebrate survey methods recommended by California Fish and Wildlife. The Forest Service and BLM final conditions focus monitoring efforts on five stream reaches most likely to be affected by changes in flow and water temperature and enhancement of habitat that would result from new minimum streamflow, flow cessation, and LWD conditions. Methods would be consistent with pre-licensing studies and co-located with temperature and fish monitoring sites. This more focused monitoring program is more likely to provide information useful for evaluation of the effects of license conditions intended to enhance aquatic habitat and biological resources.

**Effects of Project Operations on Special-status Species**

Increased flows, reduced flow fluctuations, and cooler water temperatures that would result from flow measures (section 3.3.2.2.2, *Instream Flows*; 3.3.2.2.4, *Recession from Peak Flows and Flow Fluctuations*; and section 3.3.2.2.7, *Flow Augmentation for Management of Water Temperature*) proposed by NID and the relicensing stakeholders to enhance aquatic habitat, also have the potential to affect habitat for special-status species in some project-affected reaches.

*Our Analysis*

Only one special-status fish species occurs in the vicinity of the projects: hardhead (*Mylopharodon conocephalus*), which is listed by the Forest Service as a Sensitive Species and by California Fish and Wildlife as a California Species of Special Concern. Hardhead may occur in lower elevation sections of the Middle Yuba River; however, hardhead was not found in any reservoirs or stream reaches during NID's fish population surveys. Hardhead inhabit areas that have clear, deep pools with sandy, gravel/boulder substrates and slow water velocities. Hardhead generally prefer warmwater, occurring in streams that reach summer water temperatures greater than 20°C. Under laboratory conditions, their reported optimum water temperature range is 24°C to 28°C (Moyle, 2002).

The benthic macroinvertebrate community is used by the Forest Service as a Management Indicator Species. In comments on the draft EIS, Forest Service indicated that the black Juga snail (*Juga nigrina*) has been added to the list of Forest Service Sensitive Species; however, this species was not found during the special-status mollusks survey conducted by the licensees (Technical Memorandum 3-11). Increased minimum streamflows as a result of flow measures proposed by NID and

the relicensing stakeholders for the Middle Yuba River have the management objective of enhancing aquatic habitat for resident rainbow trout balanced with protection of populations of foothill yellow-legged frog between Milton diversion dam and the confluence of Wolf Creek. These measures would extend areas of Middle Yuba River that generally remain below 20°C year-round farther downstream than under the existing license to an area immediately upstream of the Wolf Creek confluence. While this would expand optimal habitat for trout, it has the potential to displace optimal habitat for hardhead farther downstream to stream reaches closer to Our House reservoir. Water temperature model results presented by NID indicate that proposed minimum streamflows would result in temperatures about 1°C cooler between Kanaka Creek and Our House diversion dam impoundment during summer than under the existing license conditions; temperatures in this reach of Middle Yuba River would be in the range of 22 to 24°C during mid-summer. The *Block Flow* recommendation of California Fish and Wildlife would further augment flows and extend cooler water temperatures farther downstream. The model results predict water temperatures above Our House diversion dam impoundment in the range of 21 to 23°C. Temperature modeling (section 3.3.2.2.7, *Flow Augmentation for Management of Water Temperature*) indicates that the effect of higher flows on reducing water temperature is dissipated with distance downstream by the warming effect of air temperature. Given that no hardhead were observed in the reaches of the Middle Yuba River between Milton diversion dam and Wolf Creek and the interaction of air and water temperatures over distance, it is not likely that the higher proposed flows in the Middle Yuba River would have a significant adverse effect on hardhead habitat.

**Implementation and Annual Review of Monitoring Program**

The agencies involved in the relicensing process have management responsibilities for aquatic resources in project-affected stream reaches and have proposed a variety of conditions and recommendations through their authority under sections of the FPA. These agencies recommended and NID proposed measures designed to enhance aquatic habitat for target resident species and have proposed plans of different scales for monitoring the effects of flow-related changes on aquatic resources under the new license. Periodic review of the results of the monitoring plan would assess the effectiveness of proposed protection and enhancement measures and provide recommendations to enhance the value of the monitoring program.

As discussed previously, Forest Service (condition 51) and BLM (condition 22) specify development and/or implementation of monitoring plans for fish populations, foothill yellow-legged frog, western pond turtle, channel morphology, water temperature and stage in order to assess the effects of changes in project operations under the new license in selected project-affected reaches on aquatic biota and habitat. California Fish and Wildlife (recommendation 8) recommends development of a comprehensive monitoring program to encompass aquatic, terrestrial, recreational, aesthetic, cultural, and historic resources. California Fish and Wildlife proposes establishment of an Ecological Group to "assist the Licensee in the project-wide implementation of Monitoring Plans and review and evaluation of monitoring data." The proposed Ecological Group would include representatives of the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other interested stakeholders. NID filed an alternative to the Ecological Group that points out that responsibility for implementation of any monitoring plans following final approval by the Commission is the sole responsibility of NID and that review and evaluation of monitoring results is intended to be one component of the annual consultation process.

Forest Service condition 1 would require NID to hold an annual consultation meeting with the Forest Service by April 15 to review project operation and maintenance schedules and monitoring results. At least 30 days in advance of the meeting, NID would notify PG&E, Forest Service, BLM, FWS, National Park Service, California Fish and Wildlife, California Water Board, NMFS, and other stakeholders. Prior to the meeting NID would distribute an operations and maintenance plan for the

upcoming year. At the meeting NID would present results from current year monitoring of noxious weeds and special-status species as well as any additional information that has been compiled for the project area, including progress reports on other resource measures. The purpose of this meeting is to share information, mutually agree upon planned maintenance activities, identify concerns that agencies may have regarding operation and maintenance activities and their potential effects on sensitive resources, and any measures required to avoid or mitigate potential effects. During the meeting NID would review and discuss the results of implementation of the streamflow and reservoir-related conditions, results of resource monitoring programs, and other issues related to preserving and protecting natural resources affected by the project. The meeting agenda would include, but not be limited to:

- A status report regarding implementation of license conditions.
- Results of any monitoring studies performed over the previous year in formats agreed to by FS and Licensee during development of implementation plans.
- Review of any non-routine maintenance.
- Discussion of any foreseeable changes to project facilities or features.
- Discussion of any necessary revisions or modifications to implementation plans approved as part of this license.
- Discussion of needed protection measures for species newly listed as threatened, endangered, or sensitive, or changes to existing management plans that may no longer be warranted due to delisting of species or, to incorporate new knowledge about a species requiring protection.
- Discussion of needed protection measures for newly discovered cultural resource sites.
- Discussion of elements of current year maintenance plans, e.g. road and trail maintenance.
- Discussion of any planned pesticide use.

In addition to the annual consultation meeting, Forest Services final 4(e) condition 2, *Consultation Group Specific to the Yuba-Bear Project,* requires NID to establish a Consultation Group composed of Forest Service, BLM, Reclamation, California Fish and Wildlife, and California Water Board within 3 months of license issuance. Meetings would be open to other interested organizations and individuals. Initially meetings would be held four times per year, although the Group could agree to meet more or less frequently as needed. The Group would primarily be responsible for review and evaluation of monitoring data related to the Middle Yuba River, Canyon Creek, and Bear River. The Group would also review plans developed as required by the new license or that require specific consultation during implementation and proposed temporary or permanent modifications to the license conditions.

On May 20,,2014, NID responded to the agencies' modified revised conditions indicating that it did not concur with the Forest Service and BLM April 2014 conditions and that their August 2012 alternatives filing reflected NID's current proposal related to consultation and the consultation group. NID proposes that the Consultation Group (formerly Forest Service condition 29, Ecological Group) be deleted as a condition because it is redundant and that appropriate parts be integrated for greater efficiency into Forest Service condition 1, Consultation. NID's alternative also identifies several issues with Forest Service condition 1 for Consultation including:, (1) inclusion of unidentified "other stakeholders" on consultation meeting invite list; (2) unnecessary requirement to provide copies of documents that would be available for downloaded from the Commission's e-Library site and notification

by e-Subscription; and (3) excessively broad requirement for consultation with agencies on project effects on non-jurisdictional lands, i.e., consulting with Forest Service on issues that do not affect NFS land.

*Our Analysis*

Implementation of approved monitoring plans and review of the results of these surveys are essential for determining if flow-related modifications in project operations included in the new license provide the benefits anticipated by the relicensing stakeholders. Development and/or implementation of monitoring plans for each resource area allows a more focused process for review of the plans and subsequent implementation, data collection, and analysis. Effective review of monitoring results and project operations and maintenance schedules would be accomplished during the annual consultation meeting, while review and evaluation of implementation of Middle Yuba River, Canyon Creek, and Bear River flow measures and monitoring data would be conducted by the Consultation Group throughout the year, as necessary. Attendance at Consultation Group quarterly meetings (more or less frequent as required) can be adjusted by the participants to assure involvement of the most appropriate stakeholders and resource experts and managers for individual affected resources.

The Consultation Group would address concerns expressed by NID in their alternative to the Ecological Group relative to the responsibility of the licensee for implementation and conducting monitoring plans and surveys and the role of resource agencies and other stakeholders in review of monitoring data. The proposed Consultation Group should include NID, PG&E, agencies responsible for project and resource management, and stakeholders involved in the relicensing process and concerned with the Middle Yuba River below Milton diversion dam, Canyon Creek below Bowman-Spaulding diversion dam, and Bear River below Drum afterbay. Participants in the annual consultation meeting would be involved in project-wide review of operations and maintenance, and implementation of license conditions for protection and enhancement of project-affected resources.

Meeting notification and documents for review during consultation meetings would be filed on e-Library and available for download by participants 30 days prior to scheduled meetings to reduce the need for distribution of paper copies.

Annual consultation meetings would ensure that agencies and stakeholders are routinely updated on the status and results of license conditions implemented to protect and enhance project-affected resources and are able to plan their management agendas around schedules for project operation and management.

**Effect of Recreation Flows on Aquatic Biota**

NID and relicensing stakeholders have proposed several flow modifications integrated into the spill cessation schedule (section 3.3.2.2.4) that would provide additional and predictable opportunities for recreational whitewater boating. These opportunities would generally occur during periods that would naturally experience high flows under unregulated flow conditions, and the range of flows is within that typical of unregulated conditions. Aquatic monitoring programs discussed previously would provide data to evaluate the effectiveness of these spill cessation measures and recreational flows to protect and enhance aquatic resources.

NID proposes a dam spill cessation measure (YB-AQR1, Part 7), discussed above, that affects the rate of flow reduction following a spill event at Milton diversion dam and Bowman-Spaulding diversion dam. In combination with measures YB-RR4 and YB-RR5 (see section 3.3.5.2, *Recreation Resources*), this measure would provide at least 6 days of recreational boating opportunity during spring in spill years below Milton diversion dam on the Middle Yuba River (Bowman Development) and 5 days on Canyon Creek between Bowman-Spaulding diversion dam and the South Yuba River (Spaulding No. 3

Development). These would be the same magnitude flows that would otherwise occur in these stream reaches in association with spill events. These flows are consistent with Forest Service condition 31, BLM condition 7, and California Fish and Wildlife recommendation 2.7, discussed previously.

In addition, NID proposes a measure (YB-RR3) that would provide fall recreational boating opportunity in about 1.4 miles of Canyon Creek between French Lake dam and Faucherie Lake. The measure would create streamflows of 120 to 150 cfs for continuous 24-hour periods; these flows would begin between September 1 and September 30 and continue until water surface elevation in French Lake drops to 6,638 feet msl (7,500 acre-feet usable storage). Proposed minimum streamflows in this reach of Canyon Creek during September and October range from 5 to 18 cfs, depending on water year type; mean and median estimated unregulated flow through this stream reach would be less than 1 cfs during this period. Relicensing studies collected only small (about 4 inches mean length, 7.4 inches maximum) rainbow trout, which may opportunistically utilize this stream reach as rearing habitat.

*Our Analysis*

The spill cessation measure for Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam as discussed previously would ensure that changes from high flow events more naturally mimic the rate of flow decrease typical of those waters in an unregulated condition. An additional benefit of this measure would be to provide predictable high flow opportunities for recreational whitewater boating. Because these high recreational flows are in a range and duration typical of estimated unregulated flows in these stream reaches, we would not expect any adverse effects on aquatic habitat and biota. The proposed aquatic monitoring plan would provide data for evaluating the effects of high flows and flow cessation on aquatic resources.

**Control of Non-native Aquatic Invasive Species**

The spread of non-native invasive species and their impact on aquatic communities and native species has become more common and of concern to resources managers. Prevention of further introductions and control of existing populations of non-native invasive species is of particular concern in areas with heavy recreational use and inter-basin transfers of water.

Forest Service (modified revised condition 37) and BLM (modified revised condition 14) specify and California Fish and Wildlife (recommendation 6) recommends an aquatic invasive species monitoring and management plan. The agencies identified four aquatic invasive species of specific concern: (1) New Zealand mudsnail; (2) Quagga mussel; (3) zebra mussel; and (4) invasive algae, rock snot. The agencies require that a plan be submitted within 1 year for management of these invasive species and prevention of their spread in project boundaries. The plan would identify aquatic invasive species BMPs, including user education and measures to remove and prevent transfer between waterbodies.

NID did not include a measure for management of aquatic invasive species in the amended final license application, but submitted an alternative to the agencies' conditions. In its alternative, aquatic invasive species are specifically addressed in the Aquatic Invasive Species Prevention Guidelines section of the Non-native Invasive Species Management Plan. NID indicates that the Non-native Invasive Species Management Plan submitted on August 29, 2012, includes all aspects of the agencies' conditions or recommendation for management of aquatic invasive species. The Integrated Vegetation Management Plan includes in section 2.4 (*Aquatic Invasive, Species Prevention Guidelines*) all BMP and user education aspects of the Forest Service and California Fish and Wildlife condition/recommendation for management of aquatic invasive species, but includes only incidental observation for invasive aquatic species, not the monitoring program included in Forest Service condition 37. NID also proposes to provide annual training to crews performing monitoring program tasks to record incidental observations of aquatic invasive species and to implement BMPs to prevent transfer between waterbodies of aquatic

invasive species in conjunction with aquatic monitoring plan surveys and other project operations. NID reaffirmed their alternative condition in their May 20, 2014 letter commenting on the April 2014 modified revised Forest Service conditions.

NID also proposes to document incidental observation of aquatic invasive species during aquatic monitoring efforts. The observations would be reported to the Forest Service so that the Forest Service would be informed of the extent of aquatic invasive species in the areas of study conducted by NID.

The Forest Service's comments on the draft EIS that the plan should include three different levels of monitoring following California Fish and Wildlife protocol at all project reservoirs that have a boat launch or identified as having boating access:

- Monitoring appropriate habitat for Quagga and zebra mussel within 100 feet of boat launches in 14 specified project lakes and any new launch facilities annually at the end of the recreation season;

- Monitoring in spring and fall for mussel veligers using vertical tows at eight specified project reservoirs and any location where new boat launches are added;

- Monitoring using artificial substrate protocol (California Fish and Wildlife) monthly at 4 specified project reservoirs and any locations with new launches added and at the beginning and end of the recreation season at another 10 specified project reservoirs.

*Our Analysis*

Some aquatic invasive species have been identified in project-affected water. An effective management plan for these species could help prevent, delay, or limit expansion of their ranges and associated regional and waterbody-specific impacts. California Fish and Wildlife risk assessment criteria indicate that most project waters are at low risk for establishment of Quagga and zebra mussel given the very low calcium concentrations observed in this region. Some aquatic invasive species have been identified in project-affected water. An effective management plan for these species could help prevent, delay, or limit expansion of their ranges and associated regional and waterbody-specific impacts. California Fish and Wildlife risk assessment criteria indicate that most project waters are at low risk for establishment of Quagga and zebra mussel given the very low calcium concentrations observed in this region. However, intense recreational use of many project reservoirs has the potential to introduce non-native aquatic invasive species into project reservoirs despite the best efforts at user education. Once introduced, eradication of these species is generally infeasible and can be nearly impossible. Although it may be difficult for populations of these invasive mussels to become established in project reservoirs due to limitations of water chemistry, dispersal downstream to non-project aquatic habitat with more amenable conditions would be possible. Monitoring would provide early warning of the potential risk to downstream waters.

Because many of the best management practices for public education and control of invasive species are similar regardless of whether the invasive species are plant or animals, NID included control and management of aquatic invasive species in their Non-native Invasive Plant Management Plan (detailed discussion in section 3.3.3.2.1, *Vegetation Management*). Management at recreation facilities and education of users is a key aspect of controlling the introduction and spread of invasive species in project waters. The Non-native Invasive Plant Management Plan proposed by NID incorporates the key components identified by the agencies in their conditions or recommendations for management of aquatic invasive species. The Aquatic Invasive Species Prevention Guidelines proposed by NID as part of the Non-native Invasive Plant Management Plan conceptually incorporates the key components identified by

the agencies in their conditions or recommendations, but does not provide specific details of measures to be implemented.

Implementation of an Aquatic Invasive Species Management and Monitoring Plan should be an effective tool for reducing the risk of dispersal of aquatic invasive species across project boundaries in conjunction with project operations and monitoring, and should reduce the risk of dispersal by recreational users. Eradication of aquatic invasive species once established is extremely difficult; consequently, effective programs to educate users to prevent the introduction of aquatic invasive species into waters in which they do not occur are an important component of the plan. In comments on the draft EIS the agencies express concern that although most project reservoirs have a low risk for establishment of Quagga and zebra mussel, given the level of recreational usage in many of these reservoirs, if introduced, veligers in particular could be carried downstream to reservoirs with water quality conditions more amenable to establishment of these invasive species. Consequently, they have specified and recommended more intensive monitoring as a mechanism for early detection of invasive aquatic species and a trigger for implementation of stronger management controls. In addition, recording of incidental observations of aquatic invasive species as part of the proposed Aquatic Monitoring Plan (discussed previously) would provide another mechanism for identifying new incidences of invasive species in project waters. NID would submit to the Commission a final plan reviewed and approved by the agencies; The Aquatic Invasive Species Management and Monitoring Plan would be implemented upon Commission approval.

#### 3.3.2.3 Cumulative Effects

**Water Quantity**

**<u>Yuba River Watershed</u>**

Proposed flow conditions and interbasin water transfers from the Middle Yuba and South Yuba Rivers to Bear River and the American River watershed could influence the volume of water that enters Englebright reservoir and is subsequently available for release to the lower Yuba River below Englebright dam. Estimated (YCWA) average monthly unregulated flows (figures -111 and 3-112) indicate that on an annual average basis the North Yuba, Middle Yuba, and South Yuba Rivers above Englebright reservoir would contribute about 47, 18, and 32 percent, respectively, to unregulated flows in the lower Yuba River at the Smartville gage located downstream from Englebright dam. North Yuba River contributes 1,087,000 acre-feet, Middle Yuba River contributes 401,000 acre-feet, and South Yuba River contributes 726,000 acre-feet annually. On a monthly basis the proportion of flow below Englebright dam from North Yuba River ranges from 44 to 73 percent, from Middle Yuba River ranges from 8 to 22 percent, and from South Yuba River ranges from 18 to 41 percent. These three sub-basins of the upper Yuba River exhibit different seasonal patterns in relative unimpaired flows contributed to the lower Yuba River: the relative monthly contribution to lower Yuba River from the North Yuba peaks at 71 to 73 percent in August and September, the Middle Yuba peaks at 22 percent in January and February, and the South Yuba peaks at 40 to 41 percent in May and June (figure 3-112).

The largest interbasin water diversions occur from the South Yuba River, followed by the North Yuba River, and then the Middle Yuba River (figures 3.3-113, 3.3-114, and 3.3-115). The Yuba-Bear Project diverts flow from the Middle Yuba River watershed at Milton diversion dam to Bowman Lake on the South Yuba tributary, Canyon Creek and then diverts flow from Canyon Creek at Bowman-Spaulding diversion dam to Lake Spaulding on South Yuba River; the proposed Upper Drum-Spaulding Project diverts flow from the South Yuba River watershed to Bear River and to the Deer Creek Project at Spaulding dam. Deer Creek eventually enters the Yuba River below Englebright dam and Bear River eventually flows into the Feather River downstream of the confluence of the Yuba River. During the scoping process we determined that the downstream effects of the Yuba-Bear Project on Middle Yuba

River is Our House dam, which is used to divert flows to New Bullards Bar reservoir via the Log Cabin diversion impoundment on Oregon Creek, a tributary to Middle Yuba River. Of the major hydroelectric projects in the Yuba River watershed, YCWA's Yuba River Project exercises the largest hydrologic influence through storage and augmentation from storage at the New Bullards Bar reservoir (figures 3.3-116, 3.3-117, and 3.3-118). The Upper Drum-Spaulding Project has the second most influence and the Yuba-Bear Project the third. The proposed Lower Drum Project diverts water from the Bear River at the Bear River canal diversion dam below Rollins dam out of the Yuba-Feather River watershed to the Lower Drum Project developments which discharge into the American River watershed. Up to 184,761acre-feet of water is diverted at the Bear River canal diversion dam to meet PG&E's contractual obligations for water delivery to NID (59,361 acre-feet) and PCWA (125,400 acre-feet) for consumptive uses including agricultural irrigation which constitutes about 90 percent of consumptive water demand.

In comments on the draft EIS, YCWA indicates that its ability to control flows in the lower Yuba River downstream of Englebright dam through its operations of the Yuba River Project varies seasonally. Although the Yuba River Project has the capacity to greatly affect flows below Englebright, only some of that capacity is operated at the discretion of YCWA. PG&E and the Corps of Engineers also affect flows to lower Yuba River through their operations at the Narrows I powerhouse and Englebright dam. YCWA has limits on the ability to manage flows downstream of Englebright dam for purposes other than flood management, a primary operational purpose of the facility managed by the Corps of Engineers. Regulatory requirements, prudent operational practices, and physical capacities limit the timing and magnitude of controlled releases from Englebright reservoir.

The Corps' Daguerre Point dam and, subsequently, Englebright dam were constructed in the early 1900s to contain the downstream transport of mining debris in the Yuba River system in order to mitigate the effects of mining activities on flooding of downstream communities. The storage capacity of both reservoirs has been significantly reduced by the accumulation of large volumes of sediment and other debris associated with historical mining in the upstream watershed. This mining debris has caused significant degradation of aquatic habitat in the upper and lower Yuba River above and below Englebright dam.

Englebright reservoir receives flow from the North Yuba, Middle Yuba, and South Yuba Rivers and reregulates flows to the lower Yuba River downstream of Englebright dam. Under the Lower Yuba River Accord (Yuba Accord)[18], discharge to the lower Yuba River from Englebright reservoir via the non-project Narrows 1 powerhouse (maximum capacity 730 cfs) operated by PG&E, Narrows 2 (maximum capacity 3,400 cfs) powerhouse operated by YCWA, and the Englebright dam low level outlet are managed primarily through releases from the New Bullards Bar reservoir via the non-project New Colgate powerhouse (maximum capacity 3,430 cfs) operated by YCWA and to a lesser extent from the New Bullards Bar dam low level outlet.

Water year type, used to determine the required Yuba River instream flows at Smartville and Marysville downstream of Englebright dam is based on the North Yuba Index as defined in the Yuba

[18] The Yuba Accord (YCWA et al. 2007) is the collaborative agreement between YCWA and 18 state and federal agencies and non-governmental organizations that affect flows in the lower Yuba River form YCWA's Yuba River Project to benefit restoration of anadromous salmonids. The Yuba Accord is comprised of 3 primary components including: Fisheries Agreement with increased minimum streamflows to benefit wild salmon and steelhead; Water Purchase Agreement to transfer water for other users including environmental flows for the Sacramento-San Joaquin Delta; and seven Conjunctive Use Agreements to improve water supply through a comprehensive groundwater program.

River Accord. The Accord defines the method for calculation of the North Yuba Index using New Bullards Bar reservoir active storage and forecasted total annual inflow to New Bullards Bar reservoir including flow from the North Yuba River and diversions from the Middle Yuba River and Oregon Creek (Our House dam diversion and Log Cabin dam diversion). Thus, minimum flows in the lower Yuba River are based solely on flow available to Englebright reservoir from the North Yuba River. YCWA has limited ability to control releases from Our House and Log Cabin dams and these facilities are not typically used to control Yuba River flows below Englebright dam.

As we discuss in sections 3.3.2.1 and 3.3.2.2.1, flows through the Yuba-Bear, Upper Drum-Spaulding, Deer Creek, and Lower Drum Projects are affected by their mutual operation and, more importantly, the exercise of water rights for diversion, contractual delivery, and use by agricultural, municipal, and commercial users in the region. These water rights are exercised by diversions made from the Middle Yuba River, Canyon Creek, South Yuba River, Deer Creek, Bear River, and North Fork of the North Fork American River sub-basins via project facilities to satisfy consumptive water demand. Water releases to meet proposed minimum streamflows in Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear project-affected stream reaches, spill cessation and management of flow fluctuations, and South Yuba River Supplemental Flows would enhance aquatic habitat and protect aquatic resources, but would also affect the quantity of water available for consumptive water delivery and power generation. Outages of a canal used to transfer water in one project can affect the ability of either licensee to meet proposed minimum streamflow conditions and water delivery to downstream project and non-project facilities, and stream reaches.

Streamflows and associated habitat in the Middle Yuba River downstream of Milton diversion dam are affected by multiple factors, including flows released at NID's Jackson Meadows dam and diverted into the Milton-Bowman conduit at Milton diversion dam and flow diversion to New Bullards Bar reservoir at YCWA's Our House diversion dam and Log Cabin dam. Middle Yuba River flows downstream of the Milton diversion dam are affected by multiple other factors including, but not limited to, natural accretion, other diversions for consumptive use, land use for logging or other purposes, and legacy mining effects in or adjacent to the channel. Consequently, water quantity in the Middle Yuba River downstream of Our House diversion dam is subject to cumulative effects associated with many different factors beyond the control of the licensee, in addition to operation of the Yuba-Bear Project.

Streamflows and associated habitat in the South Yuba River downstream of the confluence with Canyon Creek are affected by multiple factors, including flows released at PG&E's Lake Spaulding dam and NID's Bowman-Spaulding diversion dam. To a lesser extent, flows are also affected by tributary flows released at the Bowman-Spaulding conduit into the following smaller feeder tributaries: (1) Texas Creek, a tributary to Canyon Creek; and (2) Clear, Fall, Trap, and Rucker Creeks, the unnamed tributary below Fuller Lake, and Jordan Creek, all tributaries to the South Yuba River. Additionally, there is substantial distance from the Canyon Creek confluence to PG&E's Spaulding No. 1 and No. 2 Development (about 8.5 miles upstream) on the South Yuba River and to NID's Bowman Development (about 10.5 miles upstream) on Canyon Creek. South Yuba River flows downstream of the Canyon Creek confluence are affected by multiple other factors including, but not limited to, natural accretion, other diversions for consumptive use (e.g., the town of Washington's diversion in Canyon Creek), land use for logging or other purposes, and legacy mining effects in or adjacent to the channel. Consequently, water quantity in the South Yuba River downstream of Canyon Creek is subject to cumulative effects associated with many different factors beyond the control of the licensees, in addition to operation of the Upper Drum-Spaulding and Yuba-Bear Projects.

Non-project diversions and withdrawals of water in various stream reaches by other users affect instream flows in project-affected stream reaches. NID and PCWA are the two largest water providers using non-project diversions from project-affected stream reaches and canals to deliver water to

agricultural, municipal, and industrial customers. NID withdraws water for consumptive uses within the project area: (1) below the Deer Creek powerhouse on the South Fork Deer Creek (35,451 acre-feet annual average); (2) below the Bear River canal diversion dam on the Bear River (60,606 acre-feet annual average); (3) from Rock Creek reservoir (9,045 acre-feet annual average); and (4) from Auburn Ravine (34,373 acre-feet annual average). PG&E delivers water contractually to PCWA for consumptive uses within the project area: (1) below Alta powerhouse on the Little Bear River (9,695 acre-feet annual average); (2) upstream of Halsey forebay from Bear River canal (13,197 acre-feet annual average); (3) from Upper Wise canal upstream of Rock Creek reservoir (15,095 acre-feet annual average); (4) from Wise forebay (4,546 acre-feet annual average); and (5) at several locations along South canal (62,144 acre-feet annual average).

**Bear River Watershed**

The headwaters of the Bear River originate a short distance upstream of the flows diverted from the South Yuba River at Spaulding dam through the Upper Drum-Spaulding Project's Drum canal and Deer Creek Project's South Yuba canals. Water diverted from the North Fork of North Fork American River can enter the Bear River from the Upper Drum-Spaulding Project's Drum forebay or from the Alta development through the Little Bear River. Water is diverted to the Lower Drum Project at the Bear River canal diversion dam below Yuba-Bear Project's Rollins dam. Flows in the Bear River between Rollins reservoir and Lake Combie are affected by coordinated operations of the Yuba-Bear and Lower Drum projects as well as natural tributary accretion and non-project consumptive water diversions including 60,606 acre-feet annually by NID.

**American River Watershed—Auburn Ravine and Mormon Ravine**

Streamflows in Auburn Ravine are highly regulated and are cumulatively affected by numerous deliveries, withdrawals, and discharges by non-project diversions and water utilities (e.g., NID and PCWA) (technical memorandum 3-13, *Western Placer County Streams*; Supplement to Western Placer County Streams Technical Memorandum [April 11, 2012]), in addition to project-related releases made by PG&E from the Wise powerhouses via South canal (section 3.3.4, *Threatened and Endangered Species*; section 3.3.2.2.2, *Minimum Streamflows*). PG&E does not divert any water from Auburn Ravine and does not hold any water rights for the diversion of water from Auburn Ravine. Lower Drum Project discharges from South canal significantly augment flows in Auburn Ravine between the South canal release (RM 27.6) and PCWA's Auburn tunnel (RM 26.4) above estimated unregulated baseflows, enhancing coldwater aquatic habitat in the stream reach below this release point. Except during major runoff events, estimated unregulated (without hydropower operations and other consumptive water deliveries and withdrawals) baseflow in this reach of Auburn Ravine would typically be 5 to 10 cfs, similar to proposed minimum streamflows. Water delivery from PG&E's Lower Drum Project has the greatest effect in Auburn Ravine upstream of the PCWA discharge from Auburn tunnel and numerous other downstream non-project withdrawals and releases that diminish the influence of PG&E's discharges (technical memorandum 3-13, *Western Placer County Streams*). PG&E's releases to Auburn Ravine from South canal (up to 80 cfs) account for about 27 percent of the total volume of water releases to Auburn Ravine that occur upstream of NID's Auburn Ravine I diversion dam (technical memorandum 3-13, *Western Placer County Streams*). While water deliveries associated with hydropower operations account for a portion of flows in Auburn Ravine below the Auburn Ravine 1 diversion dam, other sources associated with consumptive water deliveries cumulatively account for more than 70 percent of the flow in this stream reach.

**Project Operations and Non-project Consumptive Water Use**

As discussed previously, the primary purpose of much of the infrastructure of these four projects is for transfer and delivery of water to agricultural, municipal, and industrial users in the region. The exercise of legally established water rights by NID and PG&E for contractual delivery to PCWA to meet consumptive water demand is likely to continue and increase irrespective of hydroelectric operations of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects. Our analysis of flow and operational measures proposed by PG&E, NID, the resource agencies, and other relicensing participants considers the competing demands and cumulative effects of hydroelectric generation, consumptive water delivery, and aquatic resources. Proposed license conditions would minimize cumulative effects on project-affected resources. General measures proposed by PG&E and NID (DS-GEN3, DS-AQR6, and YB-GEN6) to develop and implement a coordinated operations plan between the four projects would minimize conflicted operations and cumulative effects on water quantity associated with mutual operations. Although environmental flow measures and power operations are likely to remain similar over the duration of the project licenses, non-project consumptive water demand (agriculture, municipal, and industrial) is projected to increase during this same period. Increases in water demand and the exercise of water rights to meet that demand would cumulatively affect the ability of PG&E and NID to comply with minimum streamflow in some stream reaches, particularly during warm, dry water years when non-project water demand could be greater.

PG&E and NID used an operations model to evaluate the effect of various project flow alternatives on hydroelectric generation and the ability to comply with project-wide minimum flows and to meet water delivery obligations of NID and PCWA (Supplement 4 to the final license application, PG&E, August 30, 2012). The model was run using two water delivery scenarios: one assumed current water demand based on water delivery by NID and PCWA for water years 2001-2009; the second used water demand projected 50 years in the future, 2062. The various operating scenarios were applied to the water year conditions for the period of record, 1976-2008. The operations model indicates that, under the existing license conditions and water demand, both NID and PCWA experienced water deficits in 2 years (1977 and 1978) of the 33-year period of record (section 3.2 of Supplement 4 to the final license application, PG&E, August 30, 2012). Modifying project operations to simulate proposed flows measures (minimum streamflows, spill cessation and management of flow fluctuations, and South Yuba River Supplemental Flows) with current water demand reduced hydroelectric generation by about 10 percent and increased water deficit by 1 to 12 percent in 1977 and 1978 (section 4.2 of Supplement 4 to the final license application, PG&E, August 30, 2012). Using future water demand further reduced generation by about 4 percent and resulted in water deficits of 1 to 89 percent for NID in all but 8 of the 33-year period of record; PCWA would experience water deficits in only 3 years of the period of record (section 5.2 of Supplement 4 to the final license application, PG&E, August 30, 2012). In addition, PG&E would be unable to meet the proposed minimum streamflow requirements in several project-affected stream reaches in western Placer County in drier years. These model results quantify the cumulative effects of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects and of increasing demands (environmental, hydropower, and water supply) on the limited available water supply.

As discussed in section 3.3.2.2.2, *Minimum Streamflows*, NMFS has recommended future increases in minimum streamflows in the Middle Yuba and South Yuba Rivers during late spring and summer to support the potential reintroduction of spring-run Chinook salmon and Central Valley steelhead in the upper Yuba River Basin above Englebright dam. If and when reintroduction of either of these species occurs, the operations model results indicate that the proposed flow increases are likely to further stress the water delivery system, reduce power generation, and could lead to non-compliance with minimum streamflows in other project-affected stream reaches, particularly in downstream project areas (e.g., Auburn Ravine and Mormon Ravine) and during drier years.

After more than 15 years of litigation, negotiations resulted in the Yuba Accord agreement that was implemented on an interim basis in 2006 and 2007 with full implementation in 2008. The terms of the agreement affect operations and manage water releases from YCWA's Yuba River Project (which is also involved in relicensing) including New Bullards Bar reservoir and New Colgate and Narrows 2 powerhouses to benefit wild salmon and steelhead in the lower Yuba River as well as the Sacramento-San Joaquin delta and agricultural and other water users in central California. One component of the Accord was establishing a Yuba River metric for management and determination of minimum streamflows in the lower Yuba River below Englebright dam managed through controlled releases from New Bullards Bar reservoir storage. The Lower Yuba River Accord River Management Team (established as part of the Accord) set water temperature objectives (2010) for management of flows and water temperature in lower Yuba River.

**Water Temperature**

In regulated systems, such as the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, cold water from snowmelt is captured and stored in project lakes and reservoirs and managed discharge of cold water to downstream reaches from low-level release structures is a key to maintaining cold water habitat in these stream reaches throughout the summer. Timing of inflow and reservoir stratification, volume of the available cold water pool, timing and size of downstream releases and diversions, and depth of the low-level outlet and powerhouse intakes all influence the quantity of cold water available to maintain downstream habitat and how late into the summer adequate cold water is available.

Given the complex and interconnected features of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, water diversion, water transfer, and releases to project-affected reaches cumulatively affect flow-related environmental conditions such as water temperature. In addition, other non-project consumptive diversions, withdrawals, and discharges in some project-affected reaches further complicate the ability to sustain flow and water temperature goals beyond the immediate stream reaches below project release structures. Although environmental flow measures and power operations are likely to remain similar over the duration of the project licenses, non-project consumptive water demand (agriculture, municipal, and commercial) is projected to increase during this same period. Increases in water demand and exercising of water rights to meet that demand would cumulatively affect minimum streamflow and water temperatures in some stream reaches, particularly during warm, dry water years when non-project water demand could be greater, resulting in water temperature increases.

**Middle and South Yuba Watersheds**

Water temperature and operations modeling by PG&E and NID demonstrate that with cold water releases from project reservoirs under existing license conditions and proposed flow measures, water temperatures remain cooler later into the summer than would exist under estimated unregulated flow conditions. This is particularly apparent in lower elevation stream reaches that can provide transitional aquatic habitat supporting both cold water and warmer water species (e.g., lower reaches of the Middle and South Yuba Rivers). Flow manipulations (e.g., increasing minimum streamflows, decreasing the rate of spill recession from peak flows, seasonal supplemental flows) at project facilities that depend on releases from the cold water pool can be used to enhance aquatic habitat for some species, but could concurrently put other species at risk. The proposed flow measures would preserve the coldwater resources in the project reservoirs for protection and maintenance of downstream aquatic habitat and balance the thermal requirements of resident trout and foothill yellow-legged frog in key reaches of the Middle Yuba River, South Yuba River, Canyon Creek, and Bear River. The benefits and risks of coldwater releases to various aquatic resources and users is further cumulatively affected by other non-

project diversions, withdrawals, discharges, and water supply demands in many of these project-affected stream reaches not controlled by PG&E and NID.

NID and PG&E present model results (final license application, exhibit E, section E6.5) that indicate that existing flow conditions in the Middle Yuba River below Milton diversion dam and in the South Yuba River below Spaulding dam have a negligible cumulative effect on water temperature in the lower Yuba River below Englebright dam. The model used water temperatures upstream of Jackson Meadows reservoir and Lake Spaulding as representative of unregulated temperatures in the Middle and South Yuba Rivers upstream of the project (figure 3.3-119). The cooling and insulating effect of Lake Spaulding on the South Yuba River is demonstrated by the fact the August and September water temperatures downstream of Spaulding dam are about 3 to 5°C less than upstream of the lake (figure 3.3-120). During summer, water temperatures warm by more than 10°C in the 8.6 miles between Spaulding dam and Canyon Creek (figure 3.3-120). Water temperatures increase only 2 to 3°C over the next 32 miles downstream to Englebright reservoir. Under modeled unregulated flow conditions, water temperatures in the South Yuba River above Canyon Creek would be about 6 to 8°C warmer than under existing conditions. Water entering South Yuba River from key tributaries downstream from Canyon Creek would have negligible effect on water temperature in the South Yuba River (figure 3.3-121).

During late summer modeled water temperatures in Middle Yuba River at East Fork Creek more than 10 miles downstream of Jackson Meadows reservoir are 1 to 2°C cooler than water entering Jackson Meadows reservoir from upstream. This demonstrates the benefit of releases from the coldwater pool in Jackson Meadows reservoir accumulated during the snow melt period in spring and early summer. As a result of solar warming and tributary inflow, over the next 7.6 miles downstream to Wolf Creek water temperatures increase about 6 to 7°C and increase another 4 to 5°C in the next 14.4 miles to Our House diversion impoundment (figure 3.3-122).

Although summer water temperatures in Middle Yuba River at YCWA's Our House dam range from 25 to 26°C (figure 3.3-122) and in South Yuba River at Englebright reservoir range from about 24 to 26°C (figure 3.3-120), water temperatures 0.3 mile downstream of Englebright dam at Smartsville are consistently 11 to 13°C (figure 3.3-123. This consistently cool temperature regime is maintained due to the availability of abundant cold water at the bottom of YCWA's New Bullards Bar reservoir, the ability of Englebright reservoir to insulate cold water releases from New Bullards Bar reservoir, and the year-round operation of the Yuba River Project that provides consistent, cold flows in the reach immediately downstream of Englebright dam. Temperatures in the lower Yuba River remain relatively cool in spite of warmer inflows from the Middle and South Yuba Rivers into Englebright reservoir in the summer months, primarily because the magnitude of flows being contributed from these tributaries is low compared to the larger, colder releases typically being made from New Bullards Bar reservoir.

These data demonstrate that while the Yuba-Bear, Upper Drum-Spaulding, Deer Creek, and Lower Drum Projects may have a cumulative effect on flows in the lower Yuba River, the direct effects of interbasin water transfer on water temperature and aquatic habitat are negligible given: (1) the effects of solar heating over the 41 miles of South Yuba River between Spaulding dam and Englebright reservoir and the nearly 45 miles of Middle Yuba River between Milton diversion dam and the confluence with North Yuba River; (2) the relatively large volume of inflow to Englebright reservoir from North Yuba River compared to the Middle and South Yuba Rivers; and (3) the relatively short distance (less than 2 miles) between the non-project New Colgate powerhouse and Englebright reservoir for the effects of ambient air temperatures and solar incidence to increase water temperatures associated with the discharge from the North Yuba River.

**Bear River Watershed**

As discussed in the previous section, the operations and water temperature models were used by PG&E, NID, and the relicensing stakeholders to balance multiple demands on the coldwater pools in the numerous project lakes and reservoirs. The Bear River headwaters are a relatively short distance upstream of Drum afterbay and with a small watershed, natural base flows upstream of Drum afterbay are relatively low. Maintenance of flows and water temperatures is affected by operations of the Drum-Spaulding Project's Drum canal, South Yuba canal, Drum No. 1 and No. 2 Development, and Alta Development. The ability of NID to deliver minimum streamflows in the Bear River below Yuba-Bear's Dutch Flat afterbay dam is dependent on those Drum-Spaulding operations upstream. Without the transfer of water from PG&E's Spaulding No. 1 and No. 2 Development to the Bear River flows in the Bear River upstream of NID's Rollins reservoir would be much lower, particularly during summer and fall, and water temperatures would be higher. There is minimal water storage in the Bear River upstream of Rollins reservoir. Releases by NID from Rollins dam to the lower Bear River would be managed to comply with minimum streamflows and sustain cold water habitat in the Bear River, but also affect the ability of PG&E to divert water to the Bear River canal to meet non-project consumptive water supply contractual obligations, minimum streamflows in several western Placer County streams, and reliably generate hydropower. Downstream of the Bear River canal diversion dam, NID's non-project diversions withdraw about 60,600 acre-feet annually from the lower Bear River for consumptive uses.

Deposition of mining debris and associated aggrading of the channel have also severely affected stream channel morphology and stability in project-affected stream reaches of the Bear River, particularly in the vicinity of the Dutch Flat and Chicago Park Developments. As a consequence of thick layers of coarse substrate from historic mining activity, much of the flow through these stream reaches can be interstitial with reduced surface flow particularly during dry summers. This unconsolidated material provides poor substrate for establishment of riparian vegetation and thus, supports negligible overhead vegetative cover, disrupts connectivity of the flood plain with the river channel, and has high levels of mercury contamination associated with extraction of gold. The open aggraded channel and minimal riparian vegetation can result in increased solar heating of stream and reduced LWD. Historical grazing on leased lands in the meadows reach of the upper Bear River watershed has also impacted channel and riparian stability which can be exacerbated by high flows released from the Drum canal during facility outages in the Drum development.

**American River Watershed—Auburn Ravine and Mormon Ravine**

PG&E and the relicensing stakeholders propose and specify minimum streamflows released from the Wise and Wise No. 2 Developments (Lower Drum Project) to Auburn Ravine via South canal (Newcastle Development, Lower Drum Project) to protect and enhance cold water habitat for resident rainbow trout. Without these releases summer flows between this release location and Auburn tunnel would be very low. Cold water diverted by PCWA from the North Fork American River via the non-project Auburn tunnel diminishes the downstream influence of PG&E's releases to Auburn Ravine from South canal about 1 mile upstream form the Auburn tunnel outlet. In the intervening stream reach non-project discharges and diversions diminish the influence of PG&E's release from South canal for the benefit of aquatic species. Numerous water deliveries, diversions, and withdrawals in lower Auburn Ravine downstream of Auburn Ravine 1 diversion dam have further cumulative effects on water flow and temperature.

Minimum streamflows released to the upper reaches of the Drum-Spaulding and Yuba-Bear Projects and non-project consumptive water diversions cumulatively affect discharges to Mormon Ravine at the Newcastle header box and powerhouse (Newcastle Development, Lower Drum Project), and consequently could have cumulative effects on the cold water storage pool of Folsom Lake. Flows in

Mormon Ravine are dominated by flows from the South canal via the Newcastle Development (Lower Drum Project) and cumulatively influence the size and persistence of the cold water pool in Folsom Lake, in conjunction with other non-project upstream projects and diversions in the American River watershed from: (1) the Middle and North Fork American Rivers (Middle Fork American River Project [FERC No. 2079-069]); (2) Upper American River Project (FERC No. 2101); (3) Georgetown Divide Public Utility District's Stumpy Meadows Project (a non-FERC regulated project); (4) Foresthill Public Utility District's Sugar Pine Dam Project, which diverts flow from a tributary to the North Fork American River; (5) PCWA's Pulp Mill Canal Diversion Dam Project, which diverts flows from a tributary to the North Fork American River; and (6) PCWA's American River pump station, which diverts water from the North Fork American River to Auburn Ravine via the Auburn tunnel. Operation of each of these projects is expected to be similar in the future compared to current operations.

Operation of the proposed Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, in addition to other non-project facility operations, cumulatively affects minimum streamflows that sustain cold water temperatures and aquatic habitat. In order to minimize the cumulative effect on water temperature and streamflow, PG&E, NID, and relicensing stakeholders have proposed measures to ensure collaboration and cooperation between the operations of these two projects. Requirements for a Coordinated Operations Plan (BLM condition 2) and Coordination of Operations at Rollins Reservoir to Comply with Bear River Minimum Streamflows (BLM condition 3 and Forest Service 10(a) recommendation 2) would help ensure that this balance is achieved. In addition, the annual consultation process (Forest Service condition 1, BLM Drum-Spaulding condition 23 and Yuba-Bear condition 42, and Reclamation condition b.1) provides stakeholders with a vehicle for coordination, collaboration, and review of monitoring data and compliance with proposed measures and specified conditions to ensure that these cumulative effects on diverse resources are balanced between project operations, protection and enhancement of cold water aquatic resources, and non-project water users and water rights.

In addition, the *Water Temperature and Stage Monitoring Plan* recommended by the Forest Service and BLM would provide a continuous record of water temperature and stage at key selected locations in project–affected reaches including Auburn Ravine that could be used to evaluate the effectiveness of proposed flow conditions that would be included in the issued license to diminish cumulative project effects on water temperatures in lower Auburn Ravine.

### 3.3.3 Terrestrial Resources

#### 3.3.3.1 Affected Environment

##### 3.3.3.1.1 Vegetation

Distinct vegetation types in the vicinity of the projects are distributed along an elevation gradient creating bands with characteristic or dominant species. These bands somewhat overlap and intergrade with each other forming transition zones on their outer edges.

Vegetation in the foothills (below 2,000 feet msl) is dominated by an overstory of gray pine and ponderosa pine, with a mixture of small stands of hardwoods including canyon live oak, interior live oak, and blue oak, and low-elevation chaparral shrubs such as wedgeleaf ceanothus, manzanitas, and coffeeberry. The forest is occasionally interrupted by patches of non-native annual grasslands dominated by a variety of bromes with some medusahead grass. In some areas, pure stands of ponderosa pine exist where the conifer has been planted following fires and/or logging. In riparian areas, black cottonwood, white alder, and valley oak are common.

At mid-elevations (between 2,000 and 5,000 feet msl), dominant vegetation includes incense cedar, Douglas fir, white fir, madrone, and sugar pine. Additionally, significant stands of Brewer's oak

occupy south-facing slopes and areas of annual grasslands. Chaparral species include whiteleaf manzanita, greenleaf manzanita, mountain whitethorn, wedgeleaf ceanothus, deerbrush, and poison oak. Riparian areas are dominated by white alders, maple, and willows. In addition, the mid-elevation band includes several outcrops of habitat characterized by serpentine soil. Dominant plants in these areas are leather oak, gray pine, and wedgeleaf ceanothus. Additional serpentine indicators in these areas include milkwort jewelflower and yellow pincushion.

At higher elevations (above 5,000 feet msl), the forested areas are dominated by an incense cedar, red fir, white fir, and Jeffrey pine overstory. Lodgepole pines exist in moist soils in meadows and along shorelines. Black oak, willow, quaking aspen, and mountain alder are common deciduous trees and may form a subcanopy beneath the conifer overstory. Some areas are barren, devoid of vegetation due to rocky and steep terrain with little to no soil layer. The shrub layer is dominated by mountain whitethorn, huckleberry oak, pinemat manzanita, and bush chinquapin.

The main disturbance affecting upland vegetation in the area of the projects is fire. The Sierra Nevada Forest Plan Amendment (Forest Service, 2004, as cited in PG&E, 2011a and NID, 2011a) documents a trend of increasing acres burned on the National Forests within the Sierra Nevada Ecoregion from 1970 through 2003. The last significant fire in the vicinity of the projects occurred near Lake Valley reservoir in 2001 and burned close to 2,500 acres. The fire was not related to the operation and maintenance of either project.

**Riparian and Wetland Vegetation**

To provide baseline information on riparian and wetland vegetation, PG&E and NID reviewed information from Forest Service stream survey data sheets for the period of 1975 to 2001 and riparian inventory data sheets available for the North Fork American River sub-basin; a series of watershed maps developed by the Nevada County Planning Department; FWS National Wetlands Inventory maps; and low-elevation helicopter video imagery for each study site to identify the distribution, extent, and class of riparian and wetland habitat in the area of the projects.

Additionally, the applicants conducted Proper Functioning Condition assessments of 10 riparian habitat sites and 7 wetlands. The sites were collaboratively selected with other relicensing stakeholders to represent the range of riparian habitat and wetlands that could be affected by the projects. The applicants also collected vegetative transect data in three riparian areas for tree, shrub, and herbaceous species, but these sites were not fully evaluated for Proper Functioning Condition.

The Proper Functioning Condition assessment protocol generally defines a properly functioning riparian area as one with adequate vegetation, landform, or large woody debris that:

- Dissipates stream energy associated with high water flow, thereby reducing erosion and improving water quality;
- Filters sediment, captures bedload, and aids in flood plain development;
- Improves flood-water retention and groundwater recharge;
- Develops diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and
- Supports greater biodiversity.

Under the Proper Functioning Condition assessment methodology, a site is rated as Properly Functioning if it meets all or most checklist criteria in accordance with site capability and potential. A site is rated as Functional–At Risk if it meets all or most checklist criteria, but certain attributes or processes are not present or otherwise suggest a probability of site degradation during high-flow events. A site is rated as Nonfunctional when many checklist criteria are not met and the area clearly lacks the elements of the criteria listed above (PG&E and NID, 2011a).

Seven of the ten riparian habitat sites and five of the seven wetlands were rated as Properly Functioning. The remaining sites, described below, were rated Functional–At Risk. Functional–At Risk riparian habitat sites were identified at the Fordyce Lake dam reach and Bear River reach no. 2 at the Drum-Spaulding Project and at the Dutch Flat afterbay dam reach at the Yuba-Bear Project. Functional–At Risk wetland sites were identified at: Bear River reach no. 2, wetland RM 35; and Lower Rock Lake dam reach no. 1, wetland RM 2.8 at the Drum-Spaulding Project. To make these determinations, the site-specific attributes and processes of hydrology, vegetation, and erosion/deposition for each site were considered along with historical site information and overall site reconnaissance. Proper Functioning Condition ratings are summarized in table 3-201, and riparian and wetland habitat sites with Functional–At Risk ratings are discussed below.

Table 3-201. Riparian and wetland habitat study sites and Proper Functioning Condition ratings for the Upper Drum-Spaulding and Yuba-Bear Projects. (Source: PG&E, 2011a; NID, 2011a)

| Study Site Name | Proper Functioning Condition Rating |
|---|---|
| **Riparian Habitat Study Sites** | |
| **Upper Drum-Spaulding Project** | |
| Fordyce Lake dam reach | Functional–At Risk |
| Bear River reach no. 2 | Functional–At Risk |
| Lake Valley reservoir dam reach | Properly Functioning |
| **Yuba-Bear Project** | |
| Jackson Meadows dam reach | Properly Functioning |
| Milton diversion dam reach | Properly Functioning |
| Faucherie Lake dam reach | Properly Functioning |
| Bowman-Spaulding diversion dam reach | Properly Functioning |
| Dutch Flat afterbay dam reach | Functional–At Risk |
| **Upper Drum-Spaulding and Yuba-Bear Projects** | |
| South Yuba River reach no. 4 | Properly Functioning |
| Bear River canal diversion dam reach | Properly Functioning |

Table 3-201. Riparian and wetland habitat study sites and Proper Functioning Condition ratings for the Upper Drum-Spaulding and Yuba-Bear Projects. (Source: PG&E, 2011a; NID, 2011a)

| Study Site Name | Proper Functioning Condition Rating |
|---|---|
| **Wetland Habitat Study Sites** | |
| **Upper Drum-Spaulding Project** | |
| Meadow Lake wetland | Properly Functioning |
| White Rock Lake wetland | Properly Functioning |
| White Rock Lake dam reach no. 2, wetland RM 2.2 | Properly Functioning |
| Bear River reach no. 2, wetland RM 35 | Functional–At Risk trending upward |
| Lower Rock Lake dam reach no. 1, wetland RM 2.8 | Functional–At Risk trending upward |
| Lower Rock Lake dam reach no. 1, wetland RM 3.1 | Properly functioning |
| **Yuba-Bear Project** | |
| Jackson Meadows dam reach, wetland RM 46.4 | Properly functioning |

**Upper Drum-Spaulding Project**

*Fordyce Lake Dam Reach, Riparian Habitat*

Fordyce Lake dam reach is a 10.5-mile-long reach between Fordyce Lake dam and Lake Spaulding. The channel is mostly confined within bedrock walls and has numerous falls and gorges that define the overall character. Substrate is dominated by immobile material, and banks are bounded by bedrock, although some banks are composed of soils (< 15 percent of the site). These soils are loamy, indicating they are significantly influenced by the decomposition of organic matter and are not the result of recent sedimentation. Five plant associations occur within the study site and include mountain alder, incense cedar, red fir, huckleberry oak, and pinemat manzanita. Riverine and palustrine wetland systems occur within the study site. The riverine wetland encompasses about 4.3 acres, and palustrine wetlands encompass about 1.14 acres and consist of unconsolidated bottom wetland. Palustrine unconsolidated bottom wetlands are scattered intermittently.

The riparian area associated with this reach was classified as Functional–At Risk. Undercutting occurs in some areas (< 15 percent of overall reach length) due to 1997 elevated flood flows. Existing flows may be causing continued undercutting, and riparian vegetation has not become established enough in these areas to prevent further erosion. Throughout the majority of the reach, energy associated with large flow events is dissipated by bedrock and boulder substrate. Although there is limited riparian vegetation in these areas, it meets the potential for an area dominated by such substrates. However, some areas did not meet riparian potential, such as where soil banks were present in small, intermittent pockets throughout the reach and at a relatively short upstream section of the study site (<15 percent total). Surveys indicate that riparian vegetation was not present in these areas with enough vigor or root stability to withstand high flow events, although these areas have the potential to support a more developed riparian community. Erosion undercutting of these banks was observed, and vegetation in these areas had exposed roots. These areas contributed to the Functional–At Risk rating because they do not meet their potential, although they comprise only a small percentage of the overall site.

*Bear River Reach No. 2, Riparian Habitat*

Bear River reach no. 2 is about 1.65 miles long, at an approximate elevation of 4,000 feet msl. This reach is functionally affected by both the Drum-Spaulding and Yuba-Bear Projects. Bear River reach no. 2 occurs near the headwaters of the Bear River drainage. In the upper section, the stream is confined cohesive alluvial sediments with exposed bedrock in the channel. The upper meadow has springs and subsurface flow that are not surficially connected to the channel. In the middle section, the Bear River flows through a terrace and includes a short berm composed of cobbles and boulders. The channel is steep through this portion of the meadow, and there is no apparent hydraulic connection between the channel and the adjacent meadow. The lower section is a meandering stream with fine-grained banks, and bedrock is present along this portion. Field surveys show a substantial increase in riparian vegetation along the side channels and woody vegetation along the main stream channel since 1939. Vegetation consists of riparian species of white alder trees with an understory of mountain alder and various willows. Vegetation throughout the main and side channel stabilizes the banks and limits lateral movement. In addition, California State Highway 20 traverses the Bear River and limits stream channel movement.

The riparian area associated with Bear River reach no. 2 was classified as Functional–At Risk. Although the channel is incised in the upper and middle portions, with intermittent bank failures in the middle meadow, the study site has many of the characteristics included in the Proper Functioning Condition definition, which contributed to the upward trend rating. There are active and frequent flood plains in the lower sections of reach. Localized flood plains show connectivity to the main channel, and a high water table, hydric soils, and fine-grained deposition suggest frequent inundation. More than 95 percent cover of woody and herbaceous riparian vegetation supports bank stability, dissipates energy, and forms root masses capable of withstanding high-flow events. Twenty-nine wetland indicator species were observed and may denote a healthy distribution of anaerobic soil and groundwater movement. There are no fan deposits or braids from upland sediment sources and no indication of current excessive erosion or deposition. Regulated flows in this reach are larger than would be expected given the small drainage area; the reach is used for conveyance of spills from the Drum canal during winter storm conditions and for conveyance into the Bear River watershed during the winter and spring of wetter water years.

*Bear River Reach No. 2, Wetland RM 35*

Bear River reach no. 2, wetland RM 35 occurs about 2 miles southwest of Lake Spaulding, encompasses about 266.70 acres, and is located at about 4,520 feet msl. This reach is functionally affected by both the Drum-Spaulding and Yuba-Bear Projects. This wetland includes sections associated with the river and sections created by upslope sources. Sources of water include seeps, springs, the Bear River, and seasonal inflow from streams that drain adjacent uplands. Eight plant associations occur within the wetland, including sedge, rush, white alder, bulrush, broadleaf cattail, willow, wet meadow, and dry meadow. The wetland system is palustrine and consists of about 234.68 acres of emergent wetlands, 17.80 acres of scrub-shrub wetlands, and 14.22 acres of forested wetlands. Historical aerial photographs indicate the overall extent of this wetland has remained the same with some increases in conifers, shrub, and forest wetland vegetation. Bear valley has a long history as a pasture for livestock and, until the 1990s, was heavily grazed. The emergence of woody vegetation throughout the stream margins is most likely related to the general decline of grazing pressure.

This wetland was rated as Functional–At Risk, with an upward trend. The natural surface or subsurface flow patterns appear to have been altered by historic disturbance from grazing. Trampling and compaction eliminate vegetation, thereby increasing runoff and erosion, potentially resulting in stream-channel down-cutting. Several factors contributed to the upward trend rating of this wetland. Cattle have been removed from the wetland, and stream bank restoration measures have been implemented. Reduced

grazing pressure and natural succession have improved meadow conditions. The meadow vegetation is primarily supported by other sources of water, including seeps, springs, and intermittent and perennial streams from the surrounding mountain slopes.

*Lower Rock Lake Dam Reach No. 1, Wetland RM 2.8*

Lower Rock Lake dam reach no. 1, wetland RM 2.8 encompasses about 39.03 acres and is about 1.6 miles downstream of Lower Rock Lake dam at an elevation of about 6,000 feet msl. The wetland is bisected by Texas Creek, which is controlled by the operation of Lower Rock Lake dam. Other sources of water include seeps, springs, and inflow from several small streams draining the upland slopes northeast and southeast of the site. Nine plant associations occur within the wetland and include sedge, rush, corn lily, mountain alder, willow, wet meadow, dry meadow, lodgepole pine, and quaking aspen. The wetland system is palustrine and encompasses about 36.50 acres of emergent wetlands, 2.24 acres of scrub-shrub wetlands, and 0.29 acre of forested wetlands.

This wetland was rated as Functional–At Risk, with an upward trend, because of three main issues. First, this meadow was heavily grazed by sheep and cattle for most of the twentieth century, which has altered the natural surface or subsurface flow patterns leading to stream channel down-cutting from trampling and vegetation eliminated by compaction. Grazing also appears to have reduced woody vegetation in stream channels. Though the site is seasonally grazed by cattle and used for horse pasture late in the year following plant development, the site no longer is subject to the pressures it had experienced in the past, which may have contributed to the ongoing recovery. Restoration measures, such as the reduced grazing pressure and the placement of a grade control structure at the outlet, indicate that the wetland is now trending toward recovery. Second, plant species present did not fully indicate maintenance of riparian-wetland soil moisture characteristics. Prolonged saturation and hydric soils are absent from portions of the wetland. The wetland may drain quickly enough to establish wetland plants but does not remain inundated for a long enough duration to establish hydric soil or hydrology indicators. Third, adequate vegetative cover was not present to fully protect the soil surface and dissipate energy during overland flow events. The inability to dissipate energy during overland flow events pertains mostly to the distribution channels and not to the main Texas Creek channel. The distribution channels have been more severely affected by grazing animals and show more evidence of scour and bank failure.

**Yuba-Bear Project**

*Dutch Flat Afterbay Dam Reach, Riparian Habitat*

The Dutch Flat afterbay dam reach is a 5.4-mile section of the Bear River between the Chicago Park powerhouse at the downstream end and Dutch Flat afterbay dam at the upstream end. Vegetative cover increased from 1939 to 1977 in areas directly adjacent to the main channel flows. Field observations indicated that the vegetation at the water's edge is dominated by willow and white alder shrub. Riverine and palustrine wetland systems occur within the study site. The riverine wetland encompasses about 2.73 acres, and the palustrine wetlands encompass 9.18 acres of palustrine scrub-shrub and unconsolidated bottom.

The riparian area associated with this reach was classified as Functional–At Risk. Historic sedimentation associated with mining deposits and large historic floods have affected the functional capacity of the riparian area. Depositional mine tailings have formed terraces that prevent the river from being hydraulically connected to the banks, and upland species are present on these terraces. The coarse deposits and extensive sediment supply have also caused channel braiding. The riparian sediments are also composed of these loosely consolidated and coarse deposits and are non-cohesive and unstable. In areas where riparian habitat is establishing, it cannot withstand high flows because fine sediments have not accumulated and soils have not developed in the coarse material, which prevents strong root-holds.

Under normal flows, riparian vegetation showed a trend toward becoming more established and providing positive riparian habitat characteristics, which contributed to the upward trend rating.

**Non-native Invasive Plants (Noxious Weeds)**

Noxious weeds as used here are plant species listed as noxious weeds by Tahoe National Forest or the California Department of Food and Agriculture. To identify noxious weeds and invasive plants with the potential to occur in the vicinity of the projects, PG&E and NID reviewed Tahoe National Forest survey data and performed surveys for these noxious weeds and others that may occur in the project site. Table 3-202 lists the 16 plant species identified at the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects.

A total of 994 noxious weed occurrences, representing 16 plant species, were found during the applicants' field surveys. Of these occurrences, 76 were on NFS lands—13 within the Drum-Spaulding Project boundary, 15 within Deer Creek Project boundary, and 48 within the Yuba-Bear Project boundary—and 45 were on BLM land within the Yuba-Bear Project boundary (PG&E and NID, 2011d).

In general, noxious weeds were more abundant on private lands at lower elevations and were primarily found along roads, canals, transmission lines, and in campgrounds within the project areas. The most common are Klamath weed, skeleton weed, Scotch broom, and yellow starthistle. Where found, these weeds are continuous in and out of the project areas.

PG&E's informal noxious weed control program includes using herbicides on PG&E property around dams, canals, and roads; pressure washing and cleaning heavy equipment rentals prior to delivery to PG&E; and certifying rock and road base are weed-free before delivery. NID does not have a noxious weed control program. However, vegetation management conducted as part of project O&M may indirectly target some occurrences of noxious weeds.

Table 3-202. Noxious weeds/invasive plant species identified within the Upper Drum-Spaulding, Lower, Deer Creek, and Yuba-Bear Project boundaries. (Source: PG&E, 2011a; NID, 2011a; and Calflora, 2012)

| Common Name | 2007 California Department of Food and Agriculture Rating[a] |
|---|---|
| Barbed goatgrass | B |
| Tree of heaven | C |
| Italian thistle | C |
| Slenderflower thistle | C |
| Tocalote | C |
| Yellow starthistle | C |
| Skeleton weed | A |
| Scotch broom | C |
| Common fig | Not rated |
| French broom | C |
| Klamath weed | C |
| Tall whitetop | B |
| Spanish broom | Not rated |
| Johnson grass | C |
| Medusahead | C |
| Canada thistle | B |

[a] California Department of Food and Agriculture ratings:

A = Eradication, containment, rejection, or other holding action at the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.

B = Eradication, containment, control, or other holding action at the discretion of the commissioner. State endorsed holding action and eradication only when found in a nursery.

C = Action to retard spread outside of nurseries at the discretion of the commissioner; reject only when found in a crop seed for planting or at the discretion of the commissioner.

**Special-status and Special Interest Plant and Fungi Species**

PG&E and NID consulted with agencies and literature to develop a list of special-status plant species with the potential to occur in the Drum-Spaulding and Yuba-Bear Project areas. Field botanical surveys were conducted to determine the presence of special-status plant species in the project areas. A total of 118 occurrences of 13 special-status plants, described below, were identified within the study area; 74 occurrences were within the Drum-Spaulding Project boundary, and 44 were within the Yuba-

Bear Project boundary (table 3-203). On July 3, 2013, the Forest Service updated the sensitive species list for Region 5. Several species that were not previously included in the draft EIS are now considered sensitive forest species (table 3-203). No plant species listed under the California Endangered Species Act were found in the project boundaries (PG&E and NID, 2011d). Federally listed plant species are discussed in section 3.3.4, Threatened and Endangered Species. Webber's ivesia, a candidate for listing under the ESA, is described below.

Congdon's onion is a perennial herb native and endemic to California found at elevations from 1,000 to 5,000 feet msl, with a flowering period ranging from April to June. Habitats in which this species can be found include chaparral, cismontane woodlane, and serpentine soils. Five occurrences of Congdon's onion were found in the Upper Drum-Spaulding Project area, two occurrences were found in the Lower Drum Project area, and four occurrences were found in the Yuba-Bear Project area. In the Drum-Spaulding Project area, four occurrences were located adjacent to Drum Powerhouse Road (Upper Drum-Spaulding Project), one occurrence was located beneath the Deer Creek-Drum transmission line (Upper Drum-Spaulding Project), and two occurrences were located along Hillcrest Road, which accesses the Bear River canal (Lower Drum Project). All occurrences were on serpentine soils with wooly sunflower, wedgeleaf ceanothus, and milkwort jewelflower. One occurrence showed signs of disturbance, and two occurrences had noxious weeds in the vicinity. All occurrences of Congdon's onion in the Upper Drum-Spaulding and Lower Drum Project areas appeared healthy, with 10 to 20 percent in flower. In the Yuba-Bear Project area, all occurrences were found on Forest Service land adjacent to the Dutch Flat conduit. All occurrences were located on serpentine outcrops. Dominant species in the area included California bay, wedgeleaf ceanothus, and canyon live oak. Occurrences below the Dutch Flat conduit had noxious weeds among or adjacent to them and were subject to erosion. All occurrences of Congdon's onion in the Yuba-Bear Project area appeared healthy, with 30 percent or more of the plants in flower (PG&E and NID, 2011d).

Table 3-203. Special-status and special interest plants identified in the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project boundaries. (Source: PG&E and NID, 2011d)

| Common Name | Upper Drum-Spaulding Project | Lower Drum Project | Deer Creek Project | Yuba-Bear Project | Special-status Designation[a] |
|---|---|---|---|---|---|
| **Special-status Plants** | **Number of Sites** | | | | |
| Congdon's onion | 5 | 2 | | 4 | FSW |
| Sanborn's onion | | 1 | | -- | FSW |
| Scalloped moonwort | 1 | | | -- | FSS, CNPS 2 |
| Wooly-fruited sedge | -- | | | 1 | CNPS 2 |
| Brandegee's clarkia | | 46 | | 18 | FSS, BLM-S, CNPS 1B |
| Coralroot orchid | -- | | | 2 | CNPS 2 |

Table 3-203. Special-status and special interest plants identified in the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project boundaries. (Source: PG&E and NID, 2011d)

| Common Name | Upper Drum-Spaulding Project | Lower Drum Project | Deer Creek Project | Yuba-Bear Project | Special-status Designation[a] |
|---|---|---|---|---|---|
| Roundleaf sundew | -- | | | 2 | FSW |
| Humboldt lily | | 12 | | 5 | FSW, CNPS 4 |
| Northern bugleweed | -- | | | 1 | CNPS 4 |
| Sierra starwort | 3 | | | 7 | CNPS 4 |
| Water bulrush | -- | | | 1 | CNPS 2 |
| Rocky Mountain chickweed | 3 | | | 2 | CNPS 4 |
| Felt-leaved violet | | | 1 | 1 | CNPS 4 |
| Sierra blue grass | * | | | * | FSS* |
| Whitebark pine | * | | | * | FSS* |
| **Total Number of Occurrences** | **12** | **61** | **1** | **44** | -- |
| **Special Interest Plants** | **Number of Sites** | | | | |
| Quaking aspen | 38 | | | 23 | -- |
| Elderberry | 26 | | | -- | -- |

[a] Status Designations:
BLM-S = BLM sensitive plants
CNPS 1B = California Native Plant Society list, endangered in California and elsewhere
CNPS 2 = California Native Plant Society list, rare/threatened/endangered in California only
CNPS 4 = California Native Plant Society list, limited distribution, watch
FSS = Forest Service sensitive species
FSW = Tahoe National Forest watch list species

Table 3-203. Special-status and special interest plants identified in the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project boundaries. (Source: PG&E and NID, 2011d)

| Common Name | Upper Drum-Spaulding Project | Lower Drum Project | Deer Creek Project | Yuba-Bear Project | Special-status Designation[a] |
|---|---|---|---|---|---|
| | Note: Species designated as FSS* are special concern species that were added by the Forest Service for Region 5 on July 3, 2013. Plant surveys conducted by PG&E and NID identified the occurrence of these two species within the project boundaries, but information on the number of occurrences of each species was not provided in the updated study report (PG&E, 2011d). The Whitebark pine was located in areas above 5,000 feet in elevation. The Sierra blue grass was found in areas less than 2,500 feet in elevation, and in areas between 2,500 and 5,000 feet in elevation. | | | | |

Sanborn's onion is a perennial herb endemic to California found at elevations from 1,000 to 5,000 feet msl, with a flowering period ranging from April to June. Habitats in which this species can be found include chaparral, cismontane woodlane, and serpentine soils. One occurrence of Sanborn's onion was found in the Drum-Spaulding Project area along the Bear River canal. Dominant species in the area included California bay, Douglas fir, and manzanita. The Sanborn's onion occurrence appeared to be healthy, with more than 25 percent in flower and no visible disturbances (PG&E and NID, 2011d).

Scalloped moonwort is a fern native to California found at elevations over 4,000 feet msl, with a flowering period ranging from June to September. Habitats in which this species can be found include lower montane coniferous forests, meadows and seeps, marshes and swamps, and moist/riparian areas. One occurrence of scalloped moonwort was found in the Drum-Spaulding Project area adjacent to Lake Valley reservoir. Dominant species in the area were incense cedar, Jeffrey pine, white fir, and huckleberry oak. The scalloped moonwort occurrence appeared to be healthy, with well-developed fertile leaves and no visible disturbances (PG&E and NID, 2011d).

Wooly-fruited sedge is a perennial herb native to California found in lake margins, marsh, bog and fen, and edge habitats (Calflora, 2012). One occurrence of wooly-fruited sedge was found in the Yuba-Bear Project area adjacent to the Bowman-Spaulding transmission line, on floating vegetation mats in a pond-like wetland. Dominant species in the area included bog blueberry, buck-bean, and bog laurel. The wooly-fruited sedge occurrence appeared healthy, with the majority in flower or fruit. Evidence of dumping, possibly historic, was present on the western side of the area of occurrence (PG&E and NID, 2011d).

Brandegee's clarkia is an annual herb native and endemic to California found at elevations from 239 to 3,001 feet msl, with a flowering period ranging from May to July. Habitats in which this species can be found include chaparral and cismontane woodlands. Forty-six occurrences of Brandegee's clarkia were found in the Lower Drum Project area, and 18 were found in the Yuba-Bear Project area. In the Lower Drum Project area, occurrences were along the Bear River canal, Bear River Canal Access Road, and Wise forebay-Newcastle Powerhouse Road. All occurrences were located in openings with annual grasses; five of the occurrences were found in serpentine outcrops. Common species found in these areas included poison oak, black oak, canyon live oak, gray pine, and Douglas fir. Several of the occurrences appeared disturbed by off-highway vehicle use, road use and maintenance, and herbicide application. All but one occurrence in the Drum-Spaulding Project area appeared healthy with the majority of individuals in flower or fruit. In the Yuba-Bear Project area, 18 occurrences were located on private land and two on BLM land at Rollins reservoir and Dutch Flat afterbay. All occurrences were in openings in oak woodland, most commonly with annual grasses, poison oak, wooly sunflower, and field bindweed. The

majority of occurrences had noxious weeds among or adjacent to them. Nearly half of the occurrences showed signs of disturbance, from road maintenance, herbicide application, recreation use, fire, or non-project transmission line maintenance. The majority of Brandegee's clarkia occurrences in the Yuba-Bear Project area appeared healthy and were near full flowering (PG&E and NID, 2011d).

Coralroot orchid is a perennial herb native to California found in meadow, edge, and wetland habitats (Calflora, 2012). Two occurrences of coralroot orchid were found in the Yuba-Bear Project area. One occurrence was located on Forest Service land at the Milton diversion dam impoundment, and the second was located at Bowman Lake. The first occurrence was located on mesic swales in an extensive wetland dominated by lenticular sedge, twotooth sedge, lance-leaf self-heal, and Macloskey's violet. The second occurrence was located in a mesic opening, with rattlesnake plantain, trailplant, creeping snowberry, and sickle-keeled lupine. Both occurrences appeared healthy, with 70 percent flowering and 20 percent in fruit in the first occurrence and all plants in fruit in the second occurrence (PG&E and NID, 2011d).

Roundleaf sundew is a perennial herb native to California found in wet areas below 8,000 feet msl, with a flowering period ranging from June to September. Two occurrences of roundleaf sundew were found in the Yuba-Bear Project area. The first occurrence was located in a small wetland by the Bowman-Spaulding conduit on Forest Service land. Plants found in this area included mountain alder, yellow willow, and black cottonwood. The second occurrence was located in a wetland directly across from the Bowman-Spaulding transmission line. Dominant vegetation in this area included bog blueberry, buck-bean, and bog laurel. The first occurrence appeared healthy, with about 30 percent of the plants in flower, although there was evidence of off-highway vehicle use in the surrounding roadways and river channels. The second occurrence also appeared healthy, with about 60 percent of the plants in flower. The west side of the wetland in the second occurrence had significant amounts of garbage from dumping, some of which was possibly historic (PG&E and NID, 2011d).

Humboldt lily is a perennial herb native and endemic to California found at elevations from 1,500 to 3,500 feet msl, with a flowering period ranging from May to July. Habitats in which this species can be found include chaparral, cismontane woodland, lower montane coniferous forest, and openings. Twelve occurrences of Humboldt lily were found in the Lower Drum Project area, and five were found in the Yuba-Bear Project area. In the Lower Drum Project area, all occurrences were located on private land adjacent to the Upper Wise canal, Bear River canal, and Bear River canal access road. Occurrences were in areas of oak woodland with a few conifers, a generally thick shrub layer, and a sparse herbaceous layer. Dominant species found in association with Humboldt lily occurrences in the Upper Drum Project area included black oak, blue oak, canyon live oak, poison oak, deer brush, tonyon, and wedgeleaf ceanothus. Brush cutting was a visible disturbance around two of the occurrences, and noxious weeds grew in the vicinity of five occurrences. All occurrences in the Lower Drum Project area showed signs of grazing but appeared healthy. In the Yuba-Bear Project area, all occurrences were located in direct proximity to Rollins reservoir, with one located inside Orchard Springs campground. Dominant species in the areas of occurrence included Douglas fir, black oak, poison oak, mock orange, and deer brush. All occurrences in the Yuba-Bear Project area showed signs of grazing, and all but one had noxious weeds among or in the vicinity of the occurrence. Two occurrences showed visible disturbance due to road and recreation use or logging (PG&E and NID, 2011d).

Northern bugleweed is a perennial herb native to California found in bog and fen, wetland, and riparian habitats (Calflora, 2012). One occurrence of northern bugleweed was found in the Yuba-Bear Project area in a ponded wetland adjacent to the Bowman-Spaulding transmission line. Individuals were scattered along the shoreline in moist sites, accompanied by hardstem bulrush, purple marshlocks, and buck-bean. The northern bugleweed occurrence appeared to be healthy, with plants in flower. On the western side of the area, there was evidence of dumping, possibly historic (PG&E and NID, 2011d).

Sierra starwort is a perennial herb native to California found at elevations from 4,101 to 6,463 feet msl (Calflora, 2012). Three occurrences of Sierra starwort were found in the Upper Drum-Spaulding Project area, and seven were found in the Yuba-Bear Project area. In the Upper Drum-Spaulding Project area, occurrences were located on Carr Lake, where dominant species included red fir, lodgepole pine, and huckleberry oak. One occurrence was located on the west bank of Fuller Lake, where dominant species included ponderosa pine, white fir, and incense cedar. All occurrences in the Upper Drum-Spaulding Project area appeared to be healthy, with several plants flowering or in fruit. The only visible disturbances were due to logging, recreation, or road use. In the Yuba-Bear Project area, seven occurrences were found adjacent to the Bowman-Spaulding transmission line, project roads, the Bowman-Spaulding conduit, or Sawmill reservoir. Five occurrences were in mixed conifer habitats dominated by white fir, red fir, ponderosa pine, and incense cedar. One occurrence was found in an area dominated by mountain alder, lodgepole pine, and sedge. Another occurrence was found in an area dominated by dense shrub habitat, with huckleberry oak, black oak, and greenleaf manzanita. All occurrences in the Yuba-Bear Project area appeared to be healthy, with the exception of one that showed significant recent impact from road and canal maintenance. Maintenance was a visible disturbance at all but one occurrence, and a noxious weed, Klamath weed, was located in the vicinity of two occurrences (PG&E and NID, 2011d).

Water bulrush is a perennial herb native to California found at elevations below 6,900 feet msl, with a flowering period ranging from June to September. Habitats in which this species can be found include lower montane coniferous forests, meadows and seeps, and marshes and swamps. One occurrence of water bulrush was found in the Yuba-Bear Project area in a wetland area adjacent to the Bowman-Spaulding transmission line. Dominant plants in the area included hardstem bulrush, buck-bean, and Cusick's sedge. About 80 percent of water bulrush individuals were blooming. There was evidence of dumping, possibly historic, on the western side of the area (PG&E and NID, 2011d).

Rocky Mountain chickweed is a perennial herb native to California found in elevations from 6,000 to 7,000 feet msl, commonly in red fir forests (Calflora, 2012). Three occurrences of Rocky Mountain chickweed were found in the Upper Drum-Spaulding Project area, and two occurrences were found in the Yuba-Bear Project area. In the Upper Drum-Spaulding Project area, one occurrence was located on Carr Lake, and two occurrences were located on the south side of Feeley Lake. The dominant species at Carr Lake included quaking aspen, mountain alder, alpine enchanter's nightshade, and musk monkeyflower. The dominant species at Feeley Lake included mountain alder, musk monkeyflower, and Brewer's milkwort. All occurrences in the Upper Drum-Spaulding Project area appeared healthy, with the majority of plants in fruit or flower. In the Yuba-Bear Project area, both occurrences were located in wetlands at the end of the Milton diversion impoundment and behind Jackson Lake dam. Dominant plants in the area of the Milton diversion impoundment occurrence included yellow willow, blister sedge, and Northwest Territory sedge. Dominant plants in the area of the Jackson Lake dam occurrence included lodgepole pine, fowl mannagrass, and monkeyflower. All occurrences at the Yuba-Bear Project were healthy, with 30 percent flowering and 10 percent in fruit at the Milton diversion impoundment, and 50 percent flowering and 10 percent in fruit at Jackson Lake dam (PG&E and NID, 2011d).

Felt-leaved violet is a perennial herb native and perennial to California found in elevations from 5,000 to 6,500 feet msl, commonly in lodgepole forest, subalpine forest, and yellow pine forest habitats (Calflora, 2012). One occurrence of felt-leaved violet was found in the Deer Creek Project area, and one in the Yuba-Bear Project area. In the Deer Creek Project area, the occurrence was found along Deer Creek Road. Dominant plants in the area included ponderosa pine, incense cedar, white fir, and black oak. The occurrence at the Deer Creek Project appeared healthy, with more than 80 percent of individuals in bloom. There was evidence of logging in the area. In the Yuba-Bear Project area, the occurrence was found along Bowman-Spaulding Access Road. Dominant plants in the area included pinemat manzanita and small Douglas fir. The occurrence in the Yuba-Bear Project area appeared

healthy, with more than 90 percent of individuals in bloom. There was a small amount of the noxious weed, Klamath weed, along the road at the edge of the occurrence (PG&E and NID, 2011d).

Whitebark pine is a five-needled conifer classified as a stone pine that includes five species worldwide. Stone pines are distinguished by large, dense seeds that lack wings and therefore depend upon birds and squirrels for dispersal across the landscape. Whitebark pine is typically found in cold, windy, high elevation or high latitude sites in western North America and as a result, many stands are geographically isolated. It is a stress-tolerant pine and its hardiness allows it to grow where other conifer species cannot. The species is distributed in Coastal Mountain Ranges (from British Columbia, Washington, Oregon, down to east-central California) and Rocky Mountain Ranges (from northern British Columbia and Alberta to Idaho, Montana, Wyoming, and Nevada) (FWS, 2011). As part of their survey of sensitive plant species, whitebark pine was found to occur within the project boundaries at elevations of greater than 5,000 ft (PG&E and NID, 2011d).

Sierra blue grass is a perennial rhizomatus grass species known to occur only in portions of California. The species is found on shady moist slopes, often on mossy rocks, in canyons, forests between elevations of 1,148 and 4,921 feet (350 and 1,500 meters). The species typically blooms between April and June. The species is uncommon and its known distribution is limited to portions of the northern Sierra range in California (California Native Plant Society, 2013). As part of the plant survey conducted by NID and PG&E at the Yuba-Bear and Drum-Spaulding Projects, Sierra blue grass was found to occur within the project boundaries at elevations of less than 2,500 feet and at elevations between 2,500 and 5,000 feet (PG&E and NID, 2011d).

Webber's ivesia is a candidate for listing under the ESA. There is no critical habitat designated for this species. Webber's ivesia is found in Great Basin scrub, lower montane coniferous forest, meadows and seeps, vernal pools, eastside meadows, and seasonal drainages at elevations between 4,805 and 7,217 feet msl (PG&E and NID, 2011d). Webber's ivesia is found generally in relatively open plant associations where competition for light and moisture with other species is low (FWS, 2012a). The range for this species includes Sierra County (FWS, 2012a). This species has a flowering period ranging from June to September (PG&E and NID, 2011d). No occurrences of Webber's ivesia were documented in the project areas, although occurrences in the vicinity of the projects (outside the project boundaries) have been documented in the Tahoe National Forest (PG&E and NID, 2011d).

PG&E and NID also conducted surveys for special interest plants, including quaking aspen and three species of mushroom, as requested by the Forest Service. Special interest plants also include elderberry, which is suitable for supporting the federally threatened VELB (section 3.3.4, Threatened and Endangered Species). A total of 61 occurrences of quaking aspen and 26 occurrences of elderberry were identified in the study area (described below and in table 3-203). The mushroom species were not found within the project boundaries.

Quaking aspen is a tree native to California found in elevations from 6,000 to 10,000 feet msl, in streambank and slope habitats, and is equally likely to occur in wetlands or non-wetlands (Calflora, 2012). Thirty-eight occurrences of quaking aspen were found in the Upper Drum-Spaulding Project area at the following locations: Drum canal; middle, upper, and lower Lindsey Lake; Culbertson Lake; Lake Spaulding; Rucker Lake; Fordyce Lake; Lake Valley canal; Lake Valley reservoir; Kelly Lake; Carr Lake; Feeley Lake; boundary between upper Feely Lake and Carr Lake; lower Lindsey trailhead; Carr-Lindsey Road; and upper Lindsey Lake Road. Twenty-three occurrences of quaking aspen were located in the Yuba-Bear Project area at the following locations: Bowman Lake; Bowman Lake campground; Jackson Meadows; Bowman-Spaulding transmission line; Milton diversion dam impoundment; Jackson Lake; Sawmill Lake; and French Lake (PG&E and NID, 2011d).

Elderberry is a large, deciduous, perennial shrub or small tree in the honeysuckle family that occurs along stream banks and forest openings below 9,840 feet msl. Habitats in which this species can be found include chaparral, foothill woodland, red fir forest, riparian forest and woodland, and yellow pine forest throughout California. A total of 26 occurrences of elderberry were located within the Lower Drum Project boundary. VELB indicators (boreholes) were observed at three occurrences, all along Bear River canal. No elderberry plants were found in the Yuba-Bear Project area (PG&E and NID, 2011e).

**Culturally Important Plant Species**

Native American tribes use certain plant species for food, medicines, and utilitarian purposes. Several species of culturally significant plants preliminarily identified by PG&E and NID to occur in the vicinity of the projects are listed in table 3-204. In addition, from 2006 to 2011, PG&E and NID conducted a study to identify traditional cultural properties (TCPs) at the projects. The resulting TCP report, discussed further in section 3.3.6.1, describes specific botanical resources that are used by the Southern Maidu in ceremonies and medicine. These include several flowering plants that are gathered for use in dances and ceremonies; coffeeberry seeds and Sierra plum pits that are used to make beads; and various berries and plants that are used for purification. The TCP report indicates that these plants continue to be important in dance ceremonies.

Table 3-204. Culturally significant plant species preliminarily identified at the projects.

| Common Name | Scientific Name | Uses |
|---|---|---|
| Bitterroot | *Lewisia* sp. | food |
| Buckberry | *Shepherdia argentea* | food (fruit) |
| Bulb, Indian potato | N/A | food |
| Camas | *Camassia* sp. | food, raw and cooked |
| Currant, desert | *Ribes* sp. | food (fruit) |
| Currant, golden | *Ribes aureum* | food (fruit) |
| Death camas | *Zigadenus* sp. | poison; ritual activities |
| Elderberry | *Sambucus glauca* | food (fruit) |
| Greasewood | *Sarcobatus* sp. | combs |
| Incense cedar | *Calocedrus decurrens* | bark for houses; flavoring for acorn; incense |
| Indian balsam, wild parsley | *Lomatium (Leptotaenia) dissecta* | medicine |
| Indian tobacco | *Nicotiniana attenuata* | smoke; poultice; incense |
| Indian tobacco | *Nicotiniana bigelovii* | smoke; poultice; incense |
| Juniper | *Juniperus osteosperma/J. occidentalis* | flavoring for acorn; incense |
| Lily, sego | *Calochortus nuttallii* | food |
| Manzanita | *Arctostaphylos* sp. | cider; snowshoes |
| Miner's lettuce | *Claytonia perfoliata* | food, raw and cooked |

Table 3-204. Culturally significant plant species preliminarily identified at the projects.

| Common Name | Scientific Name | Uses |
|---|---|---|
| Mormon tea | *Ephedra* sp. | medicinal tea |
| Mushroom | N/A | several varieties used as food |
| Mustard | *Brassica* sp. | seed food |
| Oak, black | *Quercus kelloggii* | second to pinenut in importance |
| Onion | *Allium* sp. | food |
| Pigweed | *Amaranthus* sp. | seed food |
| Prunus, wild plum | *Prunus subcordata* | food (fruit) |
| Prunus, chokecherry | *Prunus virginiana* | food (fruit) |
| Rhubarb | *Peltiphyllum peltatum* | food, raw and cooked |
| Ribes, Sierra gooseberry | *Ribes* sp. | food (fruit) |
| Rye, wild | N/A | seed food |
| Serviceberry, Saskatoon | *Amelanchier alnifolia* | food (fruit) |
| Strawberries | *Fragaria virginiana* and other species | food (fruit) |
| Sunflower | N/A | seed food |
| Tule | *Scirpus* sp. | food; roots boiled or roasted; shoots and seed heads raw; ripe seeds into cakes; |
| Watercress | *Rorippa curvisiliqua, R. sinuata, Barbarea vulgaris* | food, raw and cooked |
| Wild parsnip | N/A | poison; ritual activities |

#### 3.3.3.1.2 Wildlife

**General Wildlife**

The applicants used California Fish and Wildlife's California Habitat Wildlife Relations program and existing data from the Forest Service to determine wildlife species likely to occur in the project vicinities, based in part on vegetation community structure present in the area. The two project's vicinities include a diversity of habitats and associated wildlife species that reflect wide variations in elevation, topography, and soils and are typical of the west slope of the Sierra Nevada in northern California. Based on a review of available data, the applicants determined that more than 380 terrestrial wildlife species have the potential to occur in the vicinity of the projects.

Nine species of amphibians occur in the vicinity of the projects and, except for two completely terrestrial species, most of these amphibians require still or slow-flowing water in which to breed. Amphibians found in the vicinity of the project areas include ensatina, California slender salamander, Sierra newt, Sierran treefrog, foothill yellow-legged frog, and American bullfrog. Sierran treefrog and foothill yellow-legged frog are further discussed in the Special-status Wildlife Species section, below.

Reptiles in the vicinity of the projects include western terrestrial (or mountain) garter snake, western aquatic (or Sierra) garter snake, common garter snake, western rattlesnake, western fence lizard, western sagebrush lizard, and Sierra alligator lizard. These species occur in a wide variety of habitats ranging from riverine to woodlands, forests, and grasslands. Most are active during the summer and inactive during the winter.

Common bird species that may occur in the vicinity of the projects include raptors such as red-tailed hawk and Cooper's hawk; songbirds such as dark-eyed junco and spotted towhee; woodpeckers such as white-headed woodpecker and northern flicker; and owls such as great horned owl and western screech owl. These birds are found in a variety of habitats ranging from streamside riparian habitats and wet meadows to sierra mixed conifer forests in the upper elevations of the projects (up to 5,000 feet msl) and hardwood-dominated woodlands common at the lower elevations of the projects (less than 2,000 feet msl). Some birds are only present between March and July for breeding, while others may be year-round residents.

Common mammal species in the vicinity of the projects, such as mule deer, black bear, and squirrels, are most often associated with forested and woodland habitats. Some species, such as black bear, are active during the spring and summer months and hibernate during the colder winter months. Mule deer in the vicinity of the projects are migratory and move from summer habitat at higher elevations to winter habitat along the foothills.

Black bear and mountain lion are common species throughout the Sierra Nevada, which includes both projects. Black bear and mountain lion are found in nearly all habitat types available in both projects and, like mule deer, have seasonal movements. Seasonal movement of mountain lion is likely to mimic that of mule deer, the mountain lion's primary prey. Black bear movement is most likely related to the onset of winter, causing individuals to seek out wintering dens.

Using acoustic and capture surveys, the applicants documented 15 bat species in the project areas, including big brown bat, little brown bat, California myotis, silver-haired bat, hoary bat, and Brazilian free-tailed bat; nine additional species are discussed in the *Special-status Wildlife Species* section, below. Thirteen bat roosts (two day roosts, one maternity roost, and ten night roosts) were identified in the study area. Eight Drum-Spaulding Project structures and six Yuba-Bear Project structures were found to have signs of bat use. No winter hibernacula were identified in the study area.

**Special-status Wildlife Species**

Special-status wildlife species include species that may be protected by the state of California as endangered or threatened; California species of concern, California fully protected species, species identified as watchlist species by California Fish and Wildlife, and other species identified as special animals by California Fish and Wildlife. Also included are Forest Service Region 5 species of concern. Federally listed or proposed threatened or endangered species are discussed separately in section 3.3.4, *Threatened and Endangered Species*. Candidate species and those under review by FWS for potential listing under the ESA are described below.

To identify special-status wildlife species known to occur or with the potential to occur in the project areas, PG&E and NID used existing data from the Forest Service and California Fish and Wildlife to create maps that include vegetation communities, wildlife habitats, and project facilities; analyzed habitat and project O&M; and documented incidental wildlife observations. The applicants determined that 62 special-status wildlife species are known or have the potential to occur in the vicinity of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, including 5 amphibians, 3 reptiles, 35 birds, and 19 mammal species (table 3-205).

Table 3-205. Special-status wildlife species known or with the potential to occur in the project areas. (Source: PG&E and NID, 2011f)

| Common Name | Special-status Designation[a] |
|---|---|
| **Amphibians** | |
| Foothill yellow-legged frog | FSS, SSC |
| Mt. Lyell salamander | SSC |
| Western spadefoot | SSC, BLM-S |
| Sierran treefrog | MIS |
| **Reptiles** | |
| Western pond turtle | FSS, SSC |
| Northern sagebrush lizard | BLM-S |
| Coast horned lizard | SSC, BLM-S |
| **Birds** | |
| Bank swallow | CE |
| Greater sandhill crane | CT, CFP |
| American peregrine falcon | CFP |
| Great gray owl | CE |
| Willow flycatcher | CE |
| Golden eagle | CFP |
| Swainson's hawk | CT, CFP |
| White-tailed kite | CFP |
| Redhead | SSC |
| Barrow’s goldeneye | SSC |
| Common loon | SSC |
| Bald eagle | CE |
| Sooty grouse | MIS |
| Mountain quail | MIS |
| American white pelican | SSC |
| Northern goshawk | SSC, BLM-S, FSS |
| Ferruginous hawk | BLM-S |
| Northern harrier | SSC |
| Black tern | SSC |
| Short-eared owl | SSC |
| Long-eared owl | SSC |

Table 3-205. Special-status wildlife species known or with the potential to occur in the project areas. (Source: PG&E and NID, 2011f)

| Common Name | Special-status Designation[a] |
|---|---|
| Burrowing owl | SSC, BLM-S |
| California spotted owl | SSC, BLM-S, FSS, MIS |
| Vaux's swift | SSC |
| Black swift | SSC |
| Hairy woodpecker | MIS |
| Black-backed woodpecker | MIS |
| Olive-sided flycatcher | SSC |
| Loggerhead shrike | SSC |
| Purple martin | SSC |
| Yellow warbler | SSC, MIS |
| Yellow-breasted chat | SSC |
| Fox sparrow | MIS |
| Tricolored blackbird | SSC, BLM-S |
| Yellow-headed blackbird | SSC |
| **Mammals** | |
| Sierra Nevada red fox | CT |
| Yuma myotis | BLM-S |
| Long-eared myotis | BLM-S |
| Fringed myotis | BLM-S, FSS |
| Western small-footed myotis | BLM-S |
| Western red bat | FSS |
| Spotted bat | SSC, BLM-S |
| Townsend's big-eared bat | SSC, BLM-S, FSS |
| Pallid bat | SSC, BLM-S, FSS |
| Western mastiff bat | SSC, BLM-S |
| American marten | FSS, MIS |
| Pacific fisher | SSC, BLM-S, FSS |
| Mule deer | MIS |
| Sierra Nevada snowshoe hare | SSC |
| Western white-tailed jackrabbit | SSC |
| Sierra Nevada mountain beaver | SSC |

Table 3-205. Special-status wildlife species known or with the potential to occur in the project areas. (Source: PG&E and NID, 2011f)

| Common Name | Special-status Designation[a] |
|---|---|
| Northern flying squirrel | MIS |
| American Badger | SSC |

[a] Status Designations:
BLM-S = BLM sensitive species
CE = California endangered species
CFP = California fully protected species
CT = California threatened species
FSS = Forest Service sensitive species
MIS = Tahoe National Forest management indicator species
SSC = California species of special concern

The following summaries provide information about special-status wildlife species that have been observed in the project areas.

**Amphibians and Reptiles**

*Foothill Yellow-legged Frog*

The foothill yellow-legged frog is found at elevations between 600 and 5,000 feet msl in shallow flowing streams with backwater habitats and coarse cobble-sized substrates. This species requires both mainstem and tributary habitats for long-term persistence, although small tributaries can provide seasonal habitat. Breeding occurs in spring or early summer in shallow waters. Occurrences of the foothill yellow-legged frog were reported in seven stream reaches in the Upper Drum-Spaulding Project area (South Yuba reaches no. 3, no. 4, no. 5, and no. 6, Drum afterbay dam reach, Lake Valley canal diversion dam reach, and Towle canal diversion dam reach), one stream reach in the Lower Drum Project area (Bear River canal diversion dam reach), and three stream reaches in the Yuba-Bear Project area (Milton diversion dam reach, Bowman-Spaulding diversion dam reach, and Chicago Park powerhouse reach). Additionally, although the Dutch Flat afterbay dam reach at the Yuba-Bear Project was not surveyed, previous documentation confirms foothill yellow-legged frog breeding occurrences in this location (PG&E and NID, 2010f).

*Sierran Treefrog*

The Sierran treefrog, one of the most widespread and abundant amphibian species above 5,000 feet msl, is found in a variety of habitats such as grasslands, chaparral, woodlands, forests, and desert oases. This species breeds in permanently and seasonally ponded wetlands, marshes, lakes, roadside ditches, reservoirs, and slow streams. Twelve incidental sightings of Sierran treefrog were reported at the Upper Drum-Spaulding Project (Meadow Lake, Fordyce Lake, Lake Spaulding, and Fuller Lake) and 14 incidental sightings were reported at the Yuba-Bear Project (Milton diversion impoundment) (PG&E and NID, 2011f).

*Coast Horned Lizard*

The coast horned lizard is found in the Sierra Nevada foothills below elevations of 4,000 feet msl. The coast horned lizard is not associated with water and is found in scrubland, grassland, coniferous woods, and broadleaf woodlands. One incidental sighting of the coast horned lizard was reported at the Lower Drum Project (Bear River canal), and one incidental sighting was reported at the Yuba-Bear Project (Chicago Park flume) (PG&E and NID, 2011f).

*Western Pond Turtle*

The western pond turtle is found at elevations up to 6,000 feet msl in a wide variety of aquatic habitats. This species tends to inhabit permanent ponds, lakes, side channels, backwaters, and pools of streams, but it is uncommon in high-gradient streams. Basking sites are important habitat elements for the western pond turtle and may include rocks, logs, banks, emergent vegetation, root masses, and tree limbs. Although it is highly aquatic, this species often overwinters in forested habitats, and in the summer, it lays eggs in shallow nests in sandy or loamy soil at upland sites as much as 1,200 feet from aquatic habitats. The western pond turtle has been documented away from aquatic habitats for as much as 7 months of the year. Use of terrestrial habitat may be in response to seasonal high flows. Incidental observations of western pond turtle individuals were reported in the Upper Drum-Spaulding Project area (upper South Yuba reach no. 2--9; and Kelly Lake vicinity--10), Lower Drum Project area (Bear River canal diversion dam reach--5; and Wise forebay--3), and Deer Creek Project area (Deer Creek-Drum transmission line--1) and at three locations in the Yuba-Bear Project area (Dutch Flat afterbay dam reach—2; Chicago Park conduit—1; and Rollins reservoir--1) (PG&E and NID, 2010h).

**Birds**

*Willow Flycatcher*

The willow flycatcher is commonly found at elevations between 4,000 and 8,000 feet msl, in association with meadows where high water tables have resulted in standing water and abundant riparian shrubs. This species breeds in shrubby vegetation in meadow and riparian communities, and during the early part of the breeding season, it is found in breeding grounds with some surface water or saturated soils. The willow flycatcher is known to occur in the Yuba-Bear Project area in the meadow complex above the Milton diversion impoundment along the Middle Yuba River (PG&E and NID, 2011g).

*American Peregrine Falcon*

The peregrine falcon breeds in many terrestrial biomes and occurs in greater densities in tundra and coastal areas. The most commonly occupied habitats offer protection from predators and contain steep and inaccessible cliffs for nesting with open gulfs of air and open landscapes for foraging. This species preys almost exclusively on birds captured in flight. The American peregrine falcon is a known year-long resident of the Sierra Nevada. Incidental observations of American peregrine falcon have been documented at the Upper Drum-Spaulding Project by Lake Valley reservoir. Occurrences have been reported at the Yuba-Bear Project in the vicinity of Bowman Lake and Jackson Meadow reservoir (PG&E and NID, 2011g).

*Golden Eagle*

The golden eagle occurs throughout the Sierra Nevada and foothills, primarily in sparse woodlands, grasslands, savannas, lower successional forest stages, and shrubland. Cliffs, large trees, and man-made structures, such as electric transmission towers, are used for nesting. Two incidental sightings

of golden eagle were reported in the Yuba-Bear Project at Jackson Meadows reservoir and near Fuller Lake (PG&E and NID, 2011g).

*Bald Eagle*

The bald eagle breeds or winters throughout California, except for the desert areas, and the statewide population is increasing. Most breeding in the state occurs in the northern Sierra Nevada, Cascades, and north coast range. California's breeding population is resident year-round in most areas, where the climate is relatively mild. Breeding habitat includes areas close to coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources. Most nesting territories in California are located in elevations ranging from 1,000 to 6,000 feet msl, but nesting can occur from near sea level to over 7,000 feet msl. Wintering habitat is associated with open bodies of water, primarily large lakes and reservoirs. This species preferentially roosts in conifers or other sheltered sites in winter in some areas (NID, 2008). Bald eagle occurrences have been reported at 13 locations in the Upper Drum-Spaulding Project area (Meadow Lake, Culberson Lake, Lower Lindsey Lake, Feely Lake, Carr Lake, Blue Lake, Rucker Lake, Fuller Lake, Lake Sterling, Fordyce Lake, Lake Spaulding, Lake Valley reservoir, and Kelly Lake), at 1 location in the Deer Creek Project (Deer Creek), and at 8 locations in the Yuba-Bear Project area (Jackson Meadows reservoir, Milton reservoir, Faucherie Lake, Sawmill Lake, Dutch Flat forebay, Bowman Lake, Chicago Park powerhouse, and Rollins reservoir) (PG&E and NID, 2010i). Many of these observations were single individuals soaring or foraging. Eagles have historically nested in the project areas. One active nest is located at Lake Spaulding (Upper Drum-Spaulding Project) and another is located at Rollins reservoir (Yuba-Bear Project).

*Barrow's Goldeneye*

Barrow's goldeneye is a long-distance migrant that is an uncommon winter resident of the central California coast. It is found in open water and utilizes cavities for nesting structure. Two incidental sightings of Barrow's goldeneye were documented in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project areas (PG&E and NID, 2011f).

*Northern Goshawk*

The northern goshawk is generally a permanent resident occurring throughout the Sierra Nevada at an elevation of about 5,500 feet msl. This species is found in forests—mainly lodgepole pine, red fir, mountain hemlock, and white pine dominated—with open understory and dense canopies, in nearby meadows or opens space, and in the vicinity of water. Nine incidental sightings of northern goshawk were documented at the Upper Drum-Spaulding Project area, 19 incidental sightings were documented at the Yuba-Bear Project, and 11 nests have been identified in the project areas (Upper Drum-Spaulding—6; Yuba-Bear—5) (PG&E and NID, 2011f).

*California Spotted Owl*

The California spotted owl is a permanent resident of dense, old-growth, multi-layer mixed conifer, redwood, Douglas fir, black oak, lodgepole pine, and red fir habitat found at elevations from 1,200 to 5,500 feet msl, with a breeding season from early March through June. Eighteen incidental sightings were documented at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project areas, 12 incidental sightings were documented at the Yuba-Bear Project, and 12 nesting sites have been identified in the project areas (PG&E and NID, 2011f).

**Mammals**

*Sierra Nevada Red Fox*—The Sierra Nevada red fox prefers red fir and lodgepole pine forests in the subalpine zone and alpine fell field of the Sierra Nevada. It uses forested areas in proximity to meadows, riparian areas, and brush fields. The Sierra Nevada population of red fox can be found in a variety of habitats that include alpine dwarf-shrub, wet meadow, subalpine conifer, lodgepole pine, red fir, aspen, montane chaparral, montane riparian, mixed conifer, and ponderosa pine. Individuals were recorded in the Upper Drum-Spaulding and Deer Creek Project areas along the Lake Valley and South Yuba canals. However, the Tahoe National Forest recognizes the sightings of Sierra Nevada red fox may not be reliable, especially at lower elevations within its range (PG&E and NID, 2011g).

The Sierra Nevada red fox is currently under review by FWS for potential listing under the ESA. On January 1, 2012, FWS issued a 90-Day Finding on a Petition to List Sierra Nevada red fox as endangered or threatened.

*Mule Deer*

The mule deer is found throughout the vicinity of the projects. Mule deer are herbivorous browsers that prefer open wooded mountain and foothill areas. During the fall, mule deer migrate to lower elevations where browse is still available (California Living Museum, 2012). Three mule deer herds (Downieville, Nevada City, and Blue Canyon) and their associated seasonal habitats (winter, summer, and fawning) are known to overlap with or abut project boundaries. The Nevada City Deer Herd's range encompasses the mid-elevation of the project areas. The range of the Downieville Deer Herd does not overlap with either project but abuts the Yuba-Bear Project boundary. The range of the Blue Canyon Deer Herd encompasses the southern portion of the Upper Drum-Spaulding Project near Lake Valley. In general, summer habitat encompasses all project facilities upslope of Drum forebay and Deer Creek forebay. Winter habitat is found down slope of Drum forebay and Deer Creek forebay.

*Pacific Fisher*

The Pacific fisher is found throughout the Sierra Nevada. This species prefers continuous, unfragmented mature conifer forests with high canopy closure and continuous overhead cover. The Pacific fisher is carnivorous and has been known to prey on smaller mammals and birds and to consume fruit; however, the Pacific fisher will switch prey in response to availability, even preying on lizards and insects (Forest Service, 2012). Pacific fisher occurrences have been documented at the Upper Drum-Spaulding Project (Meadow Lake, Lake Fordyce, Lake Sterling, and Lake Spaulding) and at the Yuba-Bear Project (Jackson Meadows reservoir, Milton-Bowman diversion conduit, and Sawmill Lake). Predicted habitat for the Pacific fisher exists at or is immediately adjacent to all project facilities.

The West Coast DPS of fisher is a candidate for listing under the ESA. On April 8, 2004, FWS issued a finding that the listing of the West Coast DPS of fisher is warranted but precluded by higher priority actions to amend the lists of Lists of Endangered and Threatened Wildlife and Plants. Under a 2011 settlement agreement, FWS must either publish a listing proposal on the fisher by end of fiscal year 2014 or make a determination that the listing is not warranted (FWS, 2012b and 2012c).

*American Marten*

The American marten can be found throughout the Sierra Nevada. The American marten prefers late-successional coniferous forests with overhead cover and complex ground structure. The presence of coarse woody debris and a closed canopy is more important than species composition for habitat selection. In the Sierra Nevada, the American marten has been observed foraging in riparian forests. Typical prey includes microtine rodents, birds, and squirrels, and this species also consumes vegetation

(Kucera, 1998). American marten occurrences have been documented at the Upper Drum-Spaulding Project (Fordyce Lake and Lake Sterling) and at the Yuba-Bear Project (Jackson Meadows reservoir and Faucherie Lake). Predicted habitat for the American marten exists at or is immediately adjacent to all project facilities.

*Northern Flying Squirrel*

The northern flying squirrel is a common year-long resident of coniferous habitats commonly found at elevations between 5,000 and 8,000 feet msl. It is found in ponderosa pine, lodgepole pine, and riparian-deciduous forests. The northern flying squirrel is omnivorous and is known to eat a wide range of food from seeds, nuts, and fruits to arthropods, eggs, and small animals. Individuals live near rivers and streams, especially during the summer (California Fish and Wildlife, 2012a). Northern flying squirrel individuals are common and widespread throughout both project areas.

*Special-status Bats*

Nine special-status species bats (Yuma myotis, long-eared myotis, fringed myotis, western small-footed myotis, spotted bat, Townsend's big-eared bat, pallid bat, mastiff bat, and western red bat) occur in Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project facilities. These species are described below.

Yuma myotis

The Yuma myotis is found at elevations up to 10,800 feet msl; however, this species is uncommon to rare above 8,400 feet msl. The Yuma myotis roosts in buildings, mines, caves, and crevices, and feeds over water sources such as ponds, streams, and stock tanks. Prey includes moths, midges, flies, termites, ants, homopterans, and caddisflies. Yuma myotis individuals were recorded at six locations in the Upper Drum-Spaulding Project area (Fuller Lake dam, Lake Spaulding, Alta forebay, Alta powerhouse, Lake Valley diversion dam, and Dutch Flat no. 1 powerhouse), one location in the Lower Drum Project area (Halsey powerhouse), two locations in the Deer Creek Project area (Deer Creek forebay and Deer Creek powerhouse), and four locations in the Yuba-Bear Project area (Dutch Flat afterbay, Bowman dam powerhouse, Sawmill dam, and Milton diversion impoundment) (PG&E and NID, 2010j).

Long-eared myotis

The long-eared myotis is found at elevations up to 8,400 feet msl. This species roosts in buildings, crevices, and snags, and feeds in open habitats along the edges. Insects are caught in flight, gleaned for foliage, or taken from the ground. Individuals were recorded at one location in the Upper Drum-Spaulding (Fuller Lake), one location in the Deer Creek Project area (Deer Creek forebay), and one location in the Yuba-Bear Project area (Milton diversion impoundment) (PG&E and NID, 2010j).

Fringed myotis

The fringed myotis is found at elevations between 4,300 and 7,200 feet msl. This species roosts in buildings, mines, caves, and crevices, and feeds in open habitats, over water, and by gleaning from foliage. Individuals were recorded in two locations in the Upper Drum-Spaulding Project area (Lake Spaulding and Alta powerhouse), two locations in the Deer Creek Project area (Deer Creek forebay and Deer Creek powerhouse), and one location at the Yuba-Bear Project (Milton diversion impoundment) (PG&E and NID, 2010j).

Western small-footed myotis

The western small-footed myotis is found at elevations up to 8,800 feet msl. This species roosts in caves, buildings, mines, and crevices and under bridges, and it feeds over the water of streams, ponds, and springs by gleaning from foliage. Individuals were recorded at one location in the Yuba-Bear Project area (Sawmill dam) (PG&E and NID, 2010j).

Spotted bat

The spotted bat is found at elevations up to 9,800 feet msl in arid deserts, grasslands, and mixed conifer forests. This species uses creeks and rivers to drink and forages in open areas and along forest edges, particularly in association with wet meadows. Individuals were recorded at one location in the Upper Drum-Spaulding Project area (Alta forebay), one location in the Deer Creek Project area (Deer Creek forebay), and two locations in the Yuba-Bear Project area (Sawmill dam and Milton diversion impoundment) (PG&E and NID, 2010j).

Townsend's big-eared bat

Townsend's big-eared bat is found at elevations up to 10,365 feet msl. This species roosts in buildings, mines, tunnels, and caves and forages in riparian zones along habitat edges following creeks and river drainages. Townsend's big-eared bat feeds primarily on moths and comes to pools in rivers and streams to drink. Individuals were found at three locations in the Upper Drum-Spaulding Project area (Lake Spaulding, Lake Valley diversion, and Alta forebay), one location in the Lower Drum Project area (Halsey powerhouse), two locations in the Deer Creek Project area (Deer Creek forebay and Deer Creek powerhouse), and four locations in Yuba-Bear Project area (Rollins dam powerhouse, Bowman dam powerhouse, Sawmill dam, and Milton diversion impoundment) (PG&E and NID, 2010j).

Pallid bat

The pallid bat is found at elevations of about 8,000 feet msl. This species roosts in caves, crevices, and buildings, and forages in a variety of open habitats, most frequently in riparian zones in open oak savannah and open mixed deciduous forest. The pallid bat feeds primarily on ground-dwelling arthropods and comes to rivers and streams to drink. Individuals were found at one location in the Upper Drum-Spaulding Project area (Lake Spaulding), one location in the Deer Creek Project area (Lake Spaulding and Deer Creek powerhouse), and one location in the Yuba-Bear Project area (Bowman dam powerhouse) (PG&E and NID, 2010j).

Western mastiff bat

The western mastiff bat is found primarily at lower elevations, but can be found at elevations as high as 8,700 feet msl. This species roosts in open areas with abundant crevices in rock outcrops and buildings. The western mastiff bat is an open-air forager and has been detected in large numbers flying and foraging over reservoirs elsewhere in its range. Individuals were found at one location in the Upper Drum-Spaulding Project area (Alta powerhouse), two locations in the Deer Creek Project area (Deer Creek forebay and Deer Creek powerhouse), and one location in the Yuba-Bear Project area (Sawmill dam) (PG&E and NID, 2010j).

Western red bat

The western red bat is found at elevations up to 9,800 feet msl in mixed conifer forests. This species roosts in foliage and forages in open areas in a number of terrestrial and aquatic habitats. Individuals were found at two locations in the Upper Drum-Spaulding Project area (Lake Spaulding and

Alta powerhouse), one location in the Lower Drum Project area (Halsey powerhouse), one location in the Deer Creek Project area (Deer Creek powerhouse), and six locations in the Yuba-Bear Project area (Rollins dam powerhouse, Chicago Park powerhouse, Dutch Flat afterbay, Bowman dam powerhouse, Sawmill dam, and Milton diversion impoundment) (PG&E and NID, 2010j).

#### 3.3.3.2 Environmental Effects

##### 3.3.3.2.1 Vegetation

**Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects**

**Vegetation Management**

Vegetation management activities, such as clearing or trimming vegetation around project facilities and controlling noxious plant species could affect sensitive environmental resources.

In the final license application, PG&E proposed to develop and implement an integrated vegetation management plan to manage and mitigate for effects to vegetation (DS-TR1). In November 2013, a revised Integrated Vegetation Management Plan dated March 2013 (PG&E, 2013b), was filed with the Commission. Components of the revised plan include: (1) non-native invasive plant management; (2) vegetation management related to PG&E's O&M, including (a) revegetation, (b) routine vegetation management, and (c) sensitive area protections; (3) VELB management; and (4) training, consultation, reporting and plan review.

Forest Service condition 38 and BLM condition 17 specify the implementation of the March 2013 Integrated Vegetation Management Plan for the Drum-Spaulding Project.

California Fish and Wildlife 10(j) recommendation 7.1 recommends development and implementation of an integrated vegetation and non-native invasive plant management plan similar to the Forest Service condition.

We discuss various components of vegetation management at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects below.

*Operation and Maintenance Activities*

PG&E routinely clears vegetation in the immediate vicinity of project structures, including powerhouses, canals, flumes, and rock- and earth-filled dams, and along transmission line rights-of-way. Clearing is performed by mechanical means and occurs only within the area needed to maintain the structure, which constitutes a small portion of the overall project area. Activities associated with vegetation clearing do not use ground-disturbing equipment in the project and no project facilities are located on sensitive vegetation associations. The effects of the current vegetation management practices are minor and site specific. They are expected to continue for the life of the project in most project facility areas.

Our Analysis

O&M activities that currently take place as part of normal project operations have minor effects on vegetation resources within the project boundary. O&M activities and their associated effects on vegetation resources within the project boundary would continue for the term of a new license. Proposed construction activities (e.g., develop new recreation facilities and pedestrian trails) would have permanent minor to moderate adverse effects on existing vegetation.

PG&E's March 2013 Integrated Vegetation Management Plan includes appropriate vegetation management measures related to O&M activities that would apply to the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. These measures include: (1) revegetation, which is the process of reestablishing vegetation cover in disturbed areas and is a standard component of project O&M, including erosion control and site restoration; (2) routine vegetation management activities often resulting from regulatory requirements and to ensure safe and continued project operations; and (3) sensitive area protection during vegetation management on federal lands to ensure that adverse effects are avoided or minimized. Sensitive area protections included in the March 2013 Integrated Vegetation Management Plan include specific protections for special-status plants and wildlife. Additionally, the March 2013 Integrated Vegetation Management Plan includes reporting guidelines with appropriate agencies and components for additional consultation that may occur, as necessary, to ensure that the goals and objectives of the plan are being met and proposed measures are being implemented.

Implementation of PG&E's March 2013 Integrated Vegetation Management Plan addresses and is consistent with Forest Service condition 38 and BLM condition 17 and would address O&M activities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects.

*Non-native Invasive Plants*

Human activities, including project O&M activities, can spread non-native invasive plants. Areas where non-native invasive plants are most likely to spread are recreation areas and roadsides, particularly at lower elevations. Recreation activities can lead to the spread of non-native invasive species, including through transport on boats, vehicles, and clothing. Project vehicles may also transport non-native invasive plant seeds from one area to another. O&M activities, such as road grading and vegetation control remove existing vegetation and can increase the spread of non-native invasive species. However, vegetation management may be beneficial, retarding the spread of some noxious weeds occurrences by removing them from around project facilities.

Forest Service condition 38 and BLM condition 17 specify that PG&E implement the March 2013 Integrated Vegetation Management Plan.

PG&E's March 2013 Integrated Vegetation Management Plan addresses management of non-native invasive plants on federal lands within the Upper Drum-Spaulding and Deer Creek Project boundaries, consistent with the agency conditions. PG&E's management of non-native plants focuses on prevention, detection and reporting, treatment, monitoring, and adaptive management to prevent the introduction and further spread of non-native invasive plants, as well as eradication of non-native invasive plants within the project boundary. Prevention of non-native invasive plant introductions include: (1) cleaning of all construction equipment, earth-moving equipment, and vegetation management equipment by staff prior to entering the project boundary; (2) use of certified weed-free seed and straw/mulch for construction, erosion control, or restoration; (3) seeding of topsoil stockpiles with native plant seed, (4) restriction of travel to established roads and motorized trails and avoidance of travel through areas with known non-native invasive plants populations; (5) preparation of site-specific restoration plans that do not include the use of non-native plant materials unless agreed to by the Forest Service. Beginning in the first year following license issuance and every fifth year thereafter in high-use areas, and every tenth year thereafter in low-use areas, as defined in the March 2013 plan, PG&E would conduct a complete non-native invasive plants survey of Forest Service and BLM lands within the Upper Drum-Spaulding and Deer Creek Project boundaries. If a non-native invasive plant is identified within the project boundary and extends outside the boundary, PG&E would estimate the extent of the population outside the boundary. PG&E would record non-native invasive plants composition, location, and relative abundance of high-priority and new target non-native invasive plants occurrences in a GIS

Our Analysis

Non-native invasive plants can displace native plants, reduce biodiversity, affect threatened and endangered species, alter normal ecological processes (e.g., nutrient cycling, water cycling), decrease wildlife habitat, reduce recreational value, and increase soil erosion and stream sedimentation. PG&E's March 2013 Integrated Vegetation Management Plan contains specific provisions for the monitoring and control of non-native invasive plants on federal lands (Upper Drum-Spaulding and Deer Creek Projects). Control measures include the use of an integrated pest management approach utilizing a mixture of manual, mechanical, chemical and biological control methods. In addition, the plan includes provisions for complying with National Forest and BLM plans for the use of pesticides.

Implementation of PG&E's March 2013 Integrated Vegetation Management Plan would adequately protect federal project lands (Upper Drum-Spaulding and Deer Creek Projects) from the project-related spread of non-native invasive plants and would help maintain native plant diversity and habitat quality. Implementation of the March 2013 Integrated Vegetation Management Plan is consistent with Forest Service condition 38 and BLM condition 17. However, the plan does not address the control of non-native invasive species on non-federal lands within the project boundary.

Invasive species have been identified on non-federal lands. In 2009, PG&E performed surveys for noxious weeds and invasive plants as part of its Special-status Plants Study. A total of 557 noxious weed occurrences, representing 15 plant species, were found at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. Twenty of the occurrences were on NFS lands located inside the FERC project boundaries and 537 occurrences were on private lands located within the FERC project boundaries. In general, weeds are more abundant on private lands at lower elevations. The most common weeds are Klamath weed, skeleton weed, Scotch broom and yellow starthistle. Where they were found, these weeds are continuous in and out of the FERC project areas. In the FERC project areas, weeds are primarily found along roads, canals, transmission lines, and in campgrounds. Applying invasive species control measures to all accessible project lands would also help to minimize the spread of non-native invasive plants and would help to maintain plant diversity and habitat quality.

*Recreation Facilities*

The installation, modification, and maintenance of project recreation facilities have the potential to affect vegetation resources including riparian and wetland vegetation, non-native invasive plants, and special-status and special interest plants.

PG&E's March 2013 Integrated Vegetation Management Plan includes provisions based on the goals of tree stand improvement, view enhancement, and removal of hazard trees. In addition, vegetative planting at recreation sites would be done for screening, to cover construction scars, provide shade, increase site attractiveness, control erosion and minimize noise. Forest Service condition 38 specifies implementation of the March 2013 Integrated Vegetation Management Plan.

Forest Service condition 53 specifies that PG&E implement the September 2013 Recreation Facilities Plan. The September 2013 plan contains provisions for PG&E to improve and upgrade multiple recreation facilities within the project boundary, and includes specific vegetation management provisions related to recreation facilities. Areas and facilities that would be upgraded in the project area, as outlined in the September 2013 Recreation Facilities Plan, are described further in section 3.3.5.2, *Recreation Resources Environmental Effects*.

Our Analysis

Public use of project recreation facilities can have impacts to vegetation. Off-highway vehicle (OHV) use around reservoirs or other recreation areas not suitable for vehicle use, informal pedestrian and hiking trails, and camping in remote unauthorized or unimproved sites can result in vegetation compaction and trampling and increased erosion, and has the potential to negatively affect sensitive areas. Pedestrian use too can result in vegetation compaction and trampling, as well as increased erosion. Planned recreation improvements such as establishment of formal trails, upgrading and installation of vehicle barriers to prevent unauthorized access of OHVs, improvement of current campsites, and building authorized campsites could reduce impacts to vegetation from recreation activities.

Addition and upgrading of recreation facilities may result in clearing and compaction of vegetation, depending on the placement of the proposed changes. Maximizing the placement of changes to the existing footprint of current recreation facilities could minimize impacts to vegetation. At all sites, construction equipment and personnel have the potential to carry non-native invasive plants into the area.

PG&E's March 2013 Integrated Vegetation Management Plan contains specific provisions for vegetation management, including management of non-native invasive plants at project recreation sites, including those located on federal lands. Implementation of the March 2013 Integrated Vegetation Management Plan would establish goals and objectives for recreation site vegetation that are consistent with Forest Service policies, and would spell out vegetation management measures to be undertaken by PG&E at project recreation sites, including provisions for surveying recreation sites to determine vegetation management needs, removing vegetation, maintaining vegetation around fire rings, protecting existing vegetation during construction activities, and periodic silvicultural evaluation. Implementation of the March 2013 Integrated Vegetation Management Plan would be consistent with Forest Service condition 38 and BLM condition 17. Implementation of the September 2013 Recreation Facilities Plan at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects would be consistent with Forest Service condition 53.

*Culturally Important Species*

Vegetation management could affect plant species of cultural importance to the tribes. These plants are used for food, medicines, and utilitarian purposes. Over the years, native practices have declined as a direct result of loss of culturally important plants.

Two Native American communities, the Washoe Tribe of Nevada and California and the United Auburn Indian Community of the Auburn Rancheria, expressed concern for possible project-related effects on culturally sensitive plants. In addition, the TCP report describes specific botanical resources that are used by the Southern Maidu in ceremonies and medicine. These include several flowering plants that are gathered for use in dances and ceremonies; coffeeberry seeds and Sierra plum pits that are used to make beads; and various berries and plants that are used for purification. The TCP report indicates that these plants continue to be important in dance ceremonies.

Our Analysis

PG&E's March 2013 Integrated Vegetation Management Plan does not contain any specific provisions designed to identify, locate, and protect culturally important species. The TCP report identified plants and salmon fishing that are culturally important to the Southern Maidu. Consulting with the tribes regarding culturally important plants in the project areas and then modifying the March 2013 Integrated Vegetation Management Plan for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects to include a section on the identification, management and protection of culturally

important species would help ensure their protection and availability of these important resources to the tribes.

*Pesticide Use*

Pesticide use can adversely affect wildlife populations, including special-status aquatic reptiles and amphibians, and can result in unintended impacts. PG&E's revised March 2013 Integrated Vegetation Management Plan clearly specifies conditions under which PG&E would use pesticides for vegetation management. The March 2013 Integrated Vegetation Management Plan recognizes that chemical control is an effective way for managing vegetation and for controlling non-native invasive plants and makes provisions for pesticide use on both federal and licensee owned project lands. The Integrated Vegetation Management Plan clarifies that written permission would be required from the Forest Service or BLM before pesticides could be applied to federal lands.

Forest Service condition 38 and BLM condition 17 specifies implementation of the March 2013 Integrated Vegetation Management Plan, which includes specific provisions for pesticide use. California Fish and Wildlife submitted a 10(j) recommendation supporting Forest Service condition 16 restricting use of pesticides on NFS lands.

Reclamation condition b.9 specifies restricted use of pesticides on Reclamation lands without prior written approval of Reclamation. PG&E would be required to develop and submit for approval an integrated pest management plan in advance of pesticide application for approval by Reclamation. The condition also includes restrictions on pesticide selection, application, and disposal, as well as the course of action in case of pesticide spills.

Our Analysis

Pesticide use can adversely affect wildlife populations, including special-status aquatic reptiles and amphibians, and can result in unintended impacts. Pesticides can also be an effective vegetation management tool for controlling the spread of non-native invasive plants. Non-native invasive plants can displace native plants, reduce biodiversity, affect threatened and endangered species, alter normal ecological processes (e.g., nutrient cycling, water cycling), decrease wildlife habitat, reduce recreational value, and increase soil erosion and stream sedimentation. Pesticide use can be an effective means of controlling non-native invasive plants is applied appropriately and under appropriate conditions. Pesticides can also be an effective means of managing vegetation around project facilities and structures, so as to maintain the safety of the project, and its continued operation.

PG&E's March 2013 Integrated Vegetation Management Plan makes specific provisions for the use of pesticides within the project boundaries on both federal lands and non-federal lands. The provisions contained in the plan address pesticide use for control of non-native invasive plants, project O&M and in sensitive areas. Forest Service condition 38 and BLM condition 17 specify implementation of the March 2013 Integrated Vegetation Management Plan. Implementation of the March 2013 Integrated Vegetation Management Plan would ensure use of pesticides does not impact natural resources at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. Implementation of the March 2013 Integrated Vegetation Management Plan for the proposed Lower Drum Project would address Reclamation condition b.9 for pesticide use.

**Riparian and Wetland Vegetation**

Riparian vegetation could be affected by changes in flow magnitude and elevation. High magnitude flows can mobilize substrate and scour riparian vegetation, while decreases in the duration of inundation during the growing season can increase riparian vegetation. Routine

maintenance activities, changes in project operations, and construction activities can alter abundance and distribution of riparian vegetation and riparian communities. Additionally, non-project activities such as cattle grazing and mining activities can negatively affect riparian vegetation.

Forest Service 4(e) condition 51 specifies implementation of the November 2013 Riparian Vegetation Monitoring Plan at the Upper Drum-Spaulding Project. PG&E has agreed to implement the plan. The November 2013 Riparian Vegetation Monitoring Plan includes provisions for monitoring at three sites: (1) Fordyce Creek immediately downstream of Fordyce dam (previously known as the Fordyce Lake dam reach); (2) South Yuba River downstream of Spaulding dam (previously known as "South Yuba #4 Canyon Sub-reach); and (3) North Fork of North Fork American River (previously known as the Lake Valley reservoir dam reach). All three of these sites are located within the proposed Upper Drum-Spaulding Project.

Under the November 2013 Riparian Vegetation Monitoring Plan, monitoring of these sites would occur at each site along transects to be established by PG&E in consultation with resource agencies. The focus of the plan is to track woody riparian vegetation recruitment and establishment over time. Monitoring would begin in year one of the new license, and would be repeated at each site in years 5 and 10. After year 10, PG&E and the agencies would determine if further monitoring is needed at any of the three sites. The plan also includes provisions for additional monitoring following a spill event. The plan details how the monitoring is to be conducted and what methods are to be used to collect and analyze riparian vegetation data. The November 2013 Riparian Vegetation Monitoring Plan also includes provisions for reporting and consultation with the Forest Service and BLM.

PG&E's also proposes to perform channel morphology and riparian vegetation assessments in the Bear River valley. PG&E would perform a quantitative and qualitative channel morphology, riparian vegetation, and bank stability assessment in Bear Valley meadow to determine whether project waters released into the Bear River are adversely affecting riparian vegetation and channel morphology in the Bear River valley. PG&E proposes a plan for management and monitoring of conditions in Bear River valley (Forest Service recommendation 7) and includes provisions for management of high flows associated with winter operations of Drum canal (Forest Service recommendation 6) and development of site-specific restoration/mitigation plans as indicated by the monitoring program. In a 10(a) recommendation, FWS recommends protecting and maintaining natural ecosystem processes. The recommendation includes several considerations for the protection of vegetation and riparian habitat, including: (1) maintaining riparian vegetation and resources in proper functioning condition and (2) maintaining or restoring streamflow regimes sufficient to sustain desired conditions of native riparian, aquatic, wetland, and meadow habitats.

PCWA approves of PG&E's proposed measure to monitor riparian vegetation in the Bear River valley; however, it recommends the monitoring of stream gravels to determine if they have become silted, and the monitoring of riparian vegetation, to prevent encroachment on the channel due to bank erosion.

The Foothill Water Network suggested that PG&E establish five locations to perform cross-sections in the Lower, Middle, and Upper Meadow reaches to be surveyed with the same frequency as longitudinal profiles.

*Our Analysis*

Of the 10 riparian habitat areas and 7 wetland areas examined by PG&E and NID, 7 riparian habitat areas and 5 wetland areas were determined to be functioning properly. The other riparian and wetland sites are discussed below.

The riparian habitat area in Fordyce Lake dam reach is in the process of reaching equilibrium under current O&M activities, which implemented point bars and banks to support the establishment of riparian vegetation. Since PG&E is not proposing changes to flows in the reach, the site should reach equilibrium. Monitoring this reach as outlined in the November 2013 Riparian Vegetation Monitoring Plan would allow the licensee and agencies to track the anticipated equilibration of riparian vegetation along this reach. Similarly, monitoring of riparian vegetation of the South Yuba River downstream of Spaulding dam and the North Fork of the North Fork American River, in accordance with the November 2013 Riparian Vegetation Monitoring Plan would track changes in riparian vegetation in response to changes in project flows and spill events through these reaches. The wetland area in Lower Rock Lake dam reach no. 1 is expected to continue recovering since PG&E is not proposing changes to flows in the reach. As such, future monitoring of riparian vegetation at this site would not be necessary and routine O&M operations would support the recovery of the wetland in the reduced presence of cattle.

The riparian habitat area and the wetland area in Bear River reach no. 2 have been affected by a variety of historical and recent uses, including grazing, local diversions, and high regulated sustained and pulse flows. Although project operational flows over the past 10 years have supported the recovery of riparian habitat, releases approaching high flows may cause or increase channel incision, bank failures, or other signs of channel instability in Bear Valley. PG&E is proposing channel morphology and riparian vegetation assessment measures in this area to determine if high flows affect conditions. The assessment would provide information to inform the development of protection and mitigation measures.

PG&E proposes to install two valves in the vicinity of the spillway gate of the Drum canal above gage YB-137 in the upper reaches of the Bear River upstream of Drum afterbay to maintain minimum streamflows between 1 and 2 cfs. These low magnitude flows should have no effects on riparian vegetation. Increasing flows within reaches could lead to increased bank erosion and scouring of vegetation. Increased flows could also lead to an increase in the inundation periods, which could restrict riparian vegetation growth, but enhance wetland hydrology processes. High flow spill events associated with facility outages and winter operations in particular that have the potential to affect erosion, bank stability, and channel morphology would be limited under Forest Service recommendation 6 agreed to by PG&E. Restoration and mitigation plans would be developed to address site-specific degradation associated with project operations. Periodic quantitative and qualitative monitoring in this area would provide information to evaluate the effectiveness of proposed measures for minimizing adverse effects of project operations and effectiveness of implemented mitigation measures.

Implementation of the November 2013 Riparian Vegetation Monitoring Plan would provide for a continuing assessment of important riparian areas in Fordyce Creek, the South Yuba River, and the North Fork of North American River, where riparian vegetation has been affected, and may continue to be affected by project operations. Implementation of the 2013 Riparian Vegetation Monitoring Plan is consistent with Forest Service condition 51. Implementation of PG&E's proposed measure for the monitoring of riparian vegetation in the Bear River valley would provide for the assessment of effects associated with project O&M activities, and addresses Forest Service 10(a) recommendation 7 and comments submitted by PCWA and Foothill Water Network.

Additional riparian vegetation monitoring suggested in California Fish and Wildlife 10(j) recommendation is repetitive of monitoring required under PG&E's proposed measures, along with Forest Service condition 51.

**Special-status and Special Interest Plant and Fungi Species**

Project-related O&M for the proposed Drum-Spaulding, Lower Drum, and Deer Creek Projects could affect special-status and special interest plant and fungi species. PG&E proposes to implement the March 2013 Integrated Vegetation Management Plan that was filed with the Commission in November 2013. PG&E's proposed plan includes provisions for the management and protection of special-status plants on federal lands. Specifically, the March 2013 Integrated Vegetation Management Plan would require PG&E, beginning in the first full calendar year, to annually review current lists of special-status species that might occur in the project area and that may be affected by project O&M activities. If a species were added to the list, PG&E in consultation with Forest Service, BLM, and California Fish and Wildlife, would determine if the species or suitable habitat is likely to occur on project lands. If a special-status species were likely to occur on project lands, then PG&E, in consultation with Forest Service, BLM, and California Fish and Wildlife, would develop and implement a study plan to assess the effects of O&M activities on the special-status species. Additionally, if special-status species were detected prior to or during construction or O&M activities, PG&E would immediately notify appropriate agencies. If it is determined that activities are adversely affecting the species, then PG&E would develop appropriate protective measures. PG&E's March 2013 Integrated Vegetation Management Plan also includes a significant component to protect special-status species through the protection of sensitive vegetation resources within the project boundary.

Forest Service condition 38 and BLM condition 17 specify that PG&E implement the March 2013 Integrated Vegetation Management Plan. Forest Service condition 44 and BLM condition 13 are nearly identical and specify that PG&E submit a biological evaluation for approval prior to any construction projects on project lands that may affect special-status species or critical habitat. The biological evaluation would assess the potential effects of the proposed action on special-status species or their habitats, and would include components such as: (1) avoidance or minimization of adverse effects to special-status species; (2) compliance of project-related activities to protective measures in management plans for special-status species; and (3) development of implementation and effectiveness monitoring of measures taken or employed to reduce effects to special-status species. Forest Service condition 45 and BLM condition 14 specify annual review of the current list of special-status species that might occur on Forest Service or BLM lands in the project area. The review would consider new additions of species, and a determination of the newly listed species is likely to occur in the project area, in consultation with the Forest Service, BLM, and other agencies. If it is determined that a newly listed species is likely to occur in the project vicinity and may be impacted by the project or its operation, the licensee would prepare and implement a study plan to evaluate potential project effects on the species.

California Fish and Wildlife submitted 10(j) recommendations 7.8 and 7.9 are similar to the Forest Service and BLM conditions, recommending an annual review of special-status species lists and the submittal of a biological evaluation prior to construction activities that may disturb special-status species or critical habitat.

*Our Analysis*

Special-status plants could be adversely affected by project O&M activities, including: (1) ground-disturbing activities; (2) vegetation management activities such as mechanical clearing and herbicide use; and (3) recreation use, which can lead to trampling of plants. Project O&M activities were observed directly affecting occurrences of five different special-status plant species: Congdon's onion, Brandegee's clarkia, Humboldt lily, felt-leaved violet, and Sierra starwort. These activities generally affected a limited number of individual plants within a larger population occurrence. Two local

populations, Brandegee's clarkia and Congdon's onion, were adversely affected in their entirety by OHV use. However, relative to the number of individuals and the area of occurrences present, the overall effect on a given species is minor.

Implementation of the March 2013 Integrated Vegetation Management Plan would require PG&E to conduct surveys for special-status plants at project facilities on federal lands within the Upper Drum-Spaulding and Deer Creek Project boundaries. PG&E would conduct the surveys within 1 year of license issuance and once every 10 years thereafter through the term of a new license. The surveys may include any new plant species added as result of updates to the lists of state threatened or endangered species, BLM sensitive plant species, or Forest Service sensitive and watchlist species. The surveys would be conducted according to the most currently accepted protocols. Implementation of the management plan would minimize and mitigate for any project effects to special-status plant species that may occur as a result of project O&M and any new project-related construction activities. Modification of the March 2013 Integrated Vegetation Management Plan to conduct surveys for special-status plants at project facilities on non-federal lands within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects would help ensure the adequate protection of these plant species on all project lands. Through the review and survey activities included in the Integrated Vegetation Management Plan, in addition to surveying special-status species at the project, PG&E would also be in direct consultation with the Forest Service, BLM, and other resource agencies about the current list of special-status species, and in this way would also fulfill the objectives of Forest Service condition 45 and 14.

PG&E's proposed Integrated Vegetation Management Plan also contains provisions for annual employee training and consultation with the agencies. Specifically, under the proposed Integrated Vegetation Management Plan, PG&E would provide annual environmental training for O&M staff on the location and identification of certain non-native invasive plants and sensitive areas, such as riparian zones and wetlands. Training would include identification of known special-status species areas. With these provisions, implementation of the proposed Integrated Vegetation Management Plan would be consistent with Forest Service conditions 44 and 45 and BLM conditions 13 and 14.

Before construction of any project features not addressed in this EIS, PG&E would first need to file a license amendment with the Commission. At that time, a biological evaluation for the protection of special-status species would be developed if appropriate as part of the license amendment proceeding.

**Yuba-Bear Project**

**Vegetation Management**

Vegetation management activities, such as removal of vegetation through clearing and trimming around project activities, and control of non-native invasive plants could affect sensitive environmental resources.

To address vegetation management at the project, NID proposes to implement an Integrated Vegetation Management Plan (March, 2013) for the Yuba-Bear Project. Forest Service condition 38 and BLM condition 15 specify the implementation of the March 2013 Integrated Vegetation Management Plan for the Yuba-Bear Project that was filed with the Commission in November 2013. The March Integrated Vegetation Management Plan focuses on: (1) restoration of native vegetation through re-vegetation of areas disturbed by project O&M activities; (2) conduct of necessary and required project-related vegetation management and hazard reduction activities, according to BMPs; and (3) protection of sensitive areas. The plan also includes guidelines for re-vegetation and avoidance and protection of sensitive areas. The Integrated Vegetation Management Plan establishes overall management and monitoring actions to prevent the introduction of non-native invasive plants within the project boundaries, and it includes measures to survey and monitor the distribution of non-native invasive

plants, control and contain their spread, and track the success of the management activities. The plan focuses on four main components for the control of non-native invasive plants: (1) prevention, (2) monitoring/surveys, (3) non-native invasive plant treatment, and (4) reporting.

California Fish and Wildlife 10(j) recommendation 7.1 recommends development and implementation of an integrated vegetation and non-native invasive plant management plan similar to Forest Service condition 38.

We discuss various components of vegetation management below.

*Operation and Maintenance Activities*

NID routinely clears vegetation in the immediate vicinity of project structures, including powerhouses, canals, flumes, and rock- and earth-filled dams, and along transmission line rights-of-way. Clearing is performed by mechanical means and occurs only within the area needed to maintain the structure, which constitutes a small portion of the overall project area. No ground-disturbing equipment for vegetation clearing is used in the Yuba-Bear Project, and no project facilities are located within sensitive vegetation associations. The effects of the current vegetation management practices are minimal and site specific.

Our Analysis

O&M activities that currently take place as part of normal project operations have minor effects on vegetation resources within the project boundary. O&M activities and their associated effects on vegetation resources within the project boundary would continue for the term of a new license. Proposed construction activities (e.g., develop new recreation facilities and pedestrian trails) would have permanent minor to moderate adverse effects on existing vegetation.

The proposed site of the Rollins no. 2 powerhouse is on land classified as barren by the CalVeg vegetation classification system, and there are non-native grasses and annuals growing at the location. Construction activities associated with construction of the powerhouse and the construction and additions of proposed recreation facilities would require removal of vegetation, grading, and increased impervious areas. Effects to vegetation would be minimized by maximizing the placement of changes within existing project footprints.

NID's March 2013 Integrated Vegetation Management Plan includes appropriate vegetation management measures related to O&M activities. These measures include: (1) revegetation, which is the process of reestablishing vegetation cover in disturbed areas and is a standard component of project O&M, including erosion control and site restoration; (2) routine vegetation management activities often resulting from regulatory requirements and to ensure safe and continued project operations; and (3) sensitive area protection during vegetation management to ensure that adverse effects are avoided or minimized. Sensitive area protections included in the March 2013 Integrated Vegetation Management Plan include specific protections for special-status plants and wildlife, Additionally, the March 2013 Integrated Vegetation Management Plan includes reporting guidelines with appropriate agencies and components for additional consultation that may occur, as necessary, to ensure that the goals and objectives of the plan are being met and proposed measures are being implemented.

Implementation of NID's revised March 2013 plan addresses is consistent with the Forest Service condition 38 and BLM condition 15.

*Non-native Invasive Plants*

Human activities, including project O&M activities, can spread non-native invasive plants. Areas where non-native invasive plants are most likely to spread are recreation areas and roadsides, particularly at lower elevations. Recreation activities can lead to the spread of non-native invasive plants through transport on boats, vehicles and clothing. Project vehicles may also transport non-native invasive seeds from one area to another. O&M activities, such as road grading and vegetation plant control remove existing vegetation and can increase the spread of non-native invasive plant species. However, vegetation management may be beneficial, retarding the spread of some noxious weed occurrences by removing them from project facilities.

NID's March 2013 Integrated Vegetation Management Plan addresses management of non-native invasive plants within the project boundaries, consistent with the agency conditions. NID's management of non-native plants focuses on prevention, detection and reporting, treatment, monitoring and adaptive management to prevent the introduction and further spread of non-native invasive plants, as well as eradication of non-native invasive plants within the project boundary. Prevention of non-native invasive plant introduction s include: (1) cleaning of all construction equipment, earth-moving equipment, and vegetation management equipment by staff prior to entering the project boundary; (2) use of certified weed-free seed and straw/mulch for construction, erosion control, or restoration; (3) seeding of topsoil stockpiles with native plant seed, (4) restriction of travel to established roads and motorized trails and avoidance of travel through areas with known non-native invasive plant populations; (5) preparation of site-specific restoration plans utilizing that do not include the use of non-native plant materials unless agreed to by the Forest Service. Beginning in the first year following license issuance and every fifth year thereafter in high use areas, and every tenth year thereafter in low use areas, as defined in the plan, NID would conduct a complete non-native invasive plants survey of Forest Service and BLM lands within the project boundary. If a non-native invasive plant is identified within the project boundary and extends outside the boundary, NID would estimate the extent of the population outside the boundary. NID would record non-native invasive plant composition, location, and relative abundance of high-priority and new target non-native invasive plant occurrences in a GIS.

Forest Service condition 38 and BLM condition 15 specify that PG&E implement the March 2013 Integrated Vegetation Management Plan.

California Fish and Wildlife submitted a 10(j) recommendation to implement an integrated vegetation and non-native invasive plant management plan similar to the Forest Service condition.

Our Analysis

Non-native invasive plants can displace native plants, reduce biodiversity, affect threatened and endangered species, alter normal ecological processes (e.g., nutrient cycling, water cycling), decrease wildlife habitat, reduce recreational value, and increase soil erosion and stream sedimentation.

Several non-native invasive plants have been documented in the area of the proposed Rollins no. 2 powerhouse. Construction activities associated with the proposed powerhouse could lead to the spread of non-native invasive plants, as construction equipment and clothing are vectors for carrying seeds. Unwashed construction vehicles and equipment being brought in from outside areas can also bring in seeds of non-native invasive plants not present on the project area. Additionally, soil and straw used for construction, which have not been certified as weed-free, may also carry weed seeds. Following BMPs during construction would reduce opportunities for the spread of non-native invasive plants from and to the area of the proposed powerhouse.

Implementation of NID's March 2013 Integrated Vegetation Management Plan, would adequately protect project lands from the project-related spread of non-native invasive plants and would help maintain native plant diversity and habitat quality. Implementation of the March 2013 Integrated Vegetation Management Plan would also address concerns about non-native invasive plant spread associated with the construction of the proposed Rollins no. 2 powerhouse. Implementation of NID's March 2013 is consistent with Forest Service condition 38 and BLM condition 17.

Many of the activities that could result in the spread of invasive plant species would occur on lands outside the National Forest. Expanding NID's plan to all accessible project lands would provide additional resource protection.

*Recreation Facilities*

The installation, modification, and maintenance of project recreation facilities have the potential to affect vegetation resources including riparian and wetland vegetation, non-native invasive plants, and special-status and special interest plants.

In its September 2013 Recreation Facilities Plan, NID includes provisions for avoidance, protection, mitigation, and minimization of effects to sensitive resource areas, including sensitive botanical sites, at or near planned improvement sites. In addition, NID's March 2013 Integrated Vegetation Management Plan includes specific provisions for the management of vegetation at project recreation sites on federally owned lands. The Integrated Vegetation Management Plan provisions are based on the goals of tree stand improvement, view enhancement and removal of hazard trees. In addition, vegetative planting at recreation sites would be done for screening, to cover construction scars, provide shade, increase site attractiveness, control erosion and minimize noise. Forest Service condition 57 and BLM conditions 25 and 28 through 37 specify that NID consult with the Forest Service to finalize the Recreation Facilities Plan; improve and upgrade multiple recreation facilities within the project boundary; and include specific vegetation management provisions in the plan. Areas and facilities that would be upgraded in the project area, in accordance with the September 2013 plan, consistent with Forest Service condition 57 and BLM conditions 25 and 28 through 37, are described further in section 3.3.5.2, *Recreation Resources Environmental Effects*.

Forest Service condition 38 and BLM condition 15 specify implementation of the March 2013 Integrated Vegetation Management Plan, including its provisions for vegetation management at recreation sites located on federal lands.

Our Analysis

Public use of project recreation facilities can have impacts to vegetation. Off-highway vehicle (OHV) use around reservoirs or other recreation areas not suitable for vehicle use, informal pedestrian and hiking trails, and camping in remote unauthorized or unimproved sites can result in vegetation compaction and trampling and increased erosion, and has the potential to negatively affect sensitive areas. Pedestrian use too, can result in vegetation compaction and trampling, as well as increased erosion. Planned recreation improvements such as establishment of formal trails, upgrading and installation of vehicle barriers to prevent unauthorized access of OHVs, improvement of current campsites, and building authorized campsites could reduce impacts to vegetation from recreation activities.

Addition and upgrading of recreation facilities may result in clearing and compaction of vegetation, depending on the placement of the proposed changes. Maximizing the placement of changes to the existing footprint of current recreation facilities could minimize impacts to vegetation. At all sites, construction equipment and personnel have the potential to carry non-native invasive plants into the area.

One recreation facility with proposed changes, Bowman Lake, has known non-native invasive plant occurrences (Klamath weed) in the area, so the overall effect of the proposed recreation changes is likely to be minor, if any, for spreading seed from already present occurrences of plants. However, at all sites, construction equipment and personnel have the potential to carry non-native invasive plant seeds into the area.

NID's March 2013 Integrated Vegetation Management Plan contains specific provisions for vegetation management, including management of non-native invasive plants at project recreation sites, including those located on federal lands. Implementation of the Integrated Vegetation Management Plan would establish goals and objectives for recreation site vegetation that are consistent with Forest Service policies, and would spell out vegetation management measures to be undertaken by NID and project recreation sites, including provisions for surveying recreation sites to determine vegetation management needs, removing vegetation, maintaining vegetation around fire rings, protecting existing vegetation during construction activities, and periodic silvicultural evaluation. Implementation of the March 2013 Integrated Vegetation Management Plan would be consistent with Forest Service condition 38 and BLM condition 17.

*Culturally Important Species*

Vegetation management could affect plant species of cultural importance to the tribes. These plants are used for food, medicines, and utilitarian purposes. Over the years, native practices have declined as a direct result of loss of culturally important plants.

Two Native American communities, the Washoe Tribe of Nevada and California and the United Auburn Indian Community of the Auburn Rancheria, expressed concern for possible project-related effects on culturally sensitive plants. In addition, the TCP report describes specific botanical resources that are used by the Southern Maidu in ceremonies and medicine. These include several flowering plants that are gathered for use in dances and ceremonies; coffee berry seeds and Sierra plum pits that are used to make beads; and various berries and plants that are used for purification. The TCP report indicates that these plants continue to be important in dance ceremonies.

Our Analysis

PG&E's March 2013 Integrated Vegetation Management Plan does not contain any specific provisions designed to identify, locate, and protect culturally important species. The TCP report identified plants and salmon fishing that are culturally important to the Southern Maidu. Consulting with the tribes regarding culturally important plants in the project areas and then modifying the Integrated Vegetation Management Plan to include a section on the identification, management and protection of culturally important species would help ensure the protection and availability of these important resources to the tribes.

*Pesticide Use*

Pesticide use can adversely affect wildlife populations, including special-status aquatic reptiles and amphibians, and can result in unintended impacts. NID's revised March 2013 Integrated Vegetation Management Plan clearly specifies conditions under which NID would use pesticides for vegetation management. The Integrated Vegetation Management Plan recognizes that chemical control is an effective way for managing vegetation and for controlling non-native invasive plants and makes provisions for pesticide use on both federal and licensee owned project lands. The Integrated Vegetation Management Plan clarifies that written permission would be required from the Forest Service or BLM before pesticides could be applied to federal lands.

Forest Service condition 38 and BLM condition 15 specifies implementation of the March 2013 Integrated Vegetation Management Plan which includes specific provisions for pesticide use. California Fish and Wildlife submitted a 10(j) recommendation supporting restricting use of pesticides on NFS lands.

The Foothill Water Network submitted comments supporting NID's proposed measure for the use and restrictions of pesticides on federal land.

Our Analysis

Pesticide use can adversely affect wildlife populations, including special-status aquatic reptiles and amphibians, and can result in unintended impacts. Pesticides can also be an effective vegetation management tool for controlling the spread of non-native invasive plants. Non-native invasive plants can displace native plants, reduce biodiversity, affect threatened and endangered species, alter normal ecological processes (e.g., nutrient cycling, water cycling), decrease wildlife habitat, reduce recreational value, and increase soil erosion and stream sedimentation. Pesticide use can be an effective means of controlling non-native invasive plants if applied appropriately and under appropriate conditions. Pesticides can also be an effective means of managing vegetation around project facilities and structures, so as to maintain the safety of the project, and its continued operation.

NID's March 2013 Integrated Vegetation Management Plan makes specific provisions for the use of pesticides with the project boundary on both federal lands and non-federal lands. The provisions contained in the plan address pesticide use for control of non-native invasive plants, project O&M and in sensitive areas. Forest Service condition 38 and BLM condition 15 specifies implementation of the March 2013 Integrated Vegetation Management Plan, which includes specified measures for the use of pesticides at the project. Implementation of the March 2013 Integrated Vegetation Management Plan would restrict use of pesticides at the project according to the provisions established in the Integrated Vegetation Management Plan, would help minimize the use of pesticides within the project boundary, would help protect project lands from the spread of non-native invasive plants, would help maintain plant diversity and habitat quality, and would result in a coordinated and efficient use of pesticide in instances where it is needed.

**Riparian and Wetland Vegetation**

Riparian vegetation could be affected by changes in flow magnitude and elevation. High magnitude flows can mobilize substrate and scour riparian vegetation, while decreases in the duration of inundation during the growing season can increase riparian vegetation. Routine maintenance activities, changes in project operations, and construction activities can alter abundance and distribution of riparian vegetation and riparian communities. Additionally, non-project activities such as cattle grazing and mining activities can negatively affect riparian vegetation.

NID's March 2013 Integrated Vegetation Management Plan contains measures for the protection of sensitive resources, including riparian and wetland areas. However, NID makes no specific proposals for monitoring riparian vegetation at the Yuba-Bear Project.

Forest Service 4(e) condition 51 and BLM condition 22 specify implementation of a Riparian Vegetation Monitoring Plan at the Yuba-Bear Project that was filed with the Commission in November 2013 (Forest Service, 2013x). The November 2013 Riparian Vegetation Monitoring Plan for the Yuba-Bear Project includes provisions for monitoring at two sites: (1) Middle Yuba River downstream of Milton diversion dam (previously known as the Upper Milton Sub-Reach, Dead End Mine Site); and (2) Bear River downstream of Bear River canal diversion dam.

Under the November 2013 Riparian Vegetation Monitoring Plan, monitoring of these sites would occur at each site along transects to be established by NID in consultation with resource agencies. The focus of the plan is to track woody riparian vegetation recruitment and establishment over time. Monitoring would begin in year one of the new license, and would be repeated at each site in years 5 and 10. After year 10, NID and the agencies would determine if further monitoring is needed at any of the three sites. The plan also includes provisions for additional monitoring following a spill event. The plan details how the monitoring is to be conducted and what methods are to be used to collect and analyze riparian vegetation data. The November 2013 Riparian Vegetation Monitoring Plan also includes provisions for reporting and consultation with the Forest Service and BLM.

In a letter dated December 20, 2013, NID clarifies its proposal with respect to riparian vegetation monitoring, noting that it does not concur with the riparian vegetation monitoring conditioned by the Forest Service (condition 51) and the BLM (condition 22). Instead, NID indicates that with respect to riparian vegetation monitoring, the monitoring proposals contained in its August, 29, 2012, letter are its current proposal. The August 29, 2012, proposal included a Vegetation Management Plan and an Aquatic Monitoring Plan, which included provisions for monitoring fish, foothill yellow-legged frog, and water temperature at specified stream reaches within the project. Neither of these proposed plans includes any specific provisions for monitoring riparian or wetland vegetation.

In a 10(a) recommendation, FWS recommends protecting and maintaining natural ecosystem processes. The recommendation includes several considerations for the protection of vegetation and riparian habitat, including: (1) maintaining riparian vegetation and resources in proper functioning condition and (2) maintaining or restoring streamflow regimes sufficient to sustain desired conditions of native riparian, aquatic, wetland, and meadow habitats.

*Our Analysis*

Five of the six riparian and wetland sites examined at the Yuba-Bear Project were found to be functioning properly. Only one of the six sites was found to be at risk; the Dutch Flat afterbay dam reach. This riparian site in the lower Bear River downstream of the Dutch Flat afterbay dam is in a section of stream that has been highly disturbed by historic gold mining operations. NID concluded that non-project activities have contributed to the current condition and the site is currently recovering. Recovery in this area is slow near the Dutch Flat afterbay dam, as intermittent high flows have scoured establishing vegetation. These flows are related to high water years, when there is more water in the Bear River than the Dutch Flat afterbay has the capacity to hold, and is not related to project-related releases but instead is related to overtopping of the dam. The proposed project would have a minimal effect on the riparian habitat downstream of Dutch Flat afterbay.

Construction of the proposed recreation facility at the Dutch Flat afterbay may require removal of an unknown amount of riparian vegetation along the shorelines. However, riparian vegetation removal and disturbance would be minimal, and would be addressed through the riparian vegetation, recreation, and revegetation measures included in the March 2013 Integrated Vegetation Management Plan.

NID's March 2013 Integrated Vegetation Management Plan provides management guidance for vegetation within the project boundary, including riparian vegetation and wetland areas. NID's proposed measures for the protection of sensitive resources include: (1) annual employee training of staff regarding location of riparian and wetland areas; (2) flagging of sensitive areas within a site and resource specific buffer prior to any vegetation management activities; and (3) using best management practices in sensitive areas. These measures would be appropriate for the protection of wetland and riparian habitat during routine vegetation management activities.

Implementation of the Riparian Vegetation Monitoring Plan specified by the Forest Service as part of 4(e) condition 51 and BLM as part of 4(e) condition 22 would also benefit riparian vegetation resources at the project. The two sites included for monitoring in the plan would are both relatively small sites. Riparian vegetation monitoring as described in the November 2013 Riparian Vegetation Monitoring Plan would allow NID to establish baseline conditions for riparian vegetation at these sites and then track changes in vegetation after issuance of a new project license, to confirm the anticipated minimal effects of project operations on these two areas.

FWS recommends a series of objectives to protect natural ecosystem processes but provides no specific measures. Implementation of the March 2013 Integrated Vegetation Management Plan and November 2013 Riparian Vegetation Monitoring Plan specified by the Forest Service would meet FWS objectives.

**Special-status and Special Interest Plant and Fungi Species**

Project-related O&M could affect special-status and special interest plant and fungi species. NID proposes to implement an Integrated Vegetation Management Plan (March 2013) that was filed with the Commission in November 2013. NID's proposed March 2013 Integrated Vegetation Management Plan includes provisions for the management and protection of special-status plants. Specifically, the March 2013 Integrated Vegetation Management Plan would require NID, beginning in the first full calendar year, to annually review current lists of special-status species that might occur in the project area and that may be affected by project O&M activities. If a species were added to the list, NID in consultation with Forest Service, BLM, and California Fish and Wildlife would determine if the species or suitable habitat is likely to occur on project lands. If a special-status species were likely to occur on project lands, then NID, in consultation with Forest Service, BLM, and California Fish and Wildlife, would develop and implement a study plan to assess the effects of O&M activities on the special-status species. Additionally, if special-status species were detected prior to or during construction or O&M activities, NID would immediately notify appropriate agencies. If it is determined that activities are adversely affecting the species, then NID would develop appropriate protective measures.

Forest Service condition 38 and BLM condition 15 specify that NID implement the March 2013 Integrated Vegetation Management Plan.

Forest Service condition 43 and BLM condition 13 are nearly identical and would also require that NID submit a biological evaluation for approval prior to any construction projects on project lands that may affect special-status species or critical habitat. The biological evaluation would assess the potential effects of the proposed action on special-status species or their habitats, and would include components such as: (1) avoidance or minimization of adverse effects to special-status species; (2) compliance of project-related activities with protective measures in management plans for special-status species; and (3) development of implementation and effectiveness monitoring of measures taken or employed to reduce effects to special-status species. If necessary, Forest Service or the BLM may require mitigation techniques.

Forest Service condition 44 and BLM condition 20 would require annual review of the current list of special-status species that might occur on Forest Service or BLM lands in the project area. The review would consider new additions of species, and a determination of the newly listed species is likely to occur in the project area, in consultation with the Forest Service, BLM and other agencies. If it is determined that a newly listed species is likely to occur in the project vicinity and may be impacted by the project or its operation, the license would prepare and implement a study plan to evaluate potential project effects on the species.

California Fish and Wildlife submitted 10(j) recommendations 7.6 and 7.7 are similar to the Forest Service and BLM conditions, recommending an annual review of special-status species lists and the submittal of a biological evaluation prior to construction activities that may disturb special-status species or critical habitat. This is similar to the provisions for special-status species review and protection included in the March 2013 Integrated Vegetation Management Plan.

*Our Analysis*

Special-status plants could be adversely affected by the following project O&M activities: (1) ground-disturbing activities; (2) vegetation management activities such as mechanical clearing and herbicide use; and (3) recreational use, which can lead to trampling of plants. Project O&M activities were observed directly affecting occurrences of four different special-status plant species: Congdon's onion, Brandegee's clarkia, round-leaved sundew, and Sierra starwort. These effects generally affected a limited number of individuals within a larger occurrence. In all cases, the effects were site-specific, though the duration could be long term, if project operations continue unchanged. However, relative to the number of individuals and the area of occurrences present, the overall effect on a given species is minor.

No occurrences of special-status plants were observed growing on or directly adjacent to the site of the proposed Rollins no. 2 powerhouse. In addition, the habitat is not suited to the special-status plants with the potential to grow in the project area.

The proposed changes or additions to recreation facilities are not located on or near known special-status plant occurrences. The closest occurrences of special-status plants are on the opposite bank of the reservoirs at both Milton diversion dam impoundment and Dutch Flat afterbay. The proposed recreation facilities should not affect special-status plants.

Implementation of the March 2013 Integrated Vegetation Management Plan at the Yuba-Bear Project would require NID to conduct surveys for special-status plants at project facilities on federal lands within the project boundary. NID would conduct the surveys within 1 year of license issuance and once every 10 years thereafter through the term of a new license. The surveys may include any new plant species added as result of updates to the lists of state threatened or endangered species, BLM sensitive plant species, or Forest Service sensitive and watchlist species. The surveys would be conducted according to the most currently accepted protocols. Implementation of the management plan would minimize and mitigate for any project effects to special-status plant species that may occur as a result of project O&M and any new project-related construction activities. Modification of the March 2013 Integrated Vegetation Management Plan to conduct surveys for special-status plants at project facilities on non-federal lands within the Yuba-Bear Project boundary would help ensure the adequate protection of these plant species on all project lands. Through the review and survey activities included in the Integrated Vegetation Management Plan, in addition to surveying special-status species at the project, NID would also be in direct consultation with Forest Service, BLM and other resource agencies about the current list of special-status species, and in this way would also fulfill the objectives of Forest Service condition 45 and 14.

NID's proposed Integrated Vegetation Management Plan also contains provisions for annual employee training and consultation with the agencies. Specifically, under the proposed Integrated Vegetation Management Plan, NID would provide annual environmental training for O&M staff on the location and identification of certain non-native invasive plants and sensitive areas, such as riparian zones and wetlands. Training would include identification of known special-status species areas. With these provisions, implementation of the proposed Integrated Vegetation Management Plan would be consistent with Forest Service conditions 43 and 44 and BLM conditions 13 and 20.

Before construction of any project features not addressed in this EIS, NID would first need to file a license amendment with the Commission. At that time, a biological evaluation for the protection of special-status species would be developed, if appropriate, as part of the license amendment proceeding.

#### 3.3.3.2.2 Wildlife

**Upper Drum-Spaulding Project**

**Wildlife (General)**

Terrestrial wildlife species within the project boundary have become accustomed to the activities associated with normal operation and maintenance of the Drum-Spaulding Project. PG&E has not proposed new activities (i.e., new construction) within the new license application that would be expected to adversely affect terrestrial wildlife, when compared to existing conditions. Mobile wildlife species intolerant of disturbance would be expected to flee during periods of project O&M and return when the activities have ceased. The effects of PG&E activities would generally be temporary and not severe enough to negatively affect the survival of a species or population.

Project effects on wildlife, agency conditions and recommendations related to wildlife, and PG&E's proposed wildlife measures are discussed below for various wildlife resources.

**Special-status Wildlife Species**

*General*

The Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects could affect special-status wildlife species as a result of project O&M activities and recreational use. PG&E proposes several measures for the protection of special species wildlife. PG&E's proposed March 2013 Integrated Vegetation Management Plan includes provisions for the protection of special-status wildlife species. Specifically, through the Integrated Vegetation Management Plan, PG&E proposes to apply certain limited operating periods for activities that involve the use of heavy equipment, loud noises, or habitat alteration, as appropriate, to protect special-status wildlife. The proposed limited operating periods include specific provisions for the protection of California spotted owl, northern goshawk, and great grey owl. The Integrated Vegetation Management Plan also contains specific provisions for the limitation of pesticide use in the vicinity of known locations of California red-legged frog, Sierra Nevada yellow-legged frog, or foothill yellow-legged frog.

In addition to the specified limited operating periods for the protection of special-status wildlife, the Integrated Vegetation Management Plan also contains provisions for annual employee training, including training on the location and identification of special areas, including sensitive habitats such as riparian zones and wetlands, identification of known special-status species areas, and identification of sensitive wildlife areas and the need for limited operating periods in those areas.

Finally, PG&E's proposed Integrated Vegetation Management Plan includes provisions for an annual consultation meeting between PG&E and the agencies. The annual consultation meeting would be held each year by March 31, and would be used to review upcoming O&M activities planned by PG&E that involve disturbance within any known sensitive area on federal land, including the use of machine powered equipment, that could affect special-status wildlife resources. The Integrated Vegetation Management Plan also includes provisions for reporting and plan revisions. Although the reporting provisions of the proposed Integrated Vegetation Management Plan are aimed primarily at vegetation, such reporting could also be used to report any activities involving special-status wildlife species or their habitats, as well.

Forest Service condition 38 and BLM condition 17 specify implementation of the March 2013 Integrated Vegetation Management Plan. Forest Service condition 45 and BLM condition 14, specify PG&E to review annually the current lists of special-status species that might occur in the project area and that may be affected by project O&M activities. The conditions include provisions for consultation and procedures if a special-status species is detected on project land and appropriate measures to follow.

Forest Service condition 44 and BLM condition 13 specify PG&E to submit a biological evaluation for approval prior to any construction projects on project lands that may affect special-status species or critical habitat. The biological evaluation includes provisions to evaluate the potential effects of a proposed action on special-status species or its habitat, and components to ensure protection of special-status species.

Our Analysis

Project activities that can potentially affect special-status wildlife species include: (1) vegetation management activities such as removal of hazard trees, non-native invasive plant control, defensible space maintenance, and clearing of transmission line rights-of-way; (2) recreation activities such as OHV use, camping, and hiking; and (3) facility maintenance activities such as inspections, road grading, annual repairs, and emergency repairs. Due to the abundance and widespread occupancy of the project area, there is no evidence to suggest that project activities adversely affect special-status wildlife species.

PG&E's proposal to implement the March 2013 Integrated Vegetation Management Plan which includes provisions to annually consult with appropriate federal agencies, annually train staff regarding the location of special-status species occurrences, and use of limited operating periods in sensitive areas would provide protection to special-status wildlife species within the project boundaries. In addition, annual review of special-status species as outlined in the proposed Integrated Vegetation Management Plan is consistent with specified in Forest Service conditions 38 and 45 and BLM conditions 17 and 14 and would provide a mechanism for the evaluation of effects of project O&M on newly listed species and development of appropriate protective measures.

Before construction of any project features not addressed in this EIS, PG&E would first need to file a license amendment with the Commission. At that time, a biological evaluation for the protection of special-status species would be developed if appropriate as part of the license amendment proceeding.

*Amphibians and Reptiles*

O&M of the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects could potentially affect the foothill yellow-legged frog, coast horned lizard, and western pond turtle.

Forest Service condition 51 specifies that a monitoring program be developed and reports of monitoring efforts be filed with the Commission annually. The condition specifies monitoring for the foothill yellow-legged frog and western pond turtle and includes provisions regarding: (1) reaches to monitor; (2) number of sites and frequency of monitoring; (3) distribution and population metrics; (4) habitat and environmental conditions to monitor; and (5) reporting of the monitoring program.

California Fish and Wildlife submitted a 10(j) recommendation similar to Forest Service condition 51 suggesting the development of a monitoring plan for aquatic species.

PG&E proposes to implement the Aquatic Monitoring Plan filed with the Commission in August 2012. PG&E would monitor foothill yellow-legged frog with methods similar to those used during the relicensing surveys. Monitoring would be conducted in stream reaches where breeding populations of the

frog have been documented and where data are needed to assess response to flow-related changes in habitat conditions under the new license. Where possible, PG&E would sample at the same locations as relicensing surveys to allow for comparison to conditions under the existing license (PG&E and NID 2010a, 2011g). The monitoring reaches proposed by PG&E are all within the Upper Drum-Spaulding Project and are affected by the Spaulding No. 1 and No. 2 Development: (1) one site on South Yuba River between Spaulding dam and Fall Creek; and (2) two sites on South Yuba River between Fall Creek and Canyon Creek.

Monitoring would be performed over the term of a new license in accordance with a detailed, site specific, schedule outlined in the monitoring plan. The November 2013 monitoring plan also details the locations of the monitoring sites, and monitoring methods to be used. The monitoring plan also contains provisions for data analysis and reporting, including analysis of high flow fluctuations in the stream reaches of interest. Water temperature, a critical factor in balancing streamflow measures for protection and enhancement of both resident rainbow trout and populations of foothill yellow-legged frog, would be monitored by PG&E at key locations and throughout the seasons that the sites can be safely accessed.

Additionally, in accordance with the March 2013 Integrated Vegetation Management Plan, any pesticide application on federal land within 500 feet of known populations of California red-legged frog, Sierra Nevada yellow-legged frog, or foothill yellow-legged frog would be designed to avoid adverse effects to individuals and their habitats.

Forest Service condition 51 also includes provisions for monitoring western pond turtle. PG&E proposes to implement the Aquatic Monitoring Plan filed with the Commission in August 2012. The August 2012 Aquatic Monitoring Plan indicates that field crews trained in the identification of western pond turtles would record incidental observations of the species during the performance of the fish and frog monitoring.

FWS also filed a 10(a) recommendation that PG&E develop a bullfrog eradication plan for all project lakes, reservoirs, and impoundment areas.

Our Analysis

Proposed changes in minimum streamflows and associated changes in water temperature and spill cessation measures have the potential to affect aquatic habitat of the yellow-legged frog and western pond turtle within the Upper Drum-Spaulding Project. Overall it is expected that these measures would improve habitat and provide greater protection for these species; however, while proposed spill cessation measures would reduce stranding and enhance survival of early life stages of foothill yellow-legged frog, concern has been expressed that cooler water temperatures maintained by higher flows could adversely affect foothill yellow-legged frog in some reaches.

Evidence of foothill yellow-legged frog breeding sites was found in the South Yuba River below Lake Spaulding dam (Upper Drum-Spaulding Project). Habitat and flow analysis determined that under existing operation the percent of WUA for foothill yellow-legged frog eggs is above the targeted 80 percent for extreme critically dry water years, critically dry water years, and dry water years, but below 80 percent for below normal water years, above normal water years, and wet water years. Percent WUA for foothill yellow-legged frog tadpoles was above 80 percent for all water years. Effects of proposed minimum flows on frog habitat are discussed in section 3.3.2.2.2, *Aquatic Resources, Instream Flows* and section 3.3.2.2.7, *Aquatic Resources, Water Quality*.

In the North Fork of the North Fork American River below Lake Valley canal diversion dam (Upper Drum-Spaulding Project), the foothill yellow-legged frog was detected at low numbers and evidence of breeding sites was found. Percent of WUA under existing operation for foothill yellow-

legged frog eggs was above 80 percent for all water years except critically dry and extreme critically dry water years. Percent WUA for foothill yellow-legged frog tadpoles was above 80 percent for below normal, above normal, and wet water years, but below 80 percent for extreme critically dry, critically dry, and dry water years. Effects of proposed minimum flows on frog habitat are discussed in section 3.3.2.2.2, *Aquatic Resources, Instream Flows*.

In Canyon Creek below Towle canal diversion dam (Upper Drum-Spaulding Project), there were two foothill yellow-legged frog detections, but evidence of breeding was not found. Percent WUA under existing operation for foothill yellow-legged frog eggs and tadpoles was above 80 percent for all water years. Effects of proposed minimum flows on frog habitat are discussed in section 3.3.2.2.2, *Aquatic Resources, Instream Flows*.

In the Bear River below Drum afterbay (Upper Drum-Spaulding Project), few adults and juveniles were detected, but there was no evidence of breeding sites. A flow-habitat analysis was not developed for this reach.

No surveys for foothill yellow-legged frog were performed in the South Fork Deer Creek below Deer Creek powerhouse (Deer Creek Project) due to the short length of the reach (less than 0.1 mile).

The following reaches are above foothill yellow-legged frog elevation range and are not expected to affect foothill yellow-legged frog populations: South Yuba River below Kidd Lake dam and Lower Peak Lake dam; Fordyce Creek below Fordyce Lake dam; and North Fork of the North Fork American River below Lake Valley reservoir dam (Upper Drum-Spaulding Project). No foothill yellow-legged frogs were detected in the Bear River below the Highway 20 crossing. In other reaches, due to the small amount of operational control, foothill yellow-legged frog habitat is expected to be relatively unaffected by the proposed flows.

Regarding the western pond turtle, PG&E and NID conducted a study to map potentially suitable western pond turtle aquatic habitat and nesting habitat, assembled information associated with incidental observations reported during relicensing studies from 2007 to 2009, and evaluated 41 sites within both projects on canals in areas below 6,000 feet of elevation associated with reservoirs, afterbays, forebays, canals, and stream reaches potentially affected by the projects. Upper Drum-Spaulding, Lower Drum, and Deer Creek Project reservoirs, forebays, and afterbays lack suitable habitat to support western pond turtle populations, particularly adequate basking substrates and the vegetated, shallow water areas that are necessary for juvenile western pond turtle.

Forest Service condition 51 and BLM condition 22 specify that PG&E conduct monitoring of foothill yellow-legged frog (Upper Drum-Spaulding and Deer Creek Projects). PG&E proposes to implement the Aquatic Monitoring Plan filed with the Commission in August 2012. The August 2012 Aquatic Monitoring Plan provides a focused monitoring program for foothill yellow-legged frog in project-affected reaches with documented populations of the species that could be influenced by flow modifications proposed for the new license. Given the strong relationship of flow and water temperature in some of these reaches and the concern for balancing habitat conditions for resident rainbow trout and foothill yellow-legged frog, continuous water temperature monitoring proposed in selected reaches should provide valuable information, in conjunction with biota surveys, to assess potential project flow-related effects.

Project flows are not likely to affect western pond turtle populations given their dependence on terrestrial habitat for the success of critical life stages. Although the western pond turtle may occur in some project-affected reaches, it is an amphibious species that spends a large part of the year and critical life stages, including nesting (i.e., egg laying), in terrestrial habitat that would be unaffected by

streamflow changes. Terrestrial-dependent nest success and hatchling survivorship are believed to be the critical life stages for western pond turtle population growth and success. Moreover, practical methods to monitor the western pond turtle hatchling/juvenile stage have not been developed by researchers, except in unusual circumstances where nesting areas are known.

Forest Service condition 51 and BLM condition 22 specify incidental observation monitoring at the proposed Drum-Spaulding Project for western pond turtle. Incidental monitoring of western pond turtle, as specified in Forest Service condition 51 and agreed to by PG&E would be adequate for documenting locations of occurrence; if incidental observations indicate the need for focused surveys of site-specific conditions, studies could be developed through the annual consultation process and the license can be reopened if necessary. Similar incidental monitoring for western pond turtle at the proposed Lower Drum and Deer Creek Projects would benefit the species by tracking its status at those projects as well.

Reservoir elevations would only be slightly affected under the proposed project; thus, no additional effects to amphibians or reptiles using the reservoirs are expected.

Bullfrogs are non-native species that prey on yellow-legged frogs and other native frog species. Eradication of predators can be an effective means of conserving special-status frog species. However, bullfrogs were introduced into California more than 100 years ago and are well established in lowland and foothills throughout California. They utilize stock and irrigation ponds, irrigation ditches, low gradients streams, impoundments, and other warmwater habitat; many of these habitats are situated on private property, which is outside the jurisdiction of the Commission. Although bullfrog eradication could be successful in small ponds that can be drained, more widescale efforts have not been widely implemented. Additionally, bullfrogs are capable of dispersing long distances over land and within stream systems. Thus, the recommendation for the development of a bullfrog eradication plan that addresses the project is impractical.

Road maintenance activities such as grading have the potential to affect the coast horned lizard; however, there is no information indicating that project facilities currently adversely affect coast horned lizard. Because PG&E proposes no changes to the project that would reasonably be anticipated to affect coast horned lizard, the proposed project is not expected to have an effect on coast horned lizard.

Project operations may result in decreased reservoir levels earlier in the year, which could have a potentially negative effect on breeding habitat for the Sierran treefrog.

*Birds*

Normal project O&M activities and increased recreational use could potentially disturb special-status bird species, such as the bald and golden eagle, northern goshawk, California spotted owl, and Barrow's goldeneye. Avian impacts associated with project transmission lines can occur through electrocution or injury from collisions.

Forest Service condition 43 and BLM condition 16 specify that PG&E implement its July 2013 Bald Eagle Management Plan that was filed with the Commission in November, 2013. The purpose of the plan is to provide guidance for the protection of bald eagles nesting within the project boundary that may be affected by the project. The plan is designed to help ensure that project O&M activities, as well as project-related recreation activities, do not disturb nesting birds by implementing mitigation measures such as limited operating periods that are consistent with federal and state guidelines.

PG&E's July 2103 Bald Eagle Management Plan establishes protection guidelines for the species at the Drum-Spaulding Project that would be applicable to the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. Under the plan provisions, PG&E would survey all lands within 1 mile of selected areas of the projects beginning of the first full calendar year after license issuance for bald eagle nests and every 5 years thereafter. The surveys would determine and confirm occupancy of territories, presence of eggs or nestlings, and determine nest success. Nest buffers of a 1,000-foot radius would be established around documented nests, and limits of operating periods would be established for project-related activities within the buffer areas. Non-routine O&M activities such as weed abatement, road maintenance, and construction would not occur within the buffer while the limited operation period is in effect. PG&E would consult annually with appropriate agencies to review results of nesting surveys and make agencies aware of planned activities that may disturb nesting bald eagles. The July 2013 Bald Eagle Management Plan is consistent with current National Bald Eagle Management Guidelines.

California Fish and Wildlife submitted a 10(j) recommendation identical to Forest Service condition 43 regarding a Bald Eagle Management Plan.

Forest Service condition 51 specifies a monitoring program for sensitive raptors in the vicinity of the South Yuba canal (Upper Drum-Spaulding and Deer Creek Projects). Under this specified monitoring, PG&E would record an activities associated with planned outages of the South Yuba canal that may generate noise disturbance between February 15 and September 15, within 0.25 mile of California spotted owl and northern goshawk.

Consistent with this condition, PG&E's March 2013 Integrated Vegetation Management Plan contains provisions for the protection of special-status wildlife on federal lands and establishes limit of operation periods for the bald eagle (January 1 to August 31), as well as the California spotted owl (March 1 to August 15), northern goshawk (February 15 to September 15), and great gray owl (March 1 to August 15) to avoid sensitive breeding periods.

Forest Service conditions 46 and 47 and BLM condition 15 address raptor collisions with power lines. Condition 47 specifies that PG&E record annually all incidental observations of bird collisions and electrocutions along project power lines, including the Bowman-Spaulding transmission line. Observations would include date and location, species and number of birds, bird condition (i.e., dead or injured), band number, if available, and suspected cause of death. Condition 46 specifies APLIC's "Suggested Practices for Avian Protection on Power Lines--The State of the Art in 2006," or the most current edition of this document, be used as a guideline for all new powerlines or when replacement of existing poles, phase conductors, and associated equipment is required. Condition 46 also specifies that if raptor collision monitoring conducted in accordance with condition 47 indicates a substantial issue with raptor-project transmission line interactions, the poles where the interaction issue occurs would be replaced or retrofitted, as agreed with the Forest Service, FWS, and California Fish and Wildlife. PG&E has indicated its concurrence with these conditions in its letter dated December 20, 2013.

California Fish and Wildlife's 10(j) recommendations 7.10 and 7.11 are similar and recommends the recording of incidental observations and use of the APLIC's suggested practices for new poles or when retrofitting existing poles. It also recommends that PG&E conduct an evaluation of project power poles within 1 year of license issuance and replace or retrofit any poles that are inconsistent with APLIC's suggested practices.

Our Analysis

Occasional visiting golden eagles may be disturbed by recreation activities; vegetation clearing during maintenance of fire breaks along roadsides, canals, transmission lines, and recreation facilities; or routine, intermittent facilities maintenance. These activities may lead to flushing of perched birds.

However, given the infrequency of golden eagle visits to the project area, the localized nature of potential disturbances, and the intermittent duration of these activities, the project would have a minor effect on golden eagles.

Barrow's goldeneye is highly unlikely to overlap with project O&M activities due to their infrequent presence in the project area. PG&E is unaware of any information indicating that project facilities adversely affect Barrow's goldeneye.

Northern goshawk and California spotted owl are known to be sensitive to disturbances while nesting. Disturbances while nesting may result in nest abandonment, which could lead to nest failure. project activities in the vicinity of the protected activity centers and their associated nests that may disturb nesting birds include vegetation management activities such as removal of hazard trees; non-native invasive plant control, defensible space maintenance, and clearing of transmission line rights-of-way; recreation activities such as OHV use, camping, and hiking; and facility maintenance activities such as inspections, road grading, annual repairs, and emergency repairs. Most of these activities are ongoing, routine, and limited in duration and area, and it is probable that the northern goshawk and California spotted owl have become acclimated to these activities. Removal of hazard trees, emergency repairs and some recreation activities are neither ongoing nor routine and may occur in protected activity centers. These activities are most likely to affect breeding activities if they occur during the breeding period. Limiting vegetation management activities during sensitive periods for these species would minimize potential disturbance.

The projects would result in an increase in recreationists and their activities that have the potential to disturb nesting bald eagles. The degree to which bald eagles may be disturbed is dependent on the type and location of activities relative to active nests. Activities such as camping and swimming are least likely to disturb nesting bald eagles because they are generally restricted to specific areas and result in a minimal increase in noise. Activities involving the use of motorized transportation such as boats and OHVs are most likely to disturb nesting bald eagles. Use of motorized boats results in increased noise and allows access to nearly all of a water body. Although OHV use is restricted to land, it may allow recreationists to access areas near nesting trees. Other activities such as hiking/walking and non-motorized flat-water boating are relatively noninvasive with respect to an increase in noise, but they also lead to an increase in human presence in and around project reservoirs where bald eagles may nest. The projects would not include any construction activities, timber harvest, or blasting and other loud intermittent noises. The projects and the associated increase in recreation use would have a minor effect on bald eagles.

Implementation of PG&E's July 2013 Bald Eagle Management Plan, including surveys and the establishment of nest buffers and limited operating periods, would identify and protect active eagle nests from disturbance and is sufficient for the protection of nesting bald eagles within the project boundary. Monitoring bald eagle nests would be useful in detecting changes in use and determining the need for protective measures. Monitoring would be increasingly important as bald eagle populations in California continue to grow and expand their range.

No raptor collisions or electrocutions have been reported at any of the Upper Drum-Spaulding, Lower Drum, or Deer Creek Project switchyards or transmission lines (PG&E, 2011a). Implementation by PG&E of a system-wide avian protection program such as that specified by Forest Service conditions 45 and 46 would help reduce the potential for detrimental effects of avian interaction with power lines. Recording incidental observations of bird collisions and electrocutions at the Bowman-Spaulding transmission line (Yuba-Bear Project, Bowman Development) and the use of APLIC's "Suggested Practices for Avian Protection on Power Lines" as guidelines for the design of new or retrofitted poles or lines would reduce impacts to avian resources that habitually use powerlines and

other energized equipment within the project boundary. Because there would be a period of time before all power line facilities are retrofitted in accordance with APLIC guidelines, there bird collisions and electrocutions may still occur. Similar measures implemented at the Lower Drum and Deer Creek Projects would benefit raptors and other birds at that project as well.

California Department of Fish and Wildlife recommends that PG&E conduct an evaluation of project transmission lines and replace or retrofit all power poles consistent with APLIC guidelines, regardless of whether any mortalities have been associated with those poles. Transmission lines less than 69 kV can be an electrocution hazard for eagles, hawks, and other birds large enough to simultaneously touch two energized wires or other hardware. Although this measure would eliminate any potential electrocution hazards, there is no evidence that the current design has resulted in any injury or mortality to large birds. Raptor monitoring and recording of incidental observations of bird collisions/electrocutions would allow PG&E to determine whether project power poles and other structures are negatively affecting avian resources and to take appropriate measures to correct any problem power poles.

*Mammals (Carnivores)*

Forest carnivores, such as the American marten, Pacific fisher, and Sierra red fox could occur in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project areas. Proposed mitigation measures for project-related effects on mammals are presented below under *Wildlife Movement and Mortality*.

FWS filed a 10(a) recommendation recommending that PG&E develop a Pacific fisher management plan to protect this species within carnivore management areas, and that PG&E prevent the use of second-generation anticoagulants within the project area.

In regard to anticoagulants, PG&E states in its correspondence with FWS that it adheres to federal, state, and local laws pertaining to the use of rodenticides.

Our Analysis

American marten, Pacific fisher, and Sierra Nevada red fox can be affected by the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects, including O&M activities such as hazard tree removal or brush pile removal during maintenance of fire breaks along roadsides, canals, transmission lines, and recreation facilities. Recreation activities restricted to campgrounds and reservoirs, such as swimming and boating, are unlikely to have an effect on these species because the activities are restricted in area and period of use and are likely avoided by forest carnivores. However, dispersed recreation activities such as camping, hiking, and OHV use may overlap with suitable habitat, and may result in disturbances to breeding activities.

Although Pacific fisher designated carnivore management areas overlap with portions of the Upper Drum-Spaulding, Deer Creek, and Yuba-Bear Project areas, the existing populations of Pacific fisher do not overlap with any of the project boundaries. The development of a Pacific fisher management plan, as recommended by FWS, would add limited protection to this species due to its lack of use of the available habitat within the project boundary.

PG&E is bound by federal, state, and local laws pertaining to the use of rodenticides as part of O&M activities. These products, if legally registered for use within the State of California and used as directed on the product labels, are suitable for use. Use of anti-coagulants on federal lands would require approval from the Forest Service or BLM.

*Special-status Bats*

Special-status bat species could potentially use project structures and facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects for day or night roosts as well as maternity sites during the breeding season. Individuals could be harmed if directly disturbed or excluded from the structures.

Forest Service condition 48 specifies that PG&E document all known bat roosts within project buildings, dams, or other structures that may be used as roosting structures within 1 year of license issuance and present results during the annual consultation meeting. PG&E concurs with this condition and would, where feasible, place humane exclusion devices to prevent occupation by bats. Devices would be placed when bats are absent from the facility or structure between November 1 and February 28. If overwintering bats are present in the facility, installation of exclusion devices would be delayed. Exclusion devices would be inspected annually, and facilities would be reevaluated for roosting bats every 3 years.

California Fish and Wildlife submitted a 10(j) recommendation similar to Forest Service condition 48 regarding management of bats in the Drum-Spaulding Project area.

Our Analysis

Eight facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects (Spaulding No. 1 Powerhouse, Deer Creek Powerhouse, Alta Powerhouse Intake Structure, Alta Powerhouse, Drum Powerhouse Butterfly Valve House, Drum No. 1 and 2 Powerhouse, Drum Forebay Intake Structure and Halsey Powerhouse storage shed) were found to have signs of bat use; however, there was no evidence of day roosts in any of these facilities. Project O&M activities at these facilities, which occur during daylight hours, would not affect night-roosting bats. PG&E is unaware of any information indicating that project facilities adversely affect bats. There are no proposed changes to the project that would reasonably affect bats; thus, the proposed project would have a minor effect, if any, on bats.

Forest Service condition 48 would be protective of bat species found within the project area. Surveys of all known roosting structures would be conducted and the results presented at the annual consultation meeting. If bat use were determined to occur, humane exclusion devices would be installed at the correct time of year to prevent re-occupation by bats of project facilities, minimizing potential effects to special-status bat species. Development of a Bat Management Plan for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects that incorporates the proposed provisions would ensure bats are protected at these projects.

**Wildlife Movement and Mortality**

Project conduits and facilities such as open canals, elevated flumes, non-elevated or bench flumes, siphons, tunnels, and penstocks can present barriers to wildlife movement and have the potential to result in entrapment or mortality of wildlife.

Several 4(e) conditions submitted by the Forest Service and BLM address potential project impacts on wildlife. To address the issue of wildlife loss in project canals, Forest Service condition 39 and BLM condition 12 specify measures to monitor and record animal losses in project canals. Forest Service condition 40 and BLM condition 11 specify that PG&E consult with California Fish and Wildlife and the Forest Service when replacing wildlife escape and wildlife crossing facilities. Forest Service conditions 41 and 42 and BLM condition 10 specify wildlife crossing provisions for the Drum canal (Upper Drum-Spaulding Project), South Yuba canal (Deer

Creek Project), Chalk Bluff canal (Deer Creek Project), Bear River canal (Lower Drum Project), and South canal (Lower Drum Project). PG&E concurs with these specifications.

Forest Service condition 39 and BLM condition 12 specify monitoring animal losses in project canals at the Drum-Spaulding Project. Under this condition PG&E would record animal losses in project canals including the following details: (1) location of the dead animal; (2) species; (3) date and time of observation; (4) suspected cause of death; (5) photograph; (6) estimated size; (7) estimated age; and (8) sex, if known. PG&E would also consult with California Fish and Wildlife, the Forest Service, and BLM regarding the protection and utilization of wildlife resources affected by the project. PG&E would consult with the California Fish and Wildlife prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings along project canals. PG&E would assess wildlife escape facilities annually to ensure they are functional and in proper working order. The condition also specifies that PG&E prepare an annual report including recommendations to address animal mortalities and a schedule for implementation of these recommendations. The report would be provided to the Forest Service, BLM, and California Fish and Wildlife, and would be filed with the Commission, including evidence of consultation.

Forest Service condition 40 and BLM condition 11 specify that PG&E consult with California Fish and Wildlife and the Forest Service when replacing wildlife escape and wildlife crossing facilities. California Fish and Wildlife submitted 10(j) recommendations similar to Forest Service condition 40 regarding the monitoring of animal losses in project canals and consultation with California Fish and Wildlife when replacing wildlife escape and crossing facilities.

Forest Service conditions 41 and 42, submitted as separate conditions, specify wildlife crossings conditions in the Drum and South Yuba canals and in the Bear and South canals, respectively. Condition 41 specifies that within 5 years of license issuance PG&E retrofit existing foot bridges or construct new wildlife crossings at specified locations on the Drum canal (Upper Drum-Spaulding Project) and South Yuba canal (Deer Creek Project). Condition 41 also specifies dimensions and materials to be used for the crossing structures. Condition 41 also specifies monitoring and reporting that PG&E should conduct in support of the wildlife crossing work.

Forest Service condition 42 specifies that PG&E submit a wildlife crossing plan, within 1 year of license issuance, for the Bear River and South canals (Lower Drum Project). This condition also contains information regarding the segments of conduits for the location and dimension for crossing structures. Unless otherwise specified by the agencies, new overcrossings, undercrossings and retrofits would meet the minimum specifications outlined in the condition. Crossing structures would be placed approximately every 1 mile in combination with natural landscape crossings. The wildlife crossing plan would also include an implementation plan and schedule, and include annual monitoring and reporting of crossing structures. Implementation would begin 2 years from license issuance, and completion would occur within 5 years. BLM condition 10 specifies similar wildlife crossing conditions at the Drum and South Yuba canals (Upper Drum-Spaulding Project). In addition, condition 10 specifies that PG&E develop a wildlife crossing plan for the Bear River and South canals (proposed Lower Drum Project).[19]

[19] To the degree that Forest Service condition 42 and BLM condition 10 apply to non-federal lands outside the Upper Drum-Spaulding Project, they are considered under section 10(a) of the FPA.

California Fish and Wildlife submitted a 10(j) recommendation similar to Forest Service conditions 41 and 42 regarding wildlife crossings in Drum, South Yuba, Towle, Bear, and South canals.

*Our Analysis*

Project conduits (open canals, elevated flumes, non-elevated or bench flumes, siphons, tunnels, and penstocks) and other project facilities can present barriers for wildlife present in the project boundaries. These barriers can disrupt the natural movement of wildlife species and lead to species entrapment and mortality. Animals attempting to cross open diversion canals can drown because they can enter the canal but have difficulty escaping due to the smooth sides of the canal. Canals also provide a source of water for wildlife. None of the Upper Drum-Spaulding, Lower Drum, or Deer Creek Project conduits bisect summer, critical summer, winter, and critical winter mule deer habitat, but rather parallel the ridges likely used as migration routes between the habitat types (PG&E and NID, 2011h).

Wildlife passage points were found to be common throughout the Drum-Spaulding Project, with penstocks and tunnels having the greatest opportunity for passage by the five target species. Generally, penstocks and tunnels are either completely buried or have passage opportunities at intervals less than 0.5 mile apart throughout their entire length. However, some conduits at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects contain segments that do not provide passage at least every 0.5 mile: Drum canal, Chalk Bluff/South Yuba canal, Bear River canal, Upper Wise canal, Lower Wise canal, and South canal. The greatest distance between passage opportunities at the projects occurs on the Bear River canal, where distances between crossing points are up to 1.62 miles.

Most project conduits have few wildlife entrapment points, and all consist of grizzlies (i.e., trashracks) installed at pipe, siphon, or tunnel intake locations. The Drum-Spaulding Project has 17 identified entrapment points, including: vehicle ramps; low-angle banks—natural or gunite; and low-angle banks—gunite with benches. At the Drum-Spaulding Project, 77 wildlife mortalities were reported in 2009. Mortalities included 40 mule deer and 1 black bear; 36 mortalities were species not targeted by the study. Of the mule deer mortalities, 29 were associated with the Bear River canal (Lower Drum Project), 8 with the South canal (Lower Drum Project), 2 with the Chalk Bluff canal (Deer Creek Project), and 1 each with Upper Wise canal (Lower Drum Project) and Drum canal (Upper Drum-Spaulding) (PG&E and NID, 2011h).

**Drum, South Yuba, and Towle Canals**

At the Upper Drum-Spaulding Project, the Drum canal includes segments of excavated canal, pipe, flume, and tunnel. Passage points are common along the canal and include elevated flumes, open- and closed-grate footbridges, and wooden, dirt, and paved road crossings. In some cases, wooden planks have been placed on open-grate footbridges to increase potential for deer passage. Four sections of the canal have more than 1 mile between crossings, with the largest distance between crossings being 1.47 miles. The Drum canal experienced one wildlife mortality in 2009.

The 14.92-mile-long South Yuba canal contains several passage points including elevated flumes, paved roads, and closed-grate footbridges. In certain segments of the South Yuba canal, project facilities, such as bench flumes and pipes, present barriers to wildlife due to their height or limited clearance. No mortality was reported in 2009.

The 3.9-mile-long Towle canal conduit includes a tunnel, several excavated canal segments, five flume segments, and a pipe segment. Passage crossings are common throughout the canal and consist of flume, closed-grate footbridge, and dirt road crossings. Several segments of the canal are characterized

by low banks, shallow water depths, low-velocity water, and narrow width, allowing wildlife to cross the canal. No mortalities were reported at the Towle canal.

The wildlife crossing plan for the Drum and South Yuba canals specified in Forest Service condition 41 and BLM condition 10, and proposed by PG&E, would result in crossings at least every 1 mile and crossings would meet the following specifications for overcrossings: minimum dimensions of 8-foot width, 4-foot-high side railings, access ramps less than 40 percent grade, and minimum dimensions of 10 feet high by 10 feet wide with natural substrate for undercrossings.

The Forest Service condition 41 and BLM condition 10 also provide specific locations for new or retrofitted wildlife structures on the Drum and South Yuba canals, and indicates whether the structure would be a new wildlife crossing or retrofitting an existing structure. There is limited information on the appropriate minimum specifications for wildlife crossings. PG&E, the Forest Service, and BLM base the distance between crossings on a study by Bissonette and Adair (2008). Bissonette and Adair (2008) found that placing wildlife crossings at a distance of 1 mile or less provides for daily movement across roads for most terrestrial animals (including the target species, deer, bear, and mountain lion) found in North America. The Forest Service, BLM, and California Fish and Wildlife based their specifications for crossing dimensions on the Clevenger and Huijser (2011) study of wildlife crossings at two- and four-lane highways, and on Reclamation's 1972 technical report entitled "Reducing Hazards to People and Animals on Reclamation Canals." This report indicates that crossing structures measuring 8 feet wide or more are efficient for deer on the Colorado-Big Thompson and Rouge River Projects. Other studies have shown the adequacy of deer bridges less than 8 feet wide (Gubser, 1960; Fry, 1983). Therefore, it is likely that 8-foot-wide crossing would provide adequate passage for target wildlife species.

Since there have been no mortalities in Towle canal and numerous passage points, building or retrofitting wildlife crossings structures in the Towle canal would not provide additional protection to target wildlife species.

**Bear River, South, and Chalk Bluff Canals**

At the Lower Drum Project, the Bear River canal has 28 passage points in a distance of 22 miles; 4 sections have more than 1 mile between crossings, with the longest gap between crossings of 1.62 miles. Passage points consist of paved and dirt road crossings, open- and closed-grate footbridges, and wooden bridges. However, not all of the passage points found within the Bear River canal are suitable for terrestrial mammals, specifically metal grate footbridges. As stated above, the Bear River canal experienced 29 mule deer mortalities in 2009, which is about 71 percent of target species mortalities associated with the project.

The 5.4-mile-long South canal (Lower Drum Project) includes several excavated canal segments, two tunnels, and nine flume segments. Passage points are common along the canal, most crossings are less than 0.5 mile apart; the largest distance between crossings is 0.78 mile. Passage points consist of paved road crossings, wooden bridges, and passage over penstocks. The South canal experienced the mortality of eight mule deer in 2009.

The wildlife crossing plan specified by BLM condition 10 for the Bear River canal and Forest Service condition 42 for the Bear River and South canals would provide 8-foot-wide crossings with 8-foot-high railings every 1 mile, and would adequately protect wildlife.

At the proposed Deer Creek Project, the 3.21-mile-long Chalk Bluff canal contains 12 existing crossings including wooden footbridges and Lennon flumes. Additionally, most of the Chalk Bluff canal is characterized by shallow water depth, narrow width, and slow to moderate velocity, allowing wildlife to cross across most of the canal. The Chalk Bluff canal experienced two wildlife mortalities in 2009.

BLM condition 10 provides no specific provisions for developing a wildlife crossing plan for the Chalk Bluff Canal.

**Consultation Prior to Replacing Wildlife Crossings**

PG&E's proposed measure to consult with California Fish and Wildlife and appropriate agencies prior to replacing wildlife crossings is identical to Forest Service condition 40 and BLM condition 11. This measure would be appropriate to apply to the Drum-Spaulding, Lower Drum and Deer Creek Projects and would protect wildlife movement because it would allow appropriate coordination between PG&E and agencies, and it ensures that if wildlife escape and crossing facilities become degraded and need replacement during the term of a new license, up-to-date standards would be applied to ensure the continued protection of target wildlife species.

**Monitoring Animal Mortalities**

Forest Service condition 39 specifies that PG&E monitor animal mortalities in project canals and record any pertinent information. The condition also specifies that PG&E prepare, and submit to appropriate agencies, a report including recommendations for measures to address animal mortalities in project canals and a schedule of implementation. PG&E would file this report with the Commission, and implement resource management measures required by the Commission. Monitoring would detect any changes and trends in wildlife mortality and identify the need for additional protective measures. Implementation of Forest Service condition at the Drum-Spaulding, Lower Drum, and Deer Creek Projects would protect wildlife movement activities within the project boundary because it would ensure that PG&E monitors and record animal mortalities, and if needed, develop appropriate recommendations to reduce wildlife mortalities in a timely manner. PG&E proposes to monitor animal mortalities consistent with the Forest Service condition.

**Yuba-Bear Project**

**Wildlife (General)**

Terrestrial wildlife species within the project boundary have become accustomed to the O&M activities associated with the Yuba-Bear Project. Mobile wildlife species intolerant of disturbance would be expected to flee during periods of project O&M and return when the activities have ceased. In general, the effects of NID's O&M activities would generally be temporary and not severe enough to negatively affect the survival of a species or population.

Activities associated with the construction and future O&M for the proposed Rollins no. 2 powerhouse are unlikely to affect most terrestrial wildlife species, because the powerhouse would be located immediately adjacent to an existing powerhouse. Construction would not require the removal of vegetation important to nesting activities for neotropical birds or other avian species, and Rollins dam would provide a physical buffer between the proposed powerhouse and the surface of Rollins Reservoir, an area that supports migratory waterfowl and shore birds.

Project effects on wildlife, agency conditions related to wildlife, and NID's proposed wildlife measures are discussed below for various wildlife resources.

**Special-status Wildlife Species**

*General*

The Yuba-Bear Project could affect special-status wildlife species as a result of project O&M activities and recreational use. NID proposes several measures for the protection of special-status wildlife species. NID's proposed March 2013 Integrated Vegetation Management Plan includes provisions for the protection of special-status wildlife species. Specifically, through the Integrated Vegetation Management Plan, NID proposes to apply certain limited operating periods for activities that involve the use of heavy equipment, loud noises, or habitat alteration, as appropriate, to protect special-status wildlife. The proposed limited operating periods include specific provisions for the protection of California spotted owl, northern goshawk, and great grey owl. The Integrated Vegetation Management Plan also contains specific provisions for the limitation of pesticide use in the vicinity of known locations of California red-legged frog, Sierra Nevada yellow-legged frog, or foothill yellow-legged frog.

In addition to the specified limited operating periods for the protection of special-status wildlife, the Integrated Vegetation Management Plan also contains provisions for annual employee training, including training on the location and identification of special areas, including sensitive habitats such as riparian zones and wetlands, identification of known special-status species areas, and identification of sensitive wildlife areas and the need for limited operating periods in those areas.

Finally, NID's proposed Integrated Vegetation Management Plan includes provisions for an annual consultation meeting between NID and the agencies. The annual consultation meeting would be held each year by March 31, and would be used to review upcoming O&M activities planned by NID that involve disturbance within any known sensitive area on federal land, including the use of machine powered equipment, that could affect special-status wildlife resources. The Integrated Vegetation Management Plan also includes provisions for reporting and plan revisions. Although the reporting provisions of the proposed Integrated Vegetation Management Plan are aimed primarily at vegetation, such reporting could also be used to report any activities involving special-status wildlife species or their habitats, as well.

Forest Service condition 38 and BLM condition 17 specify implementation of the March 2013 Integrated Vegetation Management Plan.

Forest Service condition 44 and BLM condition 20, specify NID to review annually the current lists of special-status species that might occur in the project area and that may be affected by project O&M activities. The conditions include provisions for consultation and procedures if a special-status species is detected on project land and appropriate measures to follow.

Forest Service condition 43 and BLM condition 19 specify NID to submit a biological evaluation for approval prior to any construction projects on project lands that may affect special-status species or critical habitat. The biological evaluation includes provisions to evaluate the potential effects of a proposed action on special-status species or its habitat, and components to ensure protection of special-status species.

Our Analysis

Project activities that can potentially affect special-status wildlife species include: (1) vegetation management activities such as removal of hazard trees, non-native invasive plant control, defensible space maintenance, and clearing of transmission line rights-of-way; (2) recreation activities such as OHV use, camping, and hiking; and (3) facility maintenance activities such as inspections, road grading, annual

repairs, and emergency repairs. Due to the abundance and widespread occupancy of the project area, there is no evidence to suggest that project activities adversely affect special-status wildlife species.

NID's proposal to implement the March 2013 Integrated Vegetation Management Plan which includes provisions to annually consult with appropriate federal agencies, annually train staff regarding the location of special-status species occurrences, and use of limited operating periods in sensitive areas would provide protection to special-status species within the project boundary. In addition, annual review of special-status species as outlined in the proposed Integrated Vegetation Management Plan is consistent with specified in Forest Service conditions 38 and 44 and BLM conditions 17 and 20 and would provide a mechanism for the evaluation of effects of project operation and maintenance on newly listed species and development of appropriate protection and mitigation measures.

Before construction of any project features not addressed in this EIS, NID would first need to file a license amendment with the Commission. At that time, a biological evaluation for the protection of special-status species would be developed if appropriate as part of the license amendment proceeding.

*Amphibians and Reptiles*

Project O&M could potentially affect the foothill yellow-legged frog, coast horned lizard, and western pond turtle.

A breeding population of foothill yellow-legged frog was identified in Steephollow Creek during relicensing studies. Forest Service condition 51 and BLM condition 22 specify that a monitoring program be developed and reports of monitoring efforts be filed with the Commission annually. The condition specifies monitoring for the foothill yellow-legged frog and western pond turtle and includes provisions regarding: (1) reaches to monitor; (2) number of sites and frequency of monitoring; (3) distribution and population metrics; (4) habitat and environmental conditions to monitor; and (5) reporting of the monitoring program.

California Fish and Wildlife submitted a 10(j) recommendation similar to the Forest Service condition, suggesting the development of a monitoring plan for aquatic species.

NID proposes to implement the Aquatic Monitoring Plan filed with the Commission in August 2012. Under the August 2012 Aquatic Monitoring Plan, NID would monitor foothill yellow-legged frog in stream reaches where there are known breeding populations of foothill yellow-legged frog, and would include sites where data are needed to assess response to flow-related changes in conditions during the new license. Where possible, NID would sample at the same locations as relicensing surveys to allow for comparison to conditions under the existing license (PG&E and NID 2010a, 2011g). The reaches to be monitored by NID are specified in NID's proposed plan and include Middle Yuba River – Milton diversion dam reach; Canyon Creek – Bowman-Spaulding diversion dam reach; Bear River – Dutch Flat afterbay dam reach; and Bear River – Bear River canal diversion dam reach. Monitoring would be done following methods outlined in the proposed plan and would performed over the term of a new license in accordance with a detailed, site specific, schedule outlined in the monitoring plan. NID's proposed foothill yellow-legged frog also includes provisions for analyzing the relationship between streamflow and foothill yellow-legged frog survey results at the three monitoring locations. Finally, the August 2012 Aquatic Monitoring Plan also contains provisions for data analysis and reporting, including analysis of high flow fluctuations in the stream reaches of interest.

NID is also proposing to implement its proposed March 2013 Integrated Vegetation Management Plan. With respect to foothill yellow-legged frog, in accordance with the proposed Integrated Vegetation Management Plan, any pesticide application that is deemed necessary on federal land within 500 feet of

known populations of California red-legged frog, Sierra Nevada yellow-legged frog, or foothill yellow-legged frog would be designed to avoid adverse effects to individuals and their habitats.

Forest Service condition 51 and BLM condition 22 also includes provisions for monitoring western pond turtle. NID proposes to implement the Aquatic Monitoring Plan filed with the Commission in August 2012. The August 2012 Aquatic Monitoring Plan indicates that field crews trained in the identification of western pond turtles would record incidental observations of the species during the performance of the fish and frog monitoring.

The Foothill Water Network submitted comments supporting a monitoring approach similar to that specified by the Forest Service.

FWS filed a 10(a) recommendation that NID develop a bullfrog eradication plan for all project lakes, reservoirs, and impoundment areas.

Our Analysis

Proposed changes in minimum streamflows and associated changes in water temperature and spill cessation measures have the potential to affect aquatic habitat of these species. Overall it is expected that these measures would improve habitat and provide greater protection for these species; however, while proposed spill cessation measures would reduce stranding and enhance survival of early life stages of foothill yellow-legged frog, concern has been expressed that cooler water temperatures maintained by higher flows could adversely affect foothill yellow-legged frog in some reaches.

Detections of foothill yellow-legged frog, varying from low to high numbers, were reported at the Milton diversion dam, Bowman dam, Dutch Flat afterbay, and Rollins dam; however, at these sites, the proposed minimum streamflow schedule would provide substantial suitable habitat and would not adversely affect foothill yellow-legged frog (section 3.3.2.2.2, *Aquatic Resources, Instream Flows*). No specific minimum streamflow has been proposed for the Bear River below Chicago Park powerhouse; flow in this reach is affected by the specified minimum flow at the upstream Dutch Flat afterbay dam and accretion over the interim reach to the Chicago Park powerhouse. Incidental observations of foothill yellow-legged frog have been reported downstream of the Chicago Park powerhouse, one of which indicated limited breeding. Suitable habitat is situated almost entirely within a relict channel, not in the main channel; thus, no effects are expected from the proposed project.

The Chicago Park powerhouse reach is within the expected foothill yellow-legged frog population range and adjacent to robust foothill yellow-legged frog populations (i.e., upstream Dutch Flat afterbay reach and tributary Steephollow Creek); however, no suitable foothill yellow-legged frog habitat was located within the reach, and a flow-habitat analysis was not developed. In the Chicago Park powerhouse reach of the Bear River, foothill yellow-legged frog breeding is largely limited to a backwater area unaffected by high flows.

Texas Creek diversion dam reach, Fall Creek diversion dam reach, Trap Creek below the Bowman-Spaulding conduit reach, and Rucker Creek before Bowman-Spaulding conduit reach were all partially within the foothill yellow-legged frog elevation range; however, the reaches are unlikely to support foothill yellow-legged frog populations, and flow-habitat analyses were not developed for these reaches.

Foothill yellow-legged frogs were detected in the Bowman-Spaulding diversion dam reach. Percent WUA under existing conditions for foothill yellow-legged frog eggs was above 80 percent for extreme critically dry water years, critically dry water years, dry water years, below normal water

years, and above normal water years, but below 80 percent for wet water years. Percent WUA for foothill yellow-legged frog tadpoles was above 80 percent for all water years except for above normal water years and wet water years.

Possible ramping effects on foothill yellow-legged frog, including stranded or trapped tadpoles in isolated pools, could occur on the stream reaches where this species breeds (Middle Yuba River downstream of Milton diversion dam; Canyon Creek downstream of Bowman dam; and Bear River downstream of Dutch Flat afterbay dam, Chicago Park powerhouse, and Rollins dam). On the Middle Yuba River below Milton diversion dam, spills are closely associated with precipitation events and snowmelt. In this reach, foothill yellow-legged frogs were detected in high numbers. Percent WUA under existing conditions for foothill yellow-legged frog eggs and tadpoles was above 80 percent for all water years.

Spills generally do not occur on the Bear River below Dutch Flat afterbay dam as spill flows at this location are diverted via the Chicago Park flume to the Chicago Park forebay. Foothill yellow-legged frogs were found in moderate to high numbers for all life stages in the Dutch Flat afterbay dam reach. Percent WUA under existing conditions for foothill yellow-legged frog eggs was above 80 percent for extremely critically dry and critically dry water years, but below 80 percent for dry, below normal, above normal, and wet water years. Percent WUA for foothill yellow-legged frog tadpoles was above 80 percent for all water years.

Flow levels typically found in the Bear River canal diversion dam reach of the Bear River below Rollins dam during the foothill yellow-legged frog breeding and rearing period are higher than would be found in the unimpaired condition, which limits suitable, low-velocity edgewater habitat. In the Rollins dam and powerhouse reach, foothill yellow-legged frogs were detected in low numbers. Percent WUA for foothill yellow-legged frog eggs and tadpoles was above 80 percent for all water years, except for being 78 percent for frog eggs for wet water years.

Down-ramping is similar under both unimpaired and regulated flows and is not an issue. The proposed project includes a supplemental flow for whitewater boating in September in Canyon Creek below French dam. The reach is above the elevation range for foothill yellow-legged frog, and Sierra Nevada yellow-legged frog does not occur; thus, no adverse effects from pulse flows are expected.

The following reaches are above the foothill yellow-legged frog elevation range and are not expected to affect foothill yellow-legged frog populations: Jackson Meadows dam reach; Wilson Creek diversion dam reach; Jackson Lake dam reach; French Lake dam reach; Faucherie Lake dam reach; Sawmill Lake dam reach; and Clear Creek below Bowman-Spaulding conduit reach.

Implementation of NID's proposed foothill yellow-legged frog monitoring plan is generally consistent with the monitoring specified by the Forest Service and BLM, and would provide a focused monitoring program for foothill yellow-legged frog in project-affected reaches with documented populations of the species that could be influenced by flow modifications proposed for the new license. The October 2013 Foothill Yellow-legged Frog Monitoring Plan includes sufficient monitoring to be able to detect effects of project operation on the foothill yellow-legged frog. Specifically, NID would monitor for the foothill yellow-legged frog only in streams with previous evidence of breeding populations because the species appears to have a breeding range within the project boundary that is strongly influenced by elevation. Most of the aquatic habitat within the project boundary is above the known elevation limits of this species. Given the strong relationship of flow and water temperature in some of these reaches and the concern for balancing habitat conditions for resident rainbow trout and foothill yellow-legged frog, continuous water temperature monitoring proposed in selected reaches should

provide valuable information, in conjunction with biota surveys, to assess potential project flow-related effects.

PG&E and NID conducted a study to map potentially suitable western pond turtle aquatic habitat and nesting habitat, assembled information associated with incidental observations reported during relicensing studies from 2007 to 2009, and evaluated 41 sites, within both projects, on canals in areas below 6,000 feet of elevation associated with reservoirs, afterbays, forebays, canals, and stream reaches potentially affected by the projects. Project reservoirs, forebays, and afterbays lack suitable habitat to support western pond turtle populations, particularly adequate basking substrates and the vegetated, shallow water areas that are necessary for juvenile western pond turtle.

Minimum streamflows have been proposed for Jackson Meadows dam, Faucherie dam, Sawmill dam, Bowman dam, the Bowman-Spaulding diversion dam, and the Bear River below the Chicago Park powerhouse; however, there have been no detections of western pond turtle reported at these locations. No historical records or incidental observations of western pond turtle were recorded in these sites or their vicinity. Thus, no effects are expected to western pond turtle from the proposed project. Minimum streamflows have been proposed for the Milton diversion dam and the Rollins dam where western pond turtle have been reported; however, the proposed minimum streamflow schedule would not markedly change and would not adversely affect western pond turtle habitats—primarily pools and backwater areas—where the species occurs. In addition, the proposed project would not measurably affect water temperatures where western pond turtles occur.

Although the western pond turtle may occur in some project-affected reaches, a focused monitoring program is not likely to generate useful data to evaluate western pond turtle population response to flow-related changes. Project flows are not likely to affect western pond turtle populations given their dependence on terrestrial habitat for the success of critical life stages. The incidental observation monitoring for western pond turtle proposed by NID is generally consistent with that specified in Forest Service condition 51 and BLM condition 22, and would generate data useful for evaluating project effects or informing decisions for protection or enhancement of the species. Recording of incidental observations of western pond turtle during other monitoring surveys would be adequate for documenting locations of occurrence; if incidental observations indicate the need for focused surveys of site-specific conditions, studies could be developed through the annual consultation process and the license can be reopened if necessary.

The proposed project potential effects of ramping on western pond turtle may be largely associated with spills that increase flows; however, western pond turtle are motile and presumably move to areas of quieter water as they would in response to natural increases in flow and to deeper water in response to stage decline. Because they often over-winter in upland sites, some of these spills may have no effect on western pond turtle. The proposed ramping rates for the Middle Yuba River downstream of Milton diversion dam and on the Bear River downstream of Rollins reservoir are comparable to or smaller than natural stage variability. In the Dutch Flat afterbay reach of the Bear River, rapid stage changes may occur during canal outages and spills, although natural changes in flow are likely to be more substantial. No western pond turtle were documented in Canyon Creek where supplemental pulse flow is proposed; thus, no adverse effects associated with pulse flows are expected.

Bullfrogs are non-native species that prey on yellow-legged frogs. Eradication of predators can be an effective means of conserving special-status frog species. However, bullfrogs were introduced into California more than 100 years ago and are well established in lowland and foothills in California. They utilize stock and irrigation ponds, irrigation ditches, low gradients streams, impoundments, and other warm-water habitat; many of these habitats are situated on private property. Additionally, bullfrogs are

capable of dispersing long distances over land and within stream systems. Thus, the recommendation for the development of a bullfrog eradication plan that addresses the project is impracticable.

Road maintenance activities such as grading have the potential to affect the coast horned lizard; however, NID is unaware of any information indicating that project facilities adversely affect coast horned lizard. Since NID proposes no changes to the project that would reasonably affect coast horned lizard, the proposed project is not expected to have an effect on coast horned lizard.

Project operations may result in decreased reservoir levels earlier in the year, which could have a potentially negative effect on breeding habitat for the Sierran treefrog and Sierra Nevada yellow-legged frog. Project operation affecting reservoir levels could also have a negative effect on Sierra Nevada yellow-legged frog that commonly used marshy edges of reservoirs.

*Birds*

Normal project O&M activities and increased recreational use could potentially disturb special-status bird species, such as the bald and golden eagle, northern goshawk, California spotted owl, and peregrine falcon. Avian impacts associated with project transmission lines can occur through electrocution or injury from collision.

NID's proposed July 2013 Bald Eagle Management Plan (filed with the Commission in November 2013) establishes protection guidelines for the species at the Yuba-Bear Project. The purpose of the plan is to provide guidance for the protection of bald eagles nesting within the project boundary that may be affected by the project. The plan is designed to help ensure that project O&M activities, as well as project-related recreation activities, do not disturb nesting birds by implementing mitigation measures such as limited operating periods that are consistent with federal and state guidelines.

Under the plan provisions, NID would survey all lands within 1 mile of selected areas of the project beginning of the first full calendar year after license issuance for bald eagle nests and every 5 years thereafter. The surveys would determine and confirm occupancy of territories, presence of eggs or nestlings, and determine nest success. Nest buffers of a 1,000-foot radius would be established around documented nests, and limits of operating periods would be established for project-related activities within the buffer areas. Non-routine O&M activities such as weed abatement, road maintenance, and construction would not occur within the buffer while the limited operation period is in effect. NID would consult annually with appropriate agencies to review results of nesting surveys and make agencies aware of planned activities that may disturb nesting bald eagles. The July 2013 Bald Eagle Management Plan is consistent with current National Bald Eagle Management Guidelines.

In addition, NID's March 2013 Integrated Vegetation Management Plan contains provisions for the protection of special-status wildlife and establishes limit of operation periods for the bald eagle (January 1 to August 31), as well as the California spotted owl (March 1 to August 15), the northern goshawk (February 15 to September 15), and the great gray owl (March 1 to August 15) to avoid sensitive breeding periods.

Forest Service condition 42 and BLM condition 18 specify that NID implement the July 2013 Bald Eagle Management Plan.

California Fish and Wildlife submitted a 10(j) recommendation identical to the Forest Service condition regarding a bald eagle management plan.

Forest Service conditions 45 and 46 address raptor collisions with power lines. Condition 46 specifies that NID record annually all incidental observations of bird collisions and electrocutions along project power lines, including the Bowman-Spaulding transmission line. Observations would include date and location, species and number of birds, bird condition (i.e., dead or injured), band number, if available, and suspected cause of death. NID agrees with Forest Service condition 46. Condition 45 specifies APLIC's "Suggested Practices for Avian Protection on Power Lines be used as a guideline for all new powerlines or when replacement of existing poles, phase conductors and associated equipment is required. The State of the Art in 2006, or the most current edition of this document, for new power lines or when replacing existing structures such as poles, phase conductors, and associated equipment on project lands. Condition 45 also specifies that if raptor collision monitoring conducted in accordance with condition 46 indicates a substantial issue with raptor-project transmission line interactions, the poles where the interaction issue occurs would be replaced or retrofitted, as agreed with the Forest Service, FWS, and California Fish and Wildlife.

California Fish and Wildlife's 10(j) recommendation 7.8 is similar and recommends the recording of incidental observations and use of the APLIC's suggested practices for new poles or when retrofitting existing poles. It also recommends that NID conduct an evaluation of project power poles within 1 year of license issuance and replace or retrofit any poles that are inconsistent with APLIC's suggested practices.

Our Analysis

Project operation may have effects on special-status birds present within the project boundary. Although there are known willow flycatcher nesting habitats that intersect the Yuba-Bear Project boundary, the proposed project is not expected to have an effect on willow flycatcher. American peregrine falcons and golden eagles that are occasional visitors may be disturbed by recreation activities; vegetation clearing activities such as transmission line rights-of-way maintenance, fire clearance maintenance, and non-native invasive plant removal; and routine, intermittent facilities maintenance. These activities may lead to flushing of perched birds; however, given the infrequency of American peregrine falcon and golden eagle visits to the project area, the concentrated nature of potential disturbances, and the intermittent duration of activities, the proposed project would not have an adverse effect on American peregrine falcon and golden eagles.

The proposed project is expected to lead to an increase in recreationists and their activities, which has the potential to disturb foraging bald eagles. The degree to which bald eagles may be disturbed is dependent on the type and level of increase in activities and the tolerance of the birds to such activity. Activities such as camping and swimming are least likely to disturb foraging bald eagles, because they are generally restricted to specific areas and result in a minimal increase in noise. Activities that involve the use of motorized transportation, such as boating and OHVs, are most likely to disturb foraging bald eagles. Use of motorized boats results in increased noise and allows access to nearly all of a water body. Although OHV use is restricted, it may allow recreationists to access areas near foraging perches. Other activities, such as hiking, walking, and non-motorized flat-water boating, are relatively non-invasive with respect to an increase in noise, but they do allow for an increase in human presence in and around project reservoirs where bald eagles may forage; however, NID believes that the proposed project and the associated increase in recreation use would not have an adverse effect on bald eagles.

Project activities in the vicinity of northern goshawk and California spotted owl protected activity centers and their associated nests that may disturb nesting birds include vegetation management activities such as, removal of hazard trees, non-native invasive plants control, defensible space maintenance and clearing of transmission line right of way; recreation activities such as OHV use,

camping, and hiking; and facility maintenance activities such as, inspections, road grading and annual repairs and emergency repairs. In general, most of these activities are ongoing, routine and limited in duration and area, and it is probable that the northern goshawk and the California spotted owl have become acclimated to the activities. Removal of hazard trees, emergency repairs and some recreation activities are not ongoing or routine and may occur in protected activity centers. These activities are most likely to affect breeding birds if they occur during the breeding period.

Activities associated with annual routine maintenance at the proposed Rollins no. 2 powerhouse may result in an increase in human presence during maintenance activities. Annual routine maintenance would be coordinated along with maintenance of the existing powerhouse and would be limited in duration. Given the physical barrier provided by Rollins dam, routine, intermittent maintenance activities are unlikely to disturb bald eagles.

Construction associated with the proposed recreation facilities changes or additions would result in a temporary increase in noise, groundborne vibration, fugitive air emissions, and general human activity. Since no known bald eagles nests occur within 1 mile of the proposed changes or additions, these temporary effects are unlikely to disturb nesting bald eagles. Some of the proposed changes or additions do have the potential to disturb foraging bald eagles; however, the level of disturbance would be temporary and minor, since construction is proposed in areas where ongoing recreation activities already exist, and no known roosts or hunting perches have been reported.

Activities associated with the construction of the proposed parking areas at the Milton diversion dam impoundment and at Sawmill Lake may affect willow flycatcher and bald eagle. These species are sensitive to disturbance during the breeding season. Construction activities would require vegetation removal, grading, installation of campfire rings, and picnic tables, which would lead to an increase in noise and human activities during the construction phase. Construction of the proposed additional parking at Pass Creek boat launch and at Bowman Lake has the potential to affect California spotted owl and northern goshawk. These species are also sensitive to disturbances during their breeding season, and construction activities would require removal of vegetation, grading, laying of asphalt, haul trucks, and installation of campfire rings and picnic tables, which would result in an increase in noise and human presence during construction activities.

Implementation of NID's July 2013 Bald Eagle Management Plan, including surveys and the establishment of nest buffers and limited operating periods, would identify and protect active eagle nests from disturbance and is sufficient for the protection of nesting bald eagles within the project boundary. Monitoring bald eagle nests would be useful in detecting changes in use and determining the need for protective measures. Monitoring would be increasingly important as bald eagle populations in California continue to grow and expand their range.

No raptor collisions or electrocutions have been reported at the Yuba-Bear Project switchyards or transmission lines (NID, 2011a). Implementation by NID of a system-wide avian protection program such as that proposed by NID and specified by Forest Service conditions 45 and 46 would help reduce the potential for detrimental effects of avian interaction with power lines. The recording of incidental observations of bird collisions and electrocutions at the Bowman-Spaulding transmission line and the use of APLIC's "Suggested Practices for Avian Protection on Power Lines" as guidelines for the design of new or retrofitted poles or lines would reduce impacts to avian resources that habitually use powerlines and other energized equipment within the project boundary. Because there would be a period of time before all power line facilities are retrofitted in accordance with APLIC guidelines, there bird collisions and electrocutions may still occur.

California Department of Fish and Wildlife recommends that NID conduct an evaluation of project transmission lines and replace or retrofit all power poles inconsistent with APLIC guidelines

regardless of whether any mortalities have been associated with those poles. Transmission lines less than 69 kV can be an electrocution hazard for eagles, hawks, and other birds large enough to simultaneously touch two energized wires or other hardware. Although this measure would eliminate any potential electrocution hazards, there is no evidence that the current design has resulted in any injury or mortality to large birds. Raptor monitoring and recording of incidental observations of bird collisions/electrocutions would allow NID to determine whether project power poles and other structures are negatively affecting avian resources and to take appropriate measures to correct any problem power poles.

*Mammals (Carnivores)*

Forest carnivores such as the American marten, Pacific fisher, and Sierra red fox could occur in the project area.

Proposed measures to mitigate for effects on wildlife are presented below under *Wildlife Movement*.

FWS filed a 10(a) recommendation recommending that NID develop a fisher management plan to protect this species within carnivore management areas, and that NID prevent the use of second-generation anticoagulants within the project area.

Our Analysis

American marten and Pacific fisher could be affected by the project, including O&M activities such as hazard tree removal or brush pile removal during maintenance of fire breaks along roadsides, canals, transmission lines, and recreation facilities. Campgrounds associated with the project are unlikely to have an effect on any of these species since the campgrounds are restricted in area and period of use and are probably avoided by these species; however, dispersed recreation activities such as camping, hiking, and OHV use may overlap with suitable habitat for these species.

Activities associated with the construction of the proposed parking areas at Sawmill Lake and at Pass Creek boat launch may affect Pacific fisher, which is sensitive to disturbances during the breeding season. Construction activities would require vegetation removal, grading, laying of asphalt, haul trucks, installation of campfire rings, and picnic tables, which would lead to an increase in noise and human activities during the construction phase.

Although Pacific fisher designated carnivore management areas overlap with some of the project areas, the existing populations of Pacific fisher do not overlap with the project boundary. The development of Pacific fisher management plan, as recommended by FWS, would add limited protection to this species due to its lack of use of the available habitat within the project boundary.

NID is bound by federal, state, and local laws pertaining to the use of rodenticides as part of O&M activities. These products, if legally registered for use within the State of California and used as directed on the product labels, are suitable for use.

*Special-status Bats*

NID proposes to survey project structures for bat roosts and establish humane exclusion devices in structures that may be used as bat roosts (YB-TR6). NID would document all known bat roosts within project buildings, including powerhouses and storage building valve houses, dams, or other structures that may be used as bat roosts. NID would provide these results to California Fish and Wildlife and other appropriate agencies. If bats or roosting signs are documented where staff has daily or weekly routine presence, bats would be humanely removed and humane exclusion devices would be installed to

prevent further occupation. Exclusion devices would be inspected annually, and facilities reevaluated for roosting every 3 years.

Forest Service condition 47 and BLM condition 21 specify bat management measures for NID that are identical to NID's proposed bat management measures.

California Fish and Wildlife filed a 10(j) recommendation identical to NID's proposed bat management measures.

Our Analysis

Six project structures at Yuba-Bear were found to have signs of bat use; three structures were classified as day roosts and the remaining three structures as night roosts. The structures classified as night roost are unlikely to be affected by the proposed project since their presence does not coincide with normal work hours by project staff. One of the structures classified as day roosts was the employee housing at Bowman powerhouse, and due to human health concerns, the bats were humanely excluded from this structure. Project activities that may affect the two remaining day roosts include recreation and O&M activities.

Two special-status bats, Western red bat and Townsend's big-eared bat, were recorded at the site selected for the proposed Rollins no. 2 powerhouse. No Townsend's big-eared bats are known to roost at the site proposed for the powerhouse and would not be affected by construction of the proposed powerhouse. The initial construction would not involve the removal of any trees where Western red bats roost and, therefore, would not affect this species.

Forest Service condition 47 and BLM condition 21 are identical to NID's bat management protective measures and would be protective of bat species within the project. Surveys of all known roosting structures would be conducted and the results presented at the annual consultation meeting. If bat use were determined to occur, humane exclusion devices would be installed at the correct time of year to prevent re-occupation by bats of project facilities, minimizing potential effects to special-status bat species.

**Wildlife Movement and Mortality**

Project conduits and facilities such as open canals, elevated flumes, non-elevated or bench flumes, siphons, tunnels, and penstocks can present barriers to wildlife movement and have the potential to result in entrapment or mortality of wildlife.

Several 4(e) conditions submitted by the Forest Service address potential project impacts on wildlife. To address the issue of wildlife loss in project canals, Forest Service condition 39 and BLM condition 16 specify measures to monitor and record animal losses in project canals. Forest Service condition 40 and BLM condition 17 specify that NID consult with California Fish and Wildlife and the Forest Service when replacing wildlife escape and wildlife crossing facilities. Forest Service conditions 41 and BLM condition 10 specify wildlife crossing provisions for the Bowman-Spaulding canal. NID concurs with these measures.

Forest Service condition 39 and BLM condition 16 specify monitoring animal losses in Yuba-Bear Project canals. Consistent with these conditions, NID proposes to record animal losses in project canals including the following details: (1) location of the dead animal; (2) species; (3) date and time of observation; (4) suspected cause of death; (5) photograph; (6) estimated size; (7) estimated age; and (8) sex, if known. NID would also consult with California Fish and Wildlife, the Forest Service, and BLM regarding the protection and utilization of wildlife resources affected by the project. NID would consult

with the California Fish and Wildlife prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings along project canals. NID would assess wildlife escape facilities annually to ensure they are functional and in proper working order. The condition also specifies that NID prepare an annual report including recommendations to address animal mortalities and a schedule for implementation of these recommendations. The report would be provided to the Forest Service, BLM, and California Fish and Wildlife, and would be filed with the Commission, including evidence of consultation.

Forest Service condition 40 and BLM condition 17 are identical to the NID's proposal to consult with California Fish and Wildlife prior to replacing wildlife crossing facilities.

California Fish and Wildlife submitted 10(j) recommendations 7.2 and 7.3 that are similar to Forest Service condition 39 regarding the monitoring of animal losses in project canals and consultation with California Fish and Wildlife when replacing wildlife escape and crossing facilities.

Forest Service condition 41 submitted as a separate condition specifies wildlife crossing conditions at the Bowman-Spaulding canal. Condition 41 specifies that upon license issuance that NID would maintain certain specified wildlife crossing along the Bowman-Spaulding canal in a functional condition for wildlife use. NID would not be required to remove or maintain the existing crossing at Point 144. Condition 41 also specifies monitoring and reporting that NID should conduct in support of the wildlife crossing maintenance program.

California Fish and Wildlife filed a 10(j) recommendation for wildlife crossing structures in Bowman-Spaulding canal that is generally consistent with Forest Service condition 41, recommending that NID maintain one existing wildlife crossing structure in the Bowman-Spaulding canal (canal mile 5.8), and either construct one new crossing or retrofit the existing crossing at canal mile 1.5. For a new structure, California Fish and wildlife recommends that the wildlife crossing meet the minimum dimensions of 12-foot width, 8-foot-high side railings, and access ramps less than 30 percent grade, and undercrossings would meet the minimum dimensions of 10 feet high by 10 feet wide with natural substrate. Forest Service condition 41 does not contain exact specifications for wildlife crossing dimensions or materials, but specifies that the crossing be maintained in a functional condition for wildlife use.

*Our Analysis*

Project conduits (open canals, elevated flumes, non-elevated or bench flumes, siphons, tunnels, and penstocks) and other project facilities can present barriers for wildlife present in the project boundaries. These barriers can disrupt the natural movement of wildlife species and lead to species entrapment and mortality. The Bowman-Spaulding canal bisects summer mule deer habitat (PG&E and NID, 2011h).

Wildlife passage points were found to be generally common throughout the Yuba-Bear Project, with penstocks and tunnels having the greatest opportunity of passage by the five target species. Generally, penstocks and tunnels are either completely buried or have passage opportunities at intervals less than 0.5 mile apart throughout their entire length. However, some conduits contain segments that do not provide passage at least every 0.5 mile: Bowman-Spaulding conduit, Dutch Flat no. 2 conduit, and Chicago Park conduit. The greatest distance between passage opportunities on the project occurs on the Bowman-Spaulding conduit, where distances between crossing points are up to 1.19 miles.

The Yuba-Bear Project contains nine entrapment points. Types of wildlife escape points include: vehicle ramps; low-angle banks—natural or gunite; and low-angle banks—gunite with benches. At the Yuba-Bear Project, one wildlife mortality, an adult mountain lion, was reported in the Dutch Flat no. 2 conduit in 2009.

**Bowman-Spaulding Canal**

The Bowman-Spaulding canal consists of eight tunnels, nine excavated canals, one flume, and one inverted siphon. Passage points throughout the canal include wooden road bridges, paved road bridges, a steel grate road bridge, an open-grate footbridge, and one flume. Certain segments of the canal are characterized by slow- to moderate-velocity water and shallow water depth potentially allowing passage by all target species. The largest distance between passage points in the canal is 1.19 miles. No mortalities have been documented in the Bowman-Spaulding canal.

Due to the distance between passage points in the Bowman-Spaulding canal, Forest Service condition 34 specifying that NID maintain three specific crossing structures (two existing and one new structure) in the Bowman-Spaulding canal in a functional condition for wildlife would adequately protect target wildlife species that commonly cross this canal.

**Consultation Prior to Replacing Wildlife Crossings**

Forest Service condition 40 and BLM condition 17 specify that NID be required to consult with appropriate federal and state agencies prior to replacing wildlife crossing facilities. NID concurs with this measure. This measure is appropriate for the protection of wildlife movement because it would allow appropriate coordination between PG&E and agencies, and it ensures that if wildlife escape and crossing facilities become degraded and need replacement during the term of a new license, up-to-date standards would be applied to ensure the continued protection of target wildlife species.

**Monitoring Animal Mortalities**

Forest Service condition 39 and BLM condition 16 contain additional protective measures specifying that NID provide a report of recommendations for measures to decrease animal mortality for review and approval by appropriate agencies. Monitoring would detect any changes in wildlife mortality and identify the need for protective measures. The agencies' additional measure would ensure that NID develop the appropriate protective measures to decrease animal mortality and protect wildlife movement activities within the project boundary.

### 3.3.4 Threatened and Endangered Species

#### 3.3.4.1 Affected Environment

In consultation with FWS and NMFS, PG&E and NID developed a list of threatened and endangered species that potentially occur in the project areas. PG&E and NID used a three-step screening process to identify threatened and endangered species that could be affected by one or both of the projects. For various reasons, certain aquatic and plant species were eliminated from further analysis (table 3-206). Central Valley steelhead DPS, Central Valley spring-run Chinook salmon ESU, green sturgeon southern DPS, Stebbins' morning-glory, Layne's butterweed, California red-legged frog, and VELB potentially occur in the vicinity of the project.

Table 3-206. Threatened and endangered species eliminated from further analysis. (Source: staff)

| Species Common Name | Species Latin Name | Status | Justification for Elimination from Further Analysis |
|---|---|---|---|
| Conservancy fairy shrimp | *Branchinecta conservatio* | Threatened | These species do not occur within the geographic scope of the projects. |
| Vernal pool tadpole | *Lepidurus packardi* | Threatened | |

Table 3-206. Threatened and endangered species eliminated from further analysis. (Source: staff)

| Species Common Name | Species Latin Name | Status | Justification for Elimination from Further Analysis |
|---|---|---|---|
| shrimp | | | |
| Delta smelt | *Hypomesus transpacificus* | Endangered | |
| Vernal pool fairy shrimp | *B. lynchi* | Endangered | |
| Lahontan cutthroat trout | *Oncorhynchus clarki henshawi* | Threatened | Inland subspecies of cutthroat trout are endemic to the physiographic Lahontan Basin of northern Nevada, eastern California, and southern Oregon; the threatened population segment of this species does not occur within the geographic scope of the projects. |
| Sacramento River winter-run chinook salmon ESU | *O. tshawytscha* | Endangered | This ESU does not occur within the geographic scope of the projects. |
| Pine Hill ceanothus | *Ceanothus roderickii* | Endangered | Suitable habitats for these species do not occur within either of the project areas; therefore, these species are unlikely to colonize the project areas. |
| Pine Hill flannelbush | *Fremontodendron decumbens* | Endangered | |
| El Dorado bedstraw | *Galium californicum* ssp. *sierrae* | Endangered | |
| Hartweg's golden sunburst | *Pseudobahia ahiifolia* | Endangered | |
| Sacramento orcutt grass | *Orcuttia viscida* | Endangered | Sacramento orcutt grass occurs only at elevations below the project boundaries; therefore, this species is unlikely to colonize the project areas. |

**NMFS' Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead**

NMFS' Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead (NMFS, 2014) established goals for restoration of spring-run Chinook salmon and Central Valley steelhead including the lower and upper Yuba River. One of the primary recovery actions is the development and implementation of a program to reintroduce spring-run Chinook salmon and steelhead to historic habitats upstream of Englebright dam potentially into project-affected reaches of the Middle and South Yuba River. The program identifies several studies that would need to be conducted before implementation of a long-term reintroduction program could begin, including: feasibility studies, habitat evaluations, fish passage design studies, and a

pilot reintroduction phase. NMFS anticipates that reintroduction of these anadromous fish species would take place within the term of a new license issued for the Drum-Spaulding Project, but there is no clearly defined implementation schedule for reintroduction.

We note that there are considerable uncertainties regarding the viability and implementation program set forth in the recovery plan (NMFS, 2014) and the Central Valley Project and State Water Project biological opinion (NMFS, 2009). NMFS (2009) states that the concept of collection of outmigrating juveniles at facilities at the head of reservoirs to ensure safe and timely downstream passage of juvenile and post-spawn steelhead is untested, and multiple concepts may need to be tested simultaneously. To our knowledge, no federal funding or proposals for any or all of these tasks have been developed. Thus, the schedule for implementation of a long-term reintroduction program for either species, particularly in the upper Yuba River, is uncertain.

**Central Valley Spring-run Chinook Salmon ESU**

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. §§ 1801-1891d) requires the identification of Essential Fish Habitat (EFH) for federally managed fishery species and the implementation of measures to conserve and enhance this habitat (16 U.S.C. § 1855(b)(2)). EFH includes specifically identified waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity, and therefore covers a species' full life cycle in the Yuba River. EFH only applies to commercial fisheries, including all runs (spring-run and fall/late fall-run) of Chinook salmon. Chinook salmon EFH in the Yuba River includes all water bodies NMFS believes were occupied or historically accessible to Chinook salmon. The complete barrier to Yuba River spring-run Chinook salmon migration, posed by Englebright dam is considered by NMFS to be the primary cause for the decline of the population in the Yuba River watershed (NMFS 2012). The lower Yuba River below Englebright dam and downstream of Daguerre Point dam provides habitat used by spring-run chinook salmon for adult spawning migration and holding, spawning, egg incubation, and juvenile forage, rearing, growth, and out-migration. Spring-run Chinook salmon EFH designated upstream of Englebright dam is presently not utilized due to the complete blockage posed by Englebright dam.

Critical habitat was designated for spring-run Chinook salmon on September 2, 2005, and includes stream reaches such as those of the Feather River, the Yuba River downstream of Englebright dam, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear Creeks, the Sacramento River, as well as portions of the northern Delta (70 FR 52488). Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. Critical habitat for spring-run Chinook salmon is defined as specific areas that contain the primary constituent elements (PCEs) and physical habitat elements essential to the conservation of the species. Within the range of the spring-run Chinook salmon ESU, biological features of the designated critical habitat that are considered vital for spring-run Chinook salmon include freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors.

**Central Valley Steelhead DPS**

The Central Valley steelhead DPS (*O. mykiss irideus)* is listed as threatened under the ESA. Critical habitat was designated in September 2005. On August 15, 2011, NMFS completed its 5-year review of Central Valley steelhead and concluded this species should remain listed as threatened. In its final listing, NMFS concluded that the threatened Central Valley steelhead DPS includes all naturally spawned populations of steelhead (and their progeny) below natural and manmade barriers in the

Sacramento and San Joaquin Rivers and their tributaries. Critical habitat for Central Valley steelhead within the geographic scope[20] of the Drum-Spaulding Project includes Auburn Ravine from RM 0 to RM 26.6. Primary constituent elements (a physical or biological feature essential to the conservation of a species on which its designated critical habitat is based) in Auburn Ravine include habitat for adult and juvenile migration, spawning and incubation, and juvenile rearing.

Critical habitat for Central Valley steelhead designated upstream of Englebright dam is presently not utilized due to the complete blockage posed by Englebright dam. Critical habitat for Central Valley steelhead is defined as specific areas that contain the PCEs and physical habitat elements essential to the conservation of the species. Within lower Yuba River, biological features of the designated critical habitat that are considered vital for Central Valley steelhead include freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors.

**Green Sturgeon Southern DPS**

The southern population of North American green sturgeon DPS (*Acipenser medirostris*) is listed under the ESA as threatened (April 7, 2006, 71 FR 17757) and critical habitat was designated on October 9, 2009 (74 FR 52300). The green sturgeon southern DPS presently contains only a single spawning population within the Sacramento River basin, primarily in the mainstem Sacramento River downstream of Keswick dam but spawning has been documented to occur in the Feather River downstream of Oroville dam and potentially in the Yuba River where adults exhibiting spawning behavior have been observed below Daguerre Point dam. Critical habitat includes the Feather River upstream to the fish barrier dam adjacent to the Feather River Fish Hatchery. Critical habitat for green sturgeon lifestages in the lower Yuba River include adult upstream migration and spawning, egg incubation and larval development, juvenile and sub-adult rearing and migration. Green sturgeon are unable to utilize the fish ladders at the Daguerre Point dam to access potential habitat that could exist between Daguerre Point and Englebright dam.

Adult green sturgeon are believed to spawn every 2 to 5 years (Beamesderfer et al., 2007). Heublein *et al*. (2006) reported that Sacramento River green sturgeon begin their upstream spawning migrations into the San Francisco Bay in March. Successful spawning was documented in spring 2011 in the Feather River by the California Water Resources, and adults demonstrating spawning behavior were also observed during the winter and spring of 2011 in the Yuba River in the scour pool downstream of Daguerre Point dam (NMFS, 2012). Sacramento River spawning is estimated to occur from late April through July with a peak in May (Gaines and Martin, 2002). Preferred spawning habitats of green sturgeon are thought to include turbulent areas in close association with deep pools (Moyle, 2002; Adams et al., 2002). Spawning most likely occurs over substrates ranging from clean sand to bedrock, with preferences for cobble substrates (Emmett et al., 1991; Moyle et al., 1995; Moyle, 2002). Information on behavior, physiology, and habitat requirements is limited for juveniles in the wild. Juveniles spend from 1–4 years in fresh and estuarine waters before migrating to coastal marine waters.

[20] Although the geographic extent of cumulative effects in Auburn Ravine was not specifically addressed in the second scoping document (FERC 2008), FERC's February 23, 2009, *Study Plan Determination for the Yuba-Bear, Drum-Spaulding, and Rollins Projects* concurred with PG&E that flows in Auburn Ravine below PCWA's Auburn tunnel are cumulatively affected by the operations of multiple entities and did not require flow and habitat studies in that stream reach.

**Stebbins' Morning-glory**

Stebbins' morning-glory (*Calystegia stebbinsii*) is listed as endangered under the ESA. No critical habitat is designated for this species. FWS has issued a recovery plan for gabbro soil plants of the central Sierra Nevada foothills, including Stebbins' morning-glory.

Stebbins' morning-glory is a leafy herbaceous perennial found on gabbro or serpentine soils in chaparral or cismontane woodland habitats at elevations between 607 and 2,394 feet msl; this species has a flowering period ranging from April to July. Appropriate habitat for this species occurs at the Upper Drum-Spaulding Project near Drum powerhouse and along Drum Powerhouse Road, and at the Yuba-Bear Project along the Dutch Flat no. 2 conduit. Therefore, this species could potentially colonize both project areas in the future. Occurrences in the vicinity of the projects (outside the project boundaries) have been documented in Shingle Springs, Coloma, Pilot Hill, Grass Valley, and Lake Combie, but surveys did not locate any individuals within the project boundary (PG&E and NID, 2011b).

**Layne's Butterweed**

Layne's butterweed (*Senecio layneae*) is listed as threatened under the ESA. No critical habitat is designated for this species. FWS's recovery plan for gabbro soil plants of the central Sierra Nevada foothills includes Layne's butterweed.

Layne's butterweed is found in open rocky areas within chaparral plant serpentine soils in chaparral and cismontane woodland at elevations between 656 and 3,280 feet msl; this species has a flowering period ranging from April to August. Appropriate habitat occurs at the Upper Drum-Spaulding Project primarily near Drum powerhouse and along Drum Powerhouse Road. This species could potentially colonize the Upper Drum-Spaulding Project area in the future. Occurrences in the vicinity of the projects (outside the project boundaries) have been documented in Shingle Springs, Clarksville, Coloma, and Pilot Hill, but surveys did not locate any individuals within the project boundary (PG&E and NID, 2011b).

**California Red-legged Frog**

The California red-legged frog (*Rana draytonii*) is listed as threatened under the ESA. Critical habitat was designated on March 2010. No known California red-legged frog populations and no critical habitat for this species are known to occur in the immediate vicinity of the project areas.

California red-legged frog breeding occurs from late November to late April in ponds, backwater pools, and creeks. Egg masses attach to emergent vegetation such as cattails and bulrushes. Outside of the breeding season, adult California red-legged frog individuals can be found foraging and seeking shelter upstream, downstream, or upslope from breeding habitats. Individuals are usually found in perennial ponds or pools and perennial or seasonal streams where water remains for a minimum of 20 weeks beginning in the spring and there is dense emergent or shoreline riparian vegetation. Long-distance dispersal of California red-legged frog can occur up to 1 mile from suitable habitats.

To determine the presence of California red-legged frog, PG&E and NID conducted habitat assessments and record reviews at all reservoirs and impoundments below 5,000 feet msl associated with the projects and at 165 aquatic habitat sites within 1 mile of these facilities (table 3-207). No California red-legged frog individuals were observed during the site assessments or during any other relicensing studies from 2007 through 2010, although the applicants identified aquatic habitats potentially suitable for this species. The site assessment surveys determined that 119 sites had or were presumed to have the essential components of California red-legged frog breeding habitat. Records reviews revealed that one historical California red-legged frog record occurred in the vicinity of the Lower Drum Project, 1 mile

from Wise forebay, and one historical record was in the vicinity of the Yuba-Bear Project, less than 1 mile from Dutch Flat afterbay and Dutch Flat no. 2 forebay (PG&E and NID, 2010l). Suitable habitat is not currently evident at the location of either of these historical records, and there are no known existing California red-legged frog populations in either project area.

Table 3-207. Summary of Project Sites Assessed for California Red-Legged Frog Habitat. (Source: PG&E and NID, 2010l)

| Project Site | Land Ownership | Essential Components of California Red-legged Frog Breeding Habitat Present |
|---|---|---|
| Dutch Flat Forebay (Yuba-Bear) | NID | Yes |
| Dutch Flat Afterbay (Yuba-Bear) | NID, PG&E, BLM, Private | Yes |
| Chicago Park flume (Little York Basin) (Yuba-Bear) | NID | Yes |
| Chicago Park Forebay (Yuba-Bea) | BLM | Yes |
| Rollins Reservoir (Yuba-Bear) | PG&E, NID, BLM, Private | No |
| Lake Spaulding (Upper Drum-Spaulding) | PG&E, USFS | No |
| Deer Creek Forebay (Deer Creek) | PG&E | Yes |
| Drum Forebay (Upper Drum-Spaulding) | PG&E | No |
| Drum Afterbay (Upper Drum-Spaulding) | PG&E | Yes |
| Halsey Forebay (Lower Drum) | PG&E | No |
| Halsey Afterbay (Lower Drum) | PG&E | Yes |
| Rock Creek Reservoir (Lower Drum) | PG&E | Yes |
| Wise Forebay (Lower Drum) | PG&E | No |
| Rollins Transmission Line (Non-project Facility | Private | N/A |

**Sierra Nevada Yellow-legged Frog**

The Sierra Nevada yellow-legged frog (Rana sierrae), also referred to as the Sierra Nevada DPS of the mountain yellow-legged frog, is found at elevations of about 5,900 feet msl in lakes, ponds, and streams. The species is highly aquatic in all life stages, although overland dispersal has been documented. Due to the short growing season at high elevations, this species may require two or more years to complete the larval phase.

Historically, Sierra Nevada yellow-legged frog occurrences have been documented near three reservoirs in the Upper Drum-Spaulding Project area (Fordyce Lake, Lake Sterling, and White Rock Lake) and two reservoirs in the Yuba-Bear Project area (French Lake and Faucherie Lake). The frog was detected during 2009 surveys at three sub-sites south of the Yuba-Bear Hydroelectric Project's French Lake, consisting of two adults in a permanent pond with deep pools, a recently metamorphosed juvenile in a large permanent pond, and two sub-adults in a pool of an intermittent stream below the ponds. The ponds are connected by the stream, which flows toward French Lake, but was dry 0.1 mile before reaching the reservoir. The survey results indicate that the frog utilizes habitat in the stream and strongly suggest that the large pond is a breeding location. Fish were not observed in the ponds or stream (PG&E and NID, 2010g).

Habitat characteristics favorable for the frog were documented at relatively large, deep, permanent ponds where fish did not occur near two of the Yuba-Bear Hydroelectric Project reservoirs: 0.1 mile from Jackson Meadows reservoir and 0.06 mile northwest of Faucherie Lake. Suitable habitat was also documented near one of the Upper Drum-Spaulding Project reservoirs: 0.4 mile west of Meadow Lake (PG&E and NID, 2010g).

Of the stream reaches that were surveyed, only a few exhibited shallow, vegetated habitat suitable for egg mass placement and use by tadpoles, as well as deeper, over-wintering habitats. Stream reaches with these characteristics include Sawmill Lake dam reach and Upper South Yuba reach #2; however, all of the stream reaches that were surveyed contained one or more species of predatory fish, which likely diminishes potential habitat quality for the frog (PG&E and NID, 2010g).

On April 29, 2014, FWS published a rule to list the Sierra Nevada yellow-legged frog as endangered (FWS, 2014a). Proposed critical habitat for the species was published on April 25, 2013. The proposed critical habitat for the Sierra Nevada yellow-legged frog encompasses portions of the projects (FWS, 2013). The following Upper Drum-Spaulding Project reservoirs are included within proposed critical subunit 2C (Black Buttes): Upper Rock Lake, Lower Rock Lake, Culbertson Lake, Middle Lindsey Lake, Feeley Lake, Carr Lake, Lower Lindsey Lake, Lake Spaulding, Lower Peak Lake, Upper Peak Lake, Kidd Lake, Fordyce Lake, Lake Sterling, White Rock Lake, Meadow Lake, and Upper Lindsey Lake. The following Yuba-Bear Project reservoirs are also included with proposed critical habitat subunit 2C: Jackson Lake, Sawmill Lake, Faucherie Lake, Bowman Lake, and French Lake.

FWS considers that subunit 2C contains the physical or biological features essential to the conservation of the species, is currently functional habitat sustaining frogs, and is needed to protect core surviving populations and their unique genetic heritage (FWS, 2012e). Within these areas, the primary constituent elements of the physical or biological features essential to the conservation of the Sierra Nevada yellow-legged frog consist of:

- Aquatic habitat for breeding and rearing--habitat that consists of permanent water bodies, or those that are either hydrologically connected with, or close to, permanent water bodies, including, but not limited to, lakes, streams, rivers, tarns, perennial creeks (or permanent plunge pools within intermittent creeks), pools (such as a body of impounded water contained above a natural dam), and other forms of aquatic habitat;

- Aquatic nonbreeding habitat (including overwintering habitat)--this habitat may contain the same characteristics as aquatic breeding and rearing habitat (often at the same locale), and may include lakes, ponds, tarns, streams, rivers, creeks, plunge pools within intermittent creeks, seeps, and springs that may not hold water long enough for the species to complete its aquatic life cycle. This habitat provides for shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and adult mountain yellow-legged frogs; and

- Upland areas adjacent to or surrounding breeding and nonbreeding aquatic habitat that provide area for feeding and movement by frogs.

**Valley Elderberry Longhorn Beetle**

The VELB (*Desmocerus californicus dimorphus*) is listed as threatened under the ESA. Designated critical habitat for VELB includes the American River Parkway and Sacramento Zones. FWS issued a recovery plan for VELB in August 1984. On February 14, 2007, FWS completed a 5-year review of VELB and recommended that the species be de-listed. On August 19, 2011, FWS issued a 90-day review notice regarding potential de-listing of VELB. On September 17, 2014, FWS withdrew its October 2, 2012 proposal to remove VELB and its designated critical habitat from the List of Endangered and Threatened Wildlife.

The VELB has a life cycle of 1 to 2 years, and it spends most of its life cycle in the larval stage. Eggs are laid on elderberry leaves or bark and hatch within 2 days; the emergent larvae live within the stems of the plants for 1 to 2 years. Adults emerge from late March through June from the stems through holes made by larvae prior to pupation and are short-lived. Under FWS conservation guidelines for the VELB, elderberry plants with stems that are 1.0 inch in diameter or larger, which are on or adjacent to project sites, must be thoroughly inspected for beetle exit holes to evaluate potential impacts to VELB habitat.

The existing Yuba-Bear, Upper Drum-Spaulding, Lower Drum, and Deer Creek Project facilities are outside of the critical habitat zones designated by FWS for VELB, but portions of each project fall within the potential range of the beetle. In 2009 and 2011, PG&E and NID conducted studies to determine the presence and distribution of the VELB and identify locations of potential VELB habitat, which extends up to 3,000 feet msl. Surveys were carried out by qualified botanists on foot and by boat, beginning at lower elevations and progressing to higher elevations. All elderberry plants that met VELB habitat requirements of a minimum stem diameter of 1.0 inch were surveyed. A total of 26 occurrences of elderberry plants were located within the Lower Drum Project boundary (table 3-208). VELB indicators (boreholes) were observed at three locations, each along Bear River canal (Lower Drum Project). No elderberry plants, VELB, or critical habitat were found in the Upper Drum-Spaulding, Deer Creek, or Yuba-Bear Project areas. NID is unaware of any historic records of VELB within the Yuba-Bear Project boundary (PG&E and NID, 2011c).

Table 3-208. Elderberry Plant Occurrences within the Lower Drum Project boundary. (Source: PG&E and NID, 2011c)

| Number | Elderberry Occurrence and Location | Site Description[a] |
|---|---|---|
| 1 | Located at the base of Mormon Ravine near the shore of Folsom Lake. | Three individuals on the north side of Mormon Ravine, cross footbridge and 20 feet northeast of rock outcrop. |
| 2 | Bear River canal about 0.20 mile upstream from the Halsey forebay. | One individual on northwest side of levee and immediately south of private driveway in willow and blackberry thicket. |
| 3 | Unnamed drainage between Wooley Creek and Bear River canal. This drainage intercepts the Bear River canal at about 1.06 miles upstream of Halsey forebay; the occurrence is 0.49 mile from the Bear River canal. | Two individuals on north side of Cole road and south of Madrone lane on the east side of Wooley Creek. |
| 4 | Unnamed drainage between Wooley Creek and Bear River canal. This drainage intercepts the Bear River canal at about 1.06 miles upstream of Halsey forebay; the occurrence is 0.77 mile from the Bear River canal. | One individual at the junction of Wooley Creek and Meadow Vista road on southeast side of Meadow Vista road, surrounded by a mesh cage. |
| 5 | Unnamed drainage between Wooley Creek and Bear River canal. This drainage intercepts the Bear River canal at about 1.06 miles upstream of Halsey forebay; the occurrence is 0.98 mile from the Bear River canal. | 10–20 individuals and many young recruits (too small to classify) in a 1,200-square-foot area on the west side of Wooly Creek and just south of Meadow lane crossing. |
| 6 | Bear River canal about 3.05 miles upstream from the Halsey forebay. | One individual on the west side of Bear River canal and about 1,500 feet south of Meadow Gate road. |
| 7 | Bear River canal about 4 miles upstream from the Halsey forebay. | Large individual with several stems equal to or greater than 5 inches in diameter right along the Bear River canal. There were multiple large stems that had splintered and collapsed, which appeared recent, and evidence of old trimming on two stems 1-3 inches in diameter. Fourteen boreholes found. |
| 8 | Near Bear River canal, about 3.86 miles upstream from the Halsey forebay. | One individual on south side of Bear River canal access road, adjacent to horse corral. |
| 9 | Bear River canal about 5.37 miles upstream from the Halsey forebay. | Small group of individuals between canal and roadway. |
| 10 | Bear River canal about 5.45 miles upstream from the Halsey forebay. | About 10 individuals on the northwestern side of Bear River canal. |

Table 3-208. Elderberry Plant Occurrences within the Lower Drum Project boundary. (Source: PG&E and NID, 2011c)

| Number | Elderberry Occurrence and Location | Site Description[a] |
|---|---|---|
| 11 | Bear River canal about 5.5 miles upstream from the Halsey forebay, between occurrences 9 and 10. | One individual, 3-5 inches in diameter, on far bank of the Bear River canal, downslope of a road on private land. |
| 12 | Bear River canal about 63 feet upstream and across the canal. Between occurrences 9 and 10 on the other side of the canal. | One individual, 1-3 inches in diameter, on far bank of the Bear River canal, downslope of a road on private land. |
| 13 | Bear River canal about 48 feet and across the canal from marker "905+00." | One individual, 1-3 inches in diameter, on far bank of the Bear River canal, downslope of a road on private land. |
| 14 | Bear River canal about 108 feet and across the canal from marker "905+00." | One individual, 1-3 inches in diameter, on far bank of the Bear River canal, downslope of a road on private land. |
| 15 | Bear River canal about 5.67 miles upstream from the Halsey forebay. | One large individual on the north side of Bear River canal between the canal and houses. |
| 16 | Bear River canal about 5.75 miles upstream from the Halsey forebay. | One individual downslope from the canal. |
| 17 | Bear River canal about 6.01 miles upstream from the Halsey forebay. | Group of smaller individuals 20 feet from the west side of canal. |
| 18 | Bear River canal about 6.13 miles upstream from the Halsey forebay. | Small group of individuals 10 feet from and on the east side of the canal. |
| 19 | Bear River canal about 6.14 miles upstream from the Halsey forebay. | Several individuals 5 feet from and on the east side of the canal. Ten boreholes found. |
| 20 | Bear River canal about 6.28 miles upstream from the Halsey forebay. | A few individuals about 30 feet from and on the south side of the canal. |
| 21 | Bear River canal about 6.33 miles upstream from the Halsey forebay. | Small group of individuals located 10 feet from and on the south side of the canal. |
| 22 | Located on access road between Hill Road and Bear River canal; the access road intercepts the Bear River canal about 6.92 miles upstream of the Halsey forebay; the occurrence on the access road is about 0.08 mile away from Bear River canal. | One large individual located on the south side of Country road and just east of bridge. Three boreholes found. |
| 23 | Located on access road which intercepts the Bear River canal about 6.85 miles upstream from the Halsey forebay; occurrence is 0.01 mile from the Bear River canal. | Large stand of individuals on southeast side of Country road and in all class sizes. |

Table 3-208. Elderberry Plant Occurrences within the Lower Drum Project boundary. (Source: PG&E and NID, 2011c)

| Number | Elderberry Occurrence and Location | Site Description[a] |
|---|---|---|
| 24 | Located near access road which intercepts the Bear River canal about 6.87 miles upstream from the Halsey forebay; occurrence is 0.01 mile from the Bear River canal. | Several individuals growing near seep on the north side of Country road, which connects Hill road with the Bear River canal. |
| 25 | Located near access road which intercepts the Bear River canal about 14.30 miles upstream from the Halsey forebay; occurrence is 0.06 miles from the Bear River canal. | About 15 individuals and small young recruits near canal access road and within blackberry thickets. |
| 26 | Near Bear River canal about 14.55 miles upstream of the Halsey forebay, and 0.01 mile away from the Bear River canal. | One individual and small young recruits upslope of canal access road, connecting Plumtree road with the Bear River canal. |

[a] Numbers of individual elderberry shrubs is often ambiguous due to regeneration of elderberry plants within existing plants.

**Pacific Fisher**

The West Coast DPS of the Pacific fisher is proposed for listing as threatened (FWS, 2014b). The Pacific fisher is an uncommon permanent resident of the Sierra Nevada, Cascades, and Klamath Mountains, and is also found in a few areas in the North Coast Range. Pacific fishers are strongly associated with mature and late successional forest habitats. Pacific fishers are habitat specialists associated with forests exhibiting late-successional characteristics, such as an abundance of large trees, snags, and logs, multiple canopy layers, high canopy closure, and few openings (Zielinski et al., 2004). Mature forests provide the structural characteristics necessary to facilitate foraging, denning, and dispersal.

The fisher is an opportunistic predator with a varied diet including birds, small mammals and rodents, reptiles, insects, vegetables and fruits. Fishers hunt exclusively in forested habitats where prey is abundant and vulnerable to capture (FWS, 2014b).

Fishers have large home ranges for feeding, resting and traveling, with males having considerably larger home ranges than females. Fishers prefer to reside in areas with high levels of canopy cover. The physical structure of the forest is thought to be more influential to fishers rather than the specific forest types due to the associated prey abundance and protection from predators in forests with low and closed canopies. Fishers appear to avoid areas with small patches of forest or significant human disturbance, and instead prefer large areas of contiguous forest.

In the Drum-Spaulding Project area, Pacific fishers have been reported within 0.25 mile of Meadow Lake, Fordyce Lake, Lake Sterling, Lake Spaulding, Meadow Lake Knoll Group Campsites, and North and Lake Sterling Walk-in Campground (Upper Drum-Spaulding Project) (PG&E and NID, 2011h). No known denning sites have been identified in the project area.

Lands designated as Forest Carnivore Management Areas (FCMA) are present at one conduit in the Drum-Spaulding Project; approximately 60 percent of the Chalk Bluff/South Yuba canal (Deer Creek Project) occurs within FCMA-designated lands. The Lake Valley canal, Drum canal, Nevada diversion, Dutch Flat No. 1 Penstock and tunnel, Towle canal, Bear River canal, Lower Wise canal, Upper Wise canal, and South canal do not occur within FCMA-designated lands (PG&E and NID, 2011h).

Most of the Drum-Spaulding Project (approximately 67 percent) is within potential Pacific fisher habitat, as derived from the Special-status Wildlife – CWHR Study (PG&E and NID, 2011h). This includes approximately 80 percent of the Lake Valley canal, Nevada diversion, Towle canal (Upper Drum-Spaulding Project), Chalk Bluff/South Yuba canal (Deer Creek Project), Drum canal, and Bear River canal conduits (Lower Drum Project). The Lower Wise canal and South canal (Lower Drum Project) occur at lower elevations and are outside of the predicted Pacific fisher habitat. Less than one percent of the Upper Wise canal (Lower Drum Project) is within potential Pacific fisher habitat. The lower reaches of the Bear River canal (Lower Drum Project) are also outside of the predicted habitat areas; however, the upper reaches of this conduit are within the predicted habitat areas.

In the Yuba-Bear Project area, Pacific fisher occurrences have been reported within 0.25 mile of Jackson Meadows reservoir, along the Milton-Bowman conduit, and Sawmill Lake, Bowman Lake area, and East Meadows, Pass Creek, and Bowman campgrounds (PG&E and NID, 2011h). No known denning sites have been identified in the project area.

Lands designated as FCMA are present in several portions of the Yuba-Bear Project (PG&E and NID, 2011h). Moderate amounts (approximately 40 percent) of the Bowman-Spaulding conduit run through FCMA-designated lands. Low amounts of the Milton-Bowman diversion (approximately 13 percent) and Dutch Flat No. 2 (approximately 14 percent) conduits run through FCMA-designated lands. The Chicago Park conduit does not occur within FCMA-designated lands.

Portions of all conduits in the Yuba-Bear Project are within potential Pacific fisher habitat, as derived from the Special-status Wildlife – CWHR Study (PG&E and NID, 2011h). Most of the Milton-Bowman and Bowman-Spaulding conduits (approximately 92 percent and 95 percent, respectively) are within potential Pacific fisher habitat. Moderate amounts of the Dutch Flat No. 2 and Chicago Park conduits (approximately 59 percent and 48 percent, respectively) are within potential Pacific fisher habitat.

#### 3.3.4.2 Environmental Effects

##### 3.3.4.2.1 Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects

**General Protection Measures**

PG&E proposes to implement an Integrated Vegetation Management Plan at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. PG&E's proposed March 2013 Integrated Vegetation Management Plan includes provisions for the management and protection of special-status plants on federal lands. Specifically, the March 2013 Integrated Vegetation Management Plan would require PG&E, beginning in the first full calendar year, to annually review current lists of special-status species that might occur in the project area and that may be affected by project O&M activities. If a species were added to the list, PG&E in consultation with Forest Service, BLM, and California Fish and Wildlife, would determine if the species or suitable habitat is likely to occur on project lands. If a special-status species were likely to occur on project lands, then PG&E, in consultation with Forest Service, BLM, and California Fish and Wildlife, would develop and implement a study plan to assess the effects of O&M activities on the special-status species. Additionally, if special-status species were detected prior to or during construction or O&M

activities, PG&E would immediately notify appropriate agencies. If it is determined that activities are adversely affecting the species, then PG&E would develop appropriate protective measures. PG&E's March 2013 Integrated Vegetation Management Plan also includes a significant component to protect special-status species through the protection of sensitive vegetation resources within the project boundary.

PG&E's proposed March 2013 Integrated Vegetation Management Plan also includes provisions for the protection of special-status wildlife species on federal lands. Specifically, through the Integrated Vegetation Management Plan, PG&E proposes to apply certain limited operating periods for activities that involve the use of heavy equipment, loud noises, or habitat alteration, as appropriate, to protect special-status wildlife. The proposed limited operating periods include specific provisions for the protection of California spotted owl, northern goshawk, and great grey owl. The Integrated Vegetation Management Plan also contains specific provisions for the limitation of pesticide use in the vicinity of known locations of California red-legged frog, Sierra Nevada yellow-legged frog, or foothill yellow-legged frog.

Forest Service condition 45 and BLM condition 14 specify that PG&E, beginning in the first full calendar year, annually review current lists of special-status species that might occur in the project area and that may be affected by project O&M activities. If a species were added to the list, PG&E in consultation with the Forest Service, BLM, and California Fish and Wildlife would determine if the species or suitable habitat is likely to occur on project lands. If a special-status species were likely to occur on project lands, then PG&E, in consultation with the Forest Service, BLM, and California Fish and Wildlife, would develop and implement a study plan to assess the effects of O&M activities on the special-status species. Additionally, if special-status species are detected prior to or during construction or O&M activities, PG&E would immediately notify appropriate agencies. If it is determined that activities would adversely affect the species, then PG&E would develop appropriate protective measures. If federally or state listed or proposed threatened or endangered species are detected prior to or during construction, PG&E would immediately notify appropriate agencies.

Forest Service condition 44 and BLM condition 13 are nearly identical and specify that PG&E submit a biological evaluation for approval prior to any construction projects on project lands that may affect special-status species or critical habitat. The biological evaluation would evaluate the potential effects of proposed action on special-status species or its habitat, and would include components such as (1) avoidance or minimization of adverse effects to special-status species; (2) compliance of project-related activities to protective measures in management plans for special-status species; and (3) development of implementation and effectiveness monitoring of measures taken or employed to reduce effects to special-status species.

Forest Service condition 45 and BLM condition 14 specify annual review of the current list of special-status species that might occur on Forest Service or BLM lands in the project area. The review would consider new additions of species, and a determination of the newly listed species is likely to occur in the project area, in consultation with the Forest Service, BLM and other agencies. If it is determined that a newly listed species is likely to occur in the project vicinity and may be impacted by the project or its operation, the license would prepare and implement a study plan to evaluate potential project effects on the species.

California Fish and Wildlife submitted 10(j) recommendations 7.8 and 7.9, which are similar to the Forest Service and BLM conditions recommending an annual review of special-status species lists and the submittal of a biological evaluation prior to construction activities that may disturb special-status species or critical habitat.

*Our Analysis*

Special-status species could be adversely affected by project O&M activities, including: (1) ground-disturbing activities; (2) vegetation management activities such as mechanical clearing and herbicide use; and (3) recreation use, which can lead to trampling of plants.

Implementation of the PG&E's proposed March 2013 Integrated Vegetation Management Plan at the Drum-Spaulding, Lower Drum, and Deer Creek Projects would require PG&E to conduct surveys for special-status plants at project facilities on federal lands within the project boundary. PG&E would conduct the surveys within 1 year of license issuance and once every 10 years thereafter through the term of a new license. The surveys may include any new plant species added as result of updates to the lists of state threatened or endangered species, BLM sensitive plant species, or Forest Service sensitive and watchlist species. The surveys would be conducted according to the most currently accepted protocols. Implementation of the management plan would minimize and mitigate for any project effects to special-status plant species that may occur as a result of project O&M and any new project-related construction activities. Through the review and survey activities included in the Integrated Vegetation Management Plan, in addition to surveying special-status species at the project, NID would also be in direct consultation with Forest Service, BLM and other resource agencies about the current list of special-status species, and in this way would also fulfill the objectives of Forest Service conditions 45 and 14.

PG&E's proposed Integrated Vegetation Management Plan measures to annually consult with appropriate agencies and perform annual employee training are also consistent with final Forest Service condition 1 for annual consultation and condition 5 for annual employee training; BLM condition 1 for annual employee training and condition 23 for annual consultation; and California Fish and Wildlife 10(j) recommendation 1 for annual employee training and 10(j) recommendation 1 for annual consultation.

Before construction of any project features not addressed in this EIS, PG&E would first need to file a license amendment with the Commission. At that time, a biological evaluation for the protection of special-status species would be developed if appropriate as part of the license amendment proceeding.

**Central Valley Chinook Salmon ESU**

Historically, the Yuba River watershed reportedly was one of the most productive habitats for runs of Chinook salmon and steelhead (Yoshiyama et al., 1996). However, the lower Yuba River has undergone significant alterations as a result of human activities and uses dating from the mid-1800s that affect streamflows and aquatic resources. NMFS believes that the current condition of spring-run Chinook salmon critical habitat is degraded, and does not provide the conservation value necessary for the recovery of the species (NMFS, 2012). Water diversions in the Yuba River basin from operations of the Yuba-Bear and Drum-Spaulding Projects upstream of Englebright reservoir average 71,000 acre-feet per year from North Yuba River, and 410,000 acre-feet per year from Middle and South Yuba Rivers (NMFS 2012). We estimate that higher minimum streamflows that may be included in the new licenses for the Yuba-Bear and Upper Drum-Spaulding Projects would reduce the magnitude of diversion from Middle and South Yuba Rivers by about 9,000 to 102,000 acre-feet per year depending on water year type. This reduction does not include the additional effects of the spill cessation measures at Milton diversion dam, Bowman-Spaulding diversion dam, and Lake Spaulding dam or the Supplemental Flow measure for water temperature management in South Yuba River below Spaulding dam.

Non-project water diversions in the Yuba River basin also include three diversion facilities (Hallwood-Cordua diversion, Brophy/South Yuba diversion, and Browns Valley Irrigation district) on the impoundment upstream of the Daguerre Point dam with a combined capacity of 1,085 cfs (460,540 acre-feet) that withdraw water primarily during the agricultural irrigation season from April through October. The Brophy/South Yuba diversion has increased water withdrawals to 75,647 acre-feet annually, a 114

percent increase since 2005. YCWA (Yuba River Development Project, Technical Memorandum 2-2, Water Balance/Operations Model, 2012) identified water delivery contracts with eight entities from lower Yuba River in the vicinity of Daguerre Point dam with an estimated present demand of about 291,200 acre-feet in wet water years and 305,100 acre-feet during dry water years. YCWA's recently constructed Wheatland Diversion Project could eventually withdraw an additional 40,230 acre-feet of water per year from between Englebright and Daguerre Point dams when Phase 2 is completed. All of these water diversions from the Yuba River basing can cumulatively affect water quantity in the lower Yuba River and quality of critical habitat spring-run Chinook salmon.

*Our Analysis*

The lower Yuba River is one of the few Central Valley tributaries supporting populations of naturally-spawning spring-run Chinook salmon and steelhead. This portion of the river historically served as a migration corridor for anadromous salmonids to upstream habitats. In 1906, Daguerre Point dam was constructed on the lower Yuba specifically to stabilize mining debris and reduce flood risks. This 28-foot high dam served to retain the debris, but made it difficult for anadromous fish to migrate to upstream spawning areas, although salmon reportedly surmounted that dam in occasional years. In 1924, the Corps installed fish ladders at Daguerre Point dam; although the ladders have been rebuilt and modified several times since, passage at the dam continues to be impeded. The Corps' 260-foot-high Englebright dam, constructed in 1941, upstream of Daguerre Point dam, has no fish ladders and completely blocks anadromous fish access to all stream reaches upstream of the dam (Eilers, 2008; PG&E, 2008; CDWR, 2009). The dam effectively restricts anadromous fish to the lower 24 miles of the Yuba River from its confluence with the Feather River.

Many streams and rivers in the ESU have impaired habitat. Additionally, critical habitat in the ESU often lacks the ability to establish essential features due to ongoing human activities. Large dams, such as Englebright dam prevent recruitment of spawning gravels to the lower Yuba River, which affects both an essential habitat type (spawning areas) as well as an essential feature of spawning areas, substrate. Water utilization can reduce summer base flows degrading water quality and water quantity associated with critical habitat. Although there is no fish hatchery located on the lower Yuba River, strays from the Feather River Fish Hatchery (FRFH) and overlap of spring-run and fall-run Chinook migration and spawning have reduced the genetic variability of the Yuba River population (NMFS, 2012).

As a result, Yuba River spring-run Chinook in the lower Yuba River below the Corps' Englebright dam are affected by long-term delays or blockages of upstream migration to historic spawning habitat, superimposition of spawning habitat due to degradation and loss of upstream spawning habitat, and continued hybridization with fall-run Chinook salmon and FRFH salmon

Yuba River water temperatures also may affect Chinook salmon downstream of the Corps' Englebright dam. The availability and thermal suitability of holding habitat for upstream migrating adult spring-run Chinook salmon in the lower Yuba River are affected by flows released at the Corps' Englebright dam, and generation at PG&E's Narrows I powerhouse (part of Narrows I Project No. 1416) and YCWA's Narrows II powerhouse. Since completion of New Bullards Bar reservoir by YCWA in 1970, higher, colder flows in the lower Yuba River have improved conditions for adult oversummer holding, spawning, and juvenile rearing of anadromous salmonids. Following the construction of New Bullards Bar dam, the burden of flood control for the Yuba basin shifted from Englebright Lake to New Bullards Bar reservoir, and Englebright Lake has since been maintained at near full capacity throughout most of the year (FERC, 1992). New Bullards Bar reservoir operations generally produce flows in lower Yuba River that are lower during the winter and spring and higher during the summer and fall compared to conditions prior to construction of this facility. YCWA's New Colgate powerhouse associated with New Bullards Bar reservoir can be used for a combination of peaking and base generation, but is typically

operated as a peaking facility. New Bullards Bar reservoir acts as a forebay to Englebright reservoir, which serves to dampen the flow fluctuations in lower Yuba River associated with peaking and ramping at the New Colgate powerhouse. During high flows when Englebright dam is spilling, the flow fluctuations generated at the New Colgate powerhouse rapidly pass downstream of Englebright dam. Power generation at PG&E's Narrows I and YCWA's Narrows II powerhouses can also generate peaking and ramping flow fluctuations in aquatic habitat downstream of Englebright dam.

The Lower Yuba River Fisheries Agreement (Yuba Accord 2007[21]) has improved conditions through revised minimum flow requirements below Englebright dam. The cold water conditions that spring-run Chinook salmon depend upon to complete their life cycle are provided below Englebright dam by provisions of the Yuba Accord and managed by cold water released upstream from YCWA's New Bullards Bar reservoir. These minimum streamflow schedules were developed based on: indices of water availability; identified flow-related stressors to anadromous salmon lifestages including flow-dependent habitat availability; flow-related habitat complexity and diversity; and water temperatures. The Yuba River below Englebright dam still experiences dynamic flood events during uncontrolled winter and spring flows (Moir and Pasternack, 2008) in above normal and normal water years. Flows under the Yuba Accord have improved habitat in recent years; however, the flows in below average water years can result in less than optimal depths for spawning and rearing spring-run Chinook salmon (Gallagher and Gard, 1999).

Flow fluctuations and both high and low flows, depending on their timing, have the potential to adversely affect the freshwater life cycle of Yuba River spring-run Chinook salmon by affecting the access to and quality of riverine and floodplain habitat in lower Yuba River below Englebright dam. Flows through this reach of the Yuba River are cumulatively affected by the out of basin water transfers resulting from operations of the Yuba-Bear and Upper Drum-Spaulding Projects as well as YCWA's operation of New Bullards Bar reservoir, the Narrows powerhouses, the Corps' Englebright dam, and other multiple consumptive water withdrawals and diversions within the watershed. Flows from Deer Creek that enters lower Yuba River a short distance below Englebright dam are also affected by non-project water diversions and power operations at Lake Wildwood.

Flows through the lower Yuba River are managed by releases at Englebright dam under the Yuba River Accord and operations at licenses for the non-project Narrows I and Narrows II powerhouses. Although the average combined diversion of about 410,000 acre-feet of water annually from the Yuba River to the Bear River watershed accounts for about 17 percent of the natural unimpaired discharge ((YCWA, 2012) from the upper Yuba watershed (North Yuba, Middle Yuba, and South Yuba Rivers), it is difficult to determine the relative influence of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects diversions on spring-run Chinook salmon habitat conditions below Englebright dam given the present flow management operations. Relicensing studies for the Yuba River Development Project (Project No. 2246) have been conducted to evaluate the appropriate seasonal minimum streamflows to support, protect, and enhance aquatic and riparian habitat for spring-run Chinook salmon freshwater lifestages in lower Yuba River below Englebright dam. When our analysis of these data is complete and the appropriate minimum streamflows are determined to meet these management objectives in lower Yuba River, the Commission staff would have the necessary information

[21] The Parties to this Agreement are: YCWA, California Fish and Wildlife, and the following non-governmental organizations: South Yuba River Citizens League; Friends of the River; Trout Unlimited; and The Bay Institute. The Agreement resolved the instream flow, flow fluctuation, and water temperature issues that had been raised in litigation regarding the State Water Board's Revised Water-Right Decision 1644 (RD-1644).

to fully evaluate the cumulative effects of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects on listed species in this reach. If necessary, the environmental analyses of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects can be supplemented to address this issue.

**Central Valley Steelhead DPS—Auburn Ravine**

The Central Valley steelhead spawning run in Auburn Ravine occurs downstream of Auburn Ravine 1 diversion dam and generally between December and April after the irrigation and peak consumptive water delivery season. Spawning within the streams around Auburn Ravine usually occurs from late January through March. Fry emerge about 4 to 6 weeks after spawning, typically from late March to May. Juveniles can remain in freshwater for 1 to 3 years before migrating to the ocean to grow and mature; however, within the lower elevation streams of the Central Valley most steelhead spend just 1 year in the natal stream, with emigration typically occurring by spring the year following emergence between January and May, but occasionally as early as October. Fry rearing in Auburn Ravine occurs year round from emergence until emigration the following spring.

*Our Analysis*

Although designated steelhead critical habitat in Auburn Ravine extends upstream to Ophir cataract at RM 26.6, it is unlikely that steelhead occupy the 2.8 mile reach downstream to the non-project Auburn diversion dam 1 at RM 23.8. The available information suggests that the 11-foot-high Auburn Ravine 1 diversion dam is a barrier to upstream-migrating adult steelhead, during all but the most infrequent hydrological conditions (PG&E, 2010, 2012a). There are no confirmed occurrences of anadromous fish in Auburn Ravine upstream of Auburn Ravine 1 diversion dam (PG&E, 2010). Reports of steelhead adults and juveniles as far up Auburn Ravine as the Wise powerhouses (Lower Drum Project) are unconfirmed, as the observed rainbow trout were not confirmed to be steelhead rather than resident rainbow trout (Technical Memorandum 3-13, Western Placer County Streams). In a survey of upstream passage and fish screen opportunities at diversion dams on Auburn Ravine, Bailey and Buell (2005) report that the Auburn Ravine 1 diversion dam is a formidable, and conceivably, perennial barrier to upstream migration except at extreme high streamflows, which would inundate the dam (flows at which the water surface elevation upstream and downstream of the dam converge).

PG&E reports that during the irrigation season (April to November) combined flows of 200 to 250 cfs are not uncommon at Auburn Ravine 1 diversion dam and do not approach inundation conditions. The flows necessary to inundate Auburn Ravine 1 diversion dam have not been documented; however, available data indicate that such flows are rare and are substantially greater than the flows available when adult steelhead would be present. Based on available hydrologic information for Auburn Ravine, estimated high unregulated flows in excess of 200 cfs occur occasionally during the winter period. Estimates of unregulated streamflow for the 12 water years from 1998 to 2009 indicate that natural unregulated streamflows would have exceeded 200 cfs on only 14 days. During that period flows would have exceeded 400 cfs only twice with a maximum of 570 cfs; it is unknown if these two flow events caused inundation of the Auburn Ravine 1 diversion dam. Typical flows from hydroelectric spill releases (about 40 to 80 cfs) during the winter and spring (November to mid-April) are considerably less. The likelihood of flows necessary to inundate Auburn Ravine 1 diversion dam at a time when adult steelhead would be present is extremely low, making this 2.8 mile reach of Auburn Ravine essentially inaccessible and unoccupied by steelhead.

Direct effects of PG&E project operations in Auburn Ravine extend from the South canal release point at RM 27.5, to about 1.2 miles downstream to the Auburn tunnel at RM 26.4. Thus, the project directly affects flows in about 0.2 mile of designated critical habitat for steelhead in Auburn Ravine between Ophir cataract and Auburn tunnel. Downstream of Auburn tunnel and Auburn 1 diversion dam,

streamflows and designated critical habitat are cumulatively affected by project and multiple non-project operations (section 3.3.2, *Cumulative Effects*).

Typical project operations result in flows that are similar to or higher than unregulated conditions and have little if any effect on designated critical habitat for steelhead in Auburn Ravine. Except during canal outages, project and non-project releases from South canal maintain streamflows that are typically higher than natural unregulated flows, which support designated critical habitat for steelhead in lower Auburn Ravine. During canal outages (typically scheduled between mid-October and mid-November following the irrigation season) flows in Auburn Ravine below PG&E's South canal release point and Auburn tunnel are relatively low consisting of the unregulated natural flow for the period. Planned outages for annual maintenance are typically completed by late November, after which Wise and Wise no. 2 powerhouses begin operation and releases from South canal augment Auburn Ravine streamflows through winter and spring.

Releases from South canal during operations of Wise and Wise no. 2 powerhouses (Lower Drum Project) in late-fall and winter generally increase the frequency and duration of high flow events. However, the magnitude and timing of these releases from South canal are in the same range as natural unregulated runoff events in this watershed (figures 3.5-19 and 3.5-20 from technical memorandum 3-13, *Western Placer County Streams*). Because the magnitude and timing of releases from South canal are in the same range as natural unregulated runoff events in this watershed, the potential direct effects of project operations on designated critical habitat upstream of Auburn tunnel (RM 26.4 to RM 26.6) are minimal.

Releases from South canal between mid-April and mid-October are made primarily to meet non-project consumptive demands (50 to 170 cfs) for irrigation downstream of Auburn tunnel. During this period, these releases would occur regardless of operations at Wise and Wise no. 2 powerhouses. Flow releases to Auburn Ravine at South canal during the consumptive water delivery period typically increase through the summer and are higher than natural unregulated flows. During late spring, PG&E's releases from South canal to meet consumptive water deliveries maintain streamflows that are significantly higher than unregulated natural flows in the 0.2 mile of Auburn Ravine with designated critical habitat for steelhead.

**Central Valley Steelhead DPS—Lower Yuba River**

Central Valley steelhead DPS has low productivity and abundance and is at high risk of extinction (NMFS, 2012). The population is limited by complete barriers to migration at Englebright dam and false attraction flows below the Narrows I and Narrows II powerhouses and at Waterway 13 discharge from the Yuba Goldfields below Daguerre Point dam. In addition, the genetic integrity of the Central Valley steelhead in the lower Yuba River is compromised by introgression with hatchery populations of Central Valley steelhead which has been found to reduce wild steelhead reproduction and fitness (NMFS, 2012).

Streamflows the lower Yuba River below Englebright dam are cumulatively affected by water diversions from Middle Yuba River and Canyon Creek by the Yuba-Bear Project, from South Yuba River by the Upper Drum-Spaulding Project and from North Yuba River by non-project operations.

*Our Analysis*

As described above for spring-run Chinook salmon, adult migration, holding, and, spawning, and juvenile rearing habitat for Central Valley steelhead in the Yuba River are similarly affected by historical habitat degradation, flow regulation, and blockage/delays to migration created by Daguerre Point and Englebright dams. As previously described, flow management and regulation at Englebright dam and the

Narrows I and II power houses, and New Bullards Bar reservoir and New Colgate powerhouse cumulative affect flow in the lower Yuba River in conjunction with operations and interbasin water transfers by the Yuba-Bear and Upper Drum-Spaulding Projects and other non-project water diversions.

Water temperatures between Englebright dam and Daguerre Point dam are generally good and support embryonic incubation. However, redd superimposition as a result of overlapping Chinook salmon spawning shifts embryos away from suitable incubation habitat and can flush embryos into the water column, where they are vulnerable to predation. This is a chronic stressor on the population that varies from year to year based on population abundance of fall-run and spring-run Chinook salmon.

Juvenile steelhead are more susceptible to the negative effects of degraded rearing habitat, as they rear in freshwater longer than most Chinook salmon. The lower Yuba River is deficient in instream woody material, gravel, has reduced floodplain availability associated with stream channel and riparian degradation from historical mining activities, high levels of predation, and a lack of access to historic juvenile rearing habitat. These factors reduce the amount and extent of juvenile rearing habitat available to steelhead in the lower Yuba River. Although suitable rearing habitat exists in the watershed, limited access under various flow conditions to adequate habitat for juvenile rearing is a very high stressor for the Yuba River Central Valley steelhead population (NMFS, 2012).

Juvenile Central Valley steelhead can be adversely affected by Daguerre Point dam on their downstream migration. The large plunge pool at the base of the dam creates an area of unnatural advantage for predatory fish which may seasonally congregate below Daguerre Point dam. The plunge pool is deep and provides optimal conditions for predators in an area where juvenile salmonids can be disoriented or stunned after they plunge over the face of the dam into the turbulent waters at the base, making them highly vulnerable to predation. High levels of predation over long periods of time can reduce juvenile numbers and weaken their contribution to year class strength and recruitment.

Flows through lower Yuba River are managed by releases at Englebright dam under the Yuba River Accord and the licenses for the non-project Narrows I and Narrows II powerhouses. As discussed above, the flow released at Englebright dam is provided and managed primarily by hydropower operations and low level outlet releases at New Bullards Bar reservoir and New Colgate powerhouse. Although the combined diversion of about 410,000 acre-feet of water annually from the Yuba River to the Bear River watershed accounts for about 17 percent of the natural discharge from the upper Yuba watershed (North Yuba, Middle Yuba, and South Yuba Rivers), it is difficult to determine the relative influence of Yuba-Bear and Upper Drum-Spaulding Project diversions on Central Valley steelhead habitat conditions below Englebright dam given the present flow management operations. Ongoing relicensing studies for the Yuba River Development Project (FERC Project No. 2246) are being conducted to evaluate the appropriate seasonal minimum streamflows to support, protect, and enhance aquatic and riparian habitat for Central Valley steelhead freshwater lifestages in lower Yuba River below Englebright dam. When analysis of these data is complete and the appropriate minimum streamflows are determined to meet these management objectives in lower Yuba River the Commission would have the necessary information to evaluate the cumulative effects of the Yuba-Bear and Upper Drum-Spaulding Projects on the aquatic resources in this reach, including effects of the interbasin transfer of water.

**Southern Green Sturgeon DPS in the Lower Yuba River**

Adult migration and spawning and early development and growth of green sturgeon in Central Valley occur primarily in the Sacramento River between Red Bluff diversion dam and Keswick dam as well as some tributaries including Feather River (NMFS, 2012). Although adults exhibiting spawning behavior were observed below Daguerre Point dam in 2011, suitable spawning habitat above the dam has been inaccessible since construction of the dam and eggs, larvae, and juveniles have not been documented in lower Yuba River. It does not appear that adult green sturgeon historically migrated above the location

of Englebright reservoir, consequently, NMFS has not proposed passage of green sturgeon above Englebright dam. NMFS (2012) identified factors affecting the low green sturgeon population and viability including blocked access to spawning habitat upstream of Daguerre Point dam, lack of suitable spawning substrate and deep pools, low flows, and elevated water temperatures.

*Our Analysis*

Key factors cited by NMFS that contribute to the low viability of the southern green sturgeon DPS in the lower Yuba River are substrate, water depth, flow, and water temperature similar to conditions affecting Central Valley spring-run Chinook salmon and steelhead. Designated habitat for green sturgeon does not exist above Englebright dam. The potential cumulative effects of flow diversions by the Yuba-Bear, Upper Drum-Spaulding, Deer Creek, and Lower Drum Projects on aquatic habitat for green sturgeon in the lower Yuba River below Englebright dam would be similar to the effects on spring-run Chinook salmon and steelhead discussed previously.

Ongoing relicensing studies for the Yuba River Development Project (FERC Project no. 2246) are being conducted to evaluate the appropriate seasonal minimum streamflows to support, protect, and enhance aquatic and riparian habitat for green sturgeon freshwater lifestages in lower Yuba River below Englebright dam and provide access to suitable spawning habitat above Daguerre Point dam. When analysis of these data is complete and the appropriate minimum streamflows are determined to meet these management objectives in lower Yuba River the Commission would have the necessary information to evaluate the cumulative effects of the Yuba-Bear and Upper Drum-Spaulding Projects on the aquatic resources in this reach, including effects of the interbasin transfer of water.

**Stebbins' Morning-glory and Layne's Butterweed**

Stebbins' morning-glory has the potential to colonize the project area based on suitable and available habitat. Stebbins' morning-glory occurs primarily on gabbro soils in the Pine Hill formation and appropriate habitat occurs in the project area.

Layne's butterweed has the potential to colonize the project area based on suitable and available habitat. It occurs primarily on gabbro soils in El Dorado County, including the Pine Hill formation, and appropriate habitat occurs in the project area.

*Our Analysis*

Although these species have not been observed in the project areas, potential habitat has been found at various locations, as described above. If these species were to colonize suitable habitats in the future, potential effects could result from O&M activities that currently take place as part of normal project operations including routine ground-disturbing activities and vegetation management activities such as mechanical clearing and herbicide use. Negative effects on threatened and endangered species associated with proposed recreation facility enhancements (e.g., road widening, parking lot expansions, campground expansion) and increased recreation use are not expected; however, may occur if these plants colonize these areas. Conversely, positive effects on these species are possible if OHV use, camping, and hiking activities in unauthorized areas are reduced by the recreation proposals contained within the final license application.

PG&E's Integrated Vegetation Management Plan includes a component to protect special-status species, which would decrease future effects to special-status plants through the protection of sensitive vegetation resources within the project boundary. It also provides for the training of employees and an annual consultation meeting that would help protect listed plant species.

Given that these species are not found within the project boundaries and with these procedures in place, the projects are not likely to adversely affect Stebbins' morning-glory or Layne's butterweed.

**California Red-legged Frog**

The nearest California red-legged frog population and critical habitat is about 4.6 miles from the Upper Drum-Spaulding Project and is unaffected by the project. No observations of California red-legged frog were documented within the project areas. Essential components of California red-legged frog breeding habitat were present at four project facilities (Deer Creek forebay, Deer Creek Project; Drum afterbay, Upper Drum-Spaulding Project; Halsey afterbay, Lower Drum Project; and Rock Creek reservoir, Lower Drum Project), but the habitat has marginal quality because of the presence of predatory fish and American bullfrog. Parts of one stream reach affected by the Drum-Spaulding Project (Bear River reach #2), and two stream reaches affected by the Lower Drum Project (Halsey afterbay dam reach, and Rock Creek reservoir dam reach) may also contain suitable habitats. None of these sites is within 1 mile of a historical or known occurrence of California red-legged frog.

*Our Analysis*

There is a low probability that California red-legged frog occurs at any facility in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects, where potential habitat is either absent, of marginal quality, or at non-project sites. However, the presence of the species cannot be disproved without extensive surveys throughout the area, most of which is on private property.

Project sites exhibiting essential components of California red-legged frog breeding habitat, including Deer Creek forebay (Deer Creek Project), Drum afterbay (Upper Drum-Spaulding Project), and the Halsey afterbay, and Rock Creek reservoir (Lower Drum Project), were characterized as small water bodies with emergent vegetation or dense, overhanging shrubs at the margins. If red-legged frogs were found at these sites, they could be affected by short-term changes in water level, and annual maintenance. However, Deer Creek forebay (brown trout), Drum afterbay, Halsey afterbay (brown trout and green sunfish), and Rock Creek reservoir also contain known introduced predatory fish that diminish suitability for California red-legged frog.

Most stream reaches potentially affected by the projects do not provide breeding habitat. Larger rivers are characterized by strong currents and do not support backwater areas or suitable vegetation for egg attachment or cover. Smaller streams are mostly too shallow and higher gradient; where sufficiently deep pools exist, suitable emergent or margin vegetation is absent. Three reaches do provide pools or backwaters with suitable emergent or margin vegetation. In Bear River reach no. 2 (Upper Drum-Spaulding Project), low water temperatures and abundant fish may limit suitability for California red-legged frog. In the Halsey afterbay dam reach and Rock Creek dam reach (Lower Drum Project), the presence of predators (centrarchid fish and American bullfrog) and surrounding suburban development may decrease the suitability and quality of potential habitat for the California red-legged frog.

PG&E's proposals to consult annually with the Forest Service, BLM, and Reclamation and to conduct annual employee training, as previously discussed under *General Protection Measures*, would help protect the red-legged frog.

Given the low probability of occurrence of this species and marginal habitat, and with these procedures in place, the projects are not likely to adversely affect the California red-legged frog.

**Sierra Nevada Yellow-legged Frog**

No observations of Sierra Nevada yellow-legged frog were documented within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project areas; however, there are observed historical occurrences of Sierra Nevada yellow-legged frog in Upper Drum-Spaulding Project reservoirs Fordyce Lake, Lake Sterling, and White Rock Lake. Suitable habitat was also documented 0.4 mile west of Meadow Lake (Upper Drum-Spaulding Project). Suitable habitat for egg mass placement and use by tadpoles, as well as deeper, over-wintering habitats were observed in the Upper South Yuba reach #2 (Upper Drum-Spaulding Project); however, the habitat has marginal quality because of the presence of predatory fish.

*Our Analysis*

There is a low probability that Sierra Nevada yellow-legged frog occurs at any facility in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects, where potential habitat is either absent, of marginal quality, or at non-Project sites. However, the presence of the species cannot be disproved without extensive surveys throughout the area, most of which is on private property. If Sierra Nevada yellow-legged frogs were found at these sites they could be affected by short-term changes in water level, and annual maintenance.

Project sites exhibiting essential components of Sierra Nevada yellow-legged frog breeding habitat, including Fordyce Lake, Lake Sterling, White Rock Lake, and Meadow Lake were characterized as relatively large, deep, permanent ponds where fish did not occur. The Upper South Yuba reach #2 was the only Upper Drum-Spaulding stream reach that exhibited shallow, vegetated habitat suitable for egg mass placement and use by tadpoles, as well as deeper, over-wintering habitat; however, the presence of predatory fish decreases the suitability and quality of potential habitat for the Sierra Nevada yellow-legged frog.

PG&E's proposals to consult annually with the Forest Service, BLM, and Reclamation and to conduct annual employee training, as previously discussed under *General Protection Measures*, would help protect the Sierra Nevada yellow-legged frog.

Given the low probability of occurrence of this species and marginal habitat, and with these procedures in place, the project is not likely to adversely affect the Sierra Nevada yellow-legged frog.

Actions that can affect the proposed critical habitat for the Sierra Nevada yellow-legged frog include significant alteration of water chemistry or temperature; significant increase sediment deposition; significant alteration channel or lake morphology, geometry, or availability; and significant reductions or limitations of the availability of breeding or overwintering aquatic habitat (FWS 2013b)

Project operation can affect the 16 reservoirs and 16 stream reaches associated with the Upper Drum-Spaulding Project (see section 3.3.4.1) that are located within the proposed critical habitat as a result of reservoir fluctuations, reduced flows in river reaches, effects on water temperature, erosion and sedimentation, and fish stocking of reservoirs.

As discussed above, current operation and maintenance has little effect on existing habitat. Many of the reservoirs and stream reaches do not provide habitat conditions suitable for the frog. Much of the currently used habitat is located near project reservoirs but outside the zone of project influence. Further, the release of minimum flows, reductions in flow fluctuations, implementation of erosion and sediment control measures recommended by PG&E or specified by Forest Service and BLM conditions would minimize potential effects to frog habitat.

Although some of the reservoirs and stream reaches may be potentially suitable habitat, the presence of predatory fish makes those habitats unsuitable. Introduced trout are a known cause for the decline of mountain yellow-legged frogs as a result of predation and also contributes to isolating remaining frog populations from each other (Bradford et al., 1993). The stocking of Upper Rock Lake, Lower Rock Lake, Culbertson Lake, Feeley Lake, Carr Lake, Lower Lindsey Lake, Lake Spaulding, Fordyce Lake, Lake Sterling, White Rock Lake, Meadow Lake, and Upper Lindsey Lake, all within the proposed critical habitat area, could contribute to the persistent of predatory fish in reservoirs and river reaches, which could preclude recolonization and limit the value of the habitat for conservation of the frog. However, many of these populations are self-sustaining.

We do not anticipate that continued operation of the Upper Drum-Spaulding Project would significantly alter water chemistry or temperature that would adversely affect individuals and their life cycle; significantly increase sediment deposition within stream channels or project reservoirs or disturb riparian foraging and dispersal habitat from project operation or recreational use; significantly alter channel or lake morphology or water availability; or significantly reduce or limit the availability of breeding or overwintering habitat. We conclude that proposed critical habitat would continue to serve its intended conservation role of the habitat and would not appreciably reduce the suitability of the critical habitat for the frog.

**Valley Elderberry Longhorn Beetle**

Future project-related maintenance activities at the Lower Drum Project could result in the clearing of elderberry and negatively affect VELB.

PG&E initiated consultation in 2001with the Forest Service, FWS, and BLM regarding the potential effects to VELB associated with PG&E's transmission line separation project. In 2003, a final Memorandum of Understanding was executed between PG&E, Forest Service, FWS, and BLM, defining the roles of each party in the consultation and implementation of a Programmatic Biological Opinion (PBO - USFWS file 1-1-01-F-0014). The Programmatic Biological Opinion was approved in 2003 and covers the effects of PG&E's routine O&M activities within the potential range of the VELB. The Programmatic Biological Opinion forms the basis for PG&E's VELB Conservation Program. It was developed to ensure that PG&E's facilities and operations, which would include the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects, are in compliance with the ESA and that PG&E's actions proactively work to support VELB recovery. The PG&E VELB Conservation Program, as articulated in the Programmatic Biological Opinion, includes transmission lines associated with FERC-licensed projects owned and operated by PG&E, as well as various PG&E linear facilities associated with hydroelectric generation projects such as, canals, penstocks, dams, weirs, flumes, culverts, powerhouses, and associated roads. The PG&E VELB Conservation Program addresses potential effects of the project by providing avoidance and minimization measures. PG&E proposes as a VELB management measure to comply with the Programmatic Biological Opinion.

PG&E also proposes to implement the March 2013 Integrated Vegetation Management Plan, which contains specific provisions and guidance for internal coordination of programmatic protections for VELB and VELB habitat.

*Our Analysis*

As discussed above, PG&E has identified elderberry at 26 locations within the Lower Drum Project area (table 3-208). PG&E routinely conducts O&M activities in the vicinity of 18 of these locations. The primary O&M activity with the potential to affect elderberry is vegetation management to ensure safe employee access to and structural integrity of water conveyance and storage and related facilities (i.e., buildings, communications structures, etc.) associated with hydroelectric generation

projects. Canal maintenance and road maintenance activities also have the potential to affect elderberry. In some locations, PG&E has observed evidence of trimming of the upper branches of elderberry, likely the result of public use of the area. "Do Not Cut" tapes have been attached to elderberry occurrences where PG&E O&M activities generally take place. Project staff is aware of the elderberry existence and avoids the plants during O&M activities

The guidance in PG&E's March 2013 Integrated Vegetation Management Plan for internal coordination of programmatic protections for VELB and VELB habitat would ensure adherence to previously developed guidance and protect or minimize VELB habitat from future construction and O&M activities. PG&E's proposals to consult annually with the Forest Service, BLM, and Reclamation and to conduct annual employee training, in addition to PG&E's acceptance of Forest Service condition 45 and BLM condition 14 to annually review lists of special-status species would provide protection to special-status species within the project boundary. Although these procedures would result in the avoidance or minimization of impacts, adverse impacts to the VELB may still result during the next license term. Any effects to elderberry shrubs during the term of the license, which is expected to be limited, would be offset by that habitat acquired or developed under the conservation program. Training of maintenance workers and implementation of minimization and avoidance would reduce the likelihood of potential incidental take of the VELB.

**West Coast DPS of the Pacific Fisher**

Project-related operation and maintenance activities, project structures, roads, recreational use have the potential to affect the Pacific fisher.

FWS filed a 10(a) recommendation recommending that PG&E develop a wolverine and Pacific fisher management plan to protect these species within carnivore management areas, and that PG&E prevent the use of second-generation anti-coagulants within the project area.

In regard to anticoagulants, PG&E states in its correspondence with FWS that it adheres to federal, state, and local laws pertaining to the use of rodenticides.

*Our Analysis*

Few historic occurrences of Pacific fisher have been documented at Meadow Lake, Fordyce Lake, Lake Sterling, and Lake Spaulding and potential habitat is widespread through the project area.

The Pacific fisher is sensitive to human disturbance and will avoid areas with high human presence. Disturbances from human activities and vegetation removal associated with operation and maintenance of project facilities that are located in potential habitat or are located in close proximity to historic sightings (PG&E and NID, 2011f, table 3.0-5) could affect the fisher or its habitat. Operation and maintenance activities within the Drum-Spaulding Project include dam inspections, road maintenance, brush pile removal, hazard tree removal, canal maintenance, servicing and repair of recreation facilities, vegetation management, and transmission line pole replacement (PG&E and NID, 2011f, table 3.0-5). These activities occur on an annual, monthly, weekly, daily, or as-needed basis. Disturbances from recreation camping, hiking off-road travel, and use of day-use areas could also disturb the fisher. Given the limited scope of these activities, they would be unlikely to result in substantial disturbance or displacement of individuals if they were to occur in the project area.

Vegetation removal associated with maintenance activities would be limited and mature trees would be removed only if considered hazardous. Effects to denning habitat, such as large snags, are expected to be minimal. Further, the removal of structural components from vegetation management

would have minimal effect on prey species. Consequently, overall vegetation management effects to the fisher would be minimal.

If individuals crossed project access roads, they could be hit by road traffic associated with operation and maintenance of the project. This possibility is considered unlikely due to the low density of fisher in the action area, and the scattered stands of forest habitat in the area crossed by access roads.

The project could also affect wildlife movement through the project area. Wildlife passage points, however, are generally common throughout the Drum-Spaulding Project study area and include footbridges, road crossings, elevated features, and tunnels. The Drum-Spaulding Project contains 180 suitable passage points for Pacific fisher. Additionally, all eight Drum-Spaulding Project penstocks provide suitable passage throughout their entire length. Six of the eight Drum-Spaulding Project conduits have specific segments that exceeded the 0.5 mile passage criteria based on the maximum distance between passage points. The three penstocks (Upper Drum-Spaulding Project) and the Drum canal associated with Lake Spaulding (Lower Drum Project) are the only conduits in close proximity to a fisher observation. All three penstocks are unlikely to impede movement of either species because they are short in length (Spaulding No. 3 and No. 2) or are buried (Spaulding No. 1). The Drum canal provides 17 passage points for Pacific fisher. Overall, any effects to wildlife are expected to be minimal.

No mortalities for Pacific fisher have been reported as a result of project conduits. Most conduits have few wildlife entrapment points, and all consist of grizzlies (i.e., trashracks) installed at pipe, siphon, or tunnel intake locations. The Drum-Spaulding Project contains 17 entrapment points. Types of wildlife escape points include vehicle ramps, low-angle banks–natural/gunite, and low-angle banks–gunite with benches. The Drum-Spaulding Project study areas have 278 escape points. Fisher mortality is expected to be minimal.

Measures previously discussed under *Wildlife Movement and Mortality* would benefit carnivores by improving movement through the project area.

Although Pacific fisher designated carnivore management areas overlap with some of the project areas, the existing populations of Pacific fisher do not overlap with the project boundary. The development of a Pacific fisher management plan, as recommended by FWS, would add limited protection to this species due to its lack of use of the available habitat within the project boundary

PG&E is bound by federal, state, and local laws pertaining to the use of rodenticides as part of O&M activities. These products, if legally registered for use within the State of California and used as directed on the product labels, are suitable for use.

PG&E's proposals to consult annually with the Forest Service, BLM, and Reclamation and to conduct annual employee training, as previously discussed under General Protection Measures, would help protect the fisher.

#### 3.3.4.2.2 Yuba-Bear Project

**General Protection Measures**

NID proposes to implement an Integrated Vegetation Management Plan at the Yuba-Bear Project. NID's March 2013 Integrated Vegetation Management Plan includes provisions for the management and protection of special-status plants on federal lands. Specifically, the March 2013 Integrated Vegetation Management Plan would require NID, beginning in the first full calendar year, to annually review current lists of special-status species that might occur in the project area and that may be affected by project O&M activities. If a species were added to the list, NID in consultation

with Forest Service, BLM, and California Fish and Wildlife, would determine if the species or suitable habitat is likely to occur on project lands. If a special-status species were likely to occur on project lands, then NID, in consultation with Forest Service, BLM, and California Fish and Wildlife, would develop and implement a study plan to assess the effects of O&M activities on the special-status species. Additionally, if special-status species were detected prior to or during construction or O&M activities, NID would immediately notify appropriate agencies. If it is determined that activities are adversely affecting the species, then NID would develop appropriate protective measures. NID's March 2013 Integrated Vegetation Management Plan also includes a significant component to protect special-status species through the protection of sensitive vegetation resources within the project boundary.

Forest Service condition 38 and BLM condition 15 specify that NID implement the March 2013 Integrated Vegetation Management Plan.

Forest Service condition 43 and BLM condition 13 are nearly identical and would also require that NID submit a biological evaluation for approval prior to any construction projects on project lands that may affect special-status species or critical habitat. The biological evaluation would assess the potential effects of the proposed action on special-status species or their habitats, and would include components such as: (1) avoidance or minimization of adverse effects to special-status species; (2) compliance of project-related activities to protective measures in management plans for special-status species; and (3) development of implementation and effectiveness monitoring of measures taken or employed to reduce effects to special-status species. If necessary, Forest Service or the BLM may require mitigation techniques.

Forest Service condition 44 and BLM condition 20 would require annual review of the current list of special-status species that might occur on Forest Service or BLM lands in the project area. The review would consider new additions of species, and a determination of the newly listed species is likely to occur in the project area, in consultation with the Forest Service, BLM and other agencies. If it is determined that a newly listed species is likely to occur in the project vicinity and may be impacted by the project or its operation, the license would prepare and implement a study plan to evaluate potential project effects on the species.

California Fish and Wildlife submitted 10(j) recommendations 7.6 and 7.7 recommending an annual review of special-status species lists and the submittal of a biological evaluation prior to construction activities that may disturb special-status species or critical habitat. This is similar to the provisions for special-status species review and protection included in the March 2013 Integrated Vegetation Management Plan.

*Our Analysis*

Special-status plants could be adversely affected by the following project O&M activities: (1) ground-disturbing activities; (2) vegetation management activities such as mechanical clearing and herbicide use; and (3) recreational use, which can lead to trampling of plants. Project O&M activities were observed directly affecting occurrences of four different special-status plant species: Congdon's onion, Brandegee's clarkia, round-leaved sundew, and Sierra starwort. These effects generally affected a limited number of individuals within a larger occurrence. In all cases, the effects were site-specific, though the duration could be long term, if project operations continue unchanged. However, relative to the number of individuals and the area of occurrences present, the overall effect on a given species is minor.

No occurrences of special-status plants were observed growing on or directly adjacent to the site of the proposed Rollins no. 2 powerhouse. In addition, the habitat is not suited to the special-status plants with the potential to grow in the project area.

The proposed changes or additions to recreation facilities are not located on or near known special-status plant occurrences. The closest occurrences of special-status plants are on the opposite bank of the reservoirs at both Milton diversion dam impoundment and Dutch Flat afterbay. The proposed recreation facilities should not affect special-status plants.

Implementation of the March 2013 Integrated Vegetation Management Plan at the Yuba-Bear Project would require NID to conduct surveys for special-status plants at project facilities on federal lands within the project boundary. NID would conduct the surveys within 1 year of license issuance and once every 10 years thereafter through the term of a new license. The surveys may include any new plant species added as result of updates to the lists of state threatened or endangered species, BLM sensitive plant species, or Forest Service sensitive and watchlist species. The surveys would be conducted according to the most currently accepted protocols. Implementation of the management plan would minimize and mitigate for any project effects to special-status plant species that may occur as a result of project O&M and any new project-related construction activities. Through the review and survey activities included in the Integrated Vegetation Management Plan, in addition to surveying special-status species at the project, NID would also be in direct consultation with Forest Service, BLM and other resource agencies about the current list of special-status species, and in this way would also fulfill the objectives of Forest Service condition 45 and 14.

Before construction of any project features not addressed in this EIS, NID would first need to file a license amendment with the Commission. At that time, a biological evaluation for the protection of special-status species would be developed, if appropriate, as part of the license amendment proceeding.

**Central Valley Chinook Salmon ESU**

Effects of the Yuba-Bear Project on the Central Valley Chinook salmon ESU are discussed in section 3.3.4.2.1, *Upper Drum-Spaulding, Lower Drum and Deer Creek Projects*.

**Central Valley Steelhead DPS—Lower Yuba River**

Effects of the Yuba-Bear Project on the Central Valley steelhead DPS are discussed in section 3.3.4.2.1, *Upper Drum-Spaulding, Lower Drum and Deer Creek Projects*.

**Southern Green Sturgeon DPS in the Lower Yuba River**

Effects of the Yuba-Bear Project on the southern green sturgeon DPS in the lower Yuba River are discussed in section 3.3.4.2.1, *Upper Drum-Spaulding, Lower Drum and Deer Creek Projects*.

**Stebbins' Morning-glory**

Stebbins' morning-glory has the potential to colonize the project area based on suitable and available habitat. Stebbins' morning-glory occurs primarily on gabbro soils in the Pine Hill formation and appropriate habitat occurs in the project area.

*Our Analysis*

Although this species has not been observed in the project area, potential habitat has been found at various locations, as described above. If this species were to colonize suitable habitats in the future,

potential effects could result from O&M activities that currently take place as part of normal project operations including routine ground-disturbing activities and vegetation management activities such as mechanical clearing and herbicide use. Negative effects on threatened and endangered species associated with proposed recreation facility enhancements (e.g., road widening, parking lot expansions, campground expansion) and increased recreation use are not expected; however, may occur if this resource colonizes these areas. Conversely, positive effects on threatened and endangered species are possible if off road vehicle use, camping, and hiking activities in unauthorized areas is reduced by the recreation proposals contained within the final license application.

NID's proposed Integrated Vegetation Management Plan that includes provisions to meet annually with the Forest Service and BLM to review pertinent special-status species lists and to consult with the Forest Service and BLM on potential effects of new facilities on special-status species on federal land, as previously discussed in the *General Protection Measures* section, would help protect listed plant species.

Given that this species is not found within the project boundary and with these procedures in place, the project is not likely to adversely affect Stebbins' morning-glory.

**California Red-legged Frog**

The nearest California red-legged frog population and critical habitats were found to be 11.5 miles from the project site and are unaffected by the project. No observations of California red-legged frog were documented within the project area. Essential components of California red-legged frog breeding habitat were present at four project facilities (Dutch Flat forebay, Dutch Flat afterbay, Little York Basin (Chicago Park flume), and Chicago Park forebay), but the habitat has marginal quality because of the presence of predatory fish and other factors (table 3-207). Additionally, there are only a few other sites within the 1-mile dispersal distance of any of these project facilities that could potentially support California red-legged frog breeding. Overall, there is a low probability that California red-legged frog occurs at any facility in the Yuba-Bear Project, where potential habitat is either absent, of marginal quality, or at non-project sites.

*Our Analysis*

There is a low probability that California red-legged frog occurs at any facility in the Yuba-Bear Project where potential habitat is either absent, of marginal quality, or at non-project sites. However, the presence of the species cannot be disproved without extensive surveys throughout the area, most of which is on private property.

Project sites exhibiting essential components of California red-legged frog breeding habitat, including Dutch Flat forebay and afterbay, Little York Basin, and Chicago Park forebay, were characterized as small water bodies with emergent vegetation or dense, overhanging shrubs at the margins. Dutch Flat afterbay and forebay are characterized by perennial, deep, slow-moving water and banks covered with dense Himalayan blackberry, that might constitute potential breeding habitat for red-legged frogs. No information regarding fish species in the Dutch Flat afterbay exists; however, fish were observed in the site during the assessment, and species known to occur in the Bear River immediately upstream of the Dutch Flat afterbay (brown trout and green sunfish) likely occur there as well.

Little York Basin consists of deep, slow-moving water and dense margin and overhanging vegetation. Fish, however, are known to occur in the Little York Basin. Although there is evidence of essential components of California red-legged frog breeding habitat in the Chicago Park forebay, there is a lack of suitable pools and emergent vegetation and largely unvegetated banks that can limit suitability for the California red-legged frog. Introduced fish are also present.

Stream reaches affected by the project do not contain breeding habitat, but might provide suitable non-breeding summer habitat. It is unlikely that any effects of project on streamflows would potential use as non-breeding habitat.

NID's proposals to meet annually with the Forest Service and BLM to review pertinent special-status species lists and to consult with the Forest Service and BLM on potential effects of new facilities on special-status species on federal land, as previously discussed in the *General Protection Measures* section, would help protect red-legged frogs, if present.

Given the low probability of occurrence of this species and marginal habitat and with these procedures in place, the project is not likely to adversely affect the California red-legged frog.

**Sierra Nevada Yellow-legged Frog**

The Sierra Nevada yellow-legged frog was documented at three sites south of the Yuba-Bear Project's French Lake. Historical occurrences of Sierra Nevada yellow-legged frog in the Yuba-Bear Project have been documented at French Lake and Faucherie Lake. These sites are characterized as relatively large, deep, permanent ponds where fish do not occur. Suitable habitat for egg mass placement and use by tadpoles, as well as deeper, over-wintering habitats were observed in the Sawmill Lake dam reach; however, the habitat has marginal quality because of the presence of predatory fish. The survey results indicate that the frog utilizes habitat in the stream and strongly suggest that the large ponds act as a breeding location.

*Our Analysis*

There is a high probability that Sierra Nevada yellow-legged frog occurs within the Yuba-Bear Project because there is documented occurrences and suitable habitat in ponds for juvenile and adult life stages, but breeding habitat quality is either absent or of marginal quality. Sierra Nevada yellow-legged frogs could be affected by short-term changes in water level, and annual maintenance. Additionally, increased minimum flows in the downstream reaches would likely enhance aquatic fishery habitat, further reducing the quality of breeding habitat available for Sierra Nevada yellow-legged frogs.

Project sites exhibiting essential components of Sierra Nevada yellow-legged frog breeding habitat, including the three sites below French Lake, were characterized as relatively large, deep, permanent ponds where fish did not occur. The Sawmill Lake dam reach was the only Yuba-Bear Project stream reach that exhibited shallow, vegetated habitat suitable for egg mass placement and use by tadpoles, as well as deeper, over-wintering habitat; however, the presence of predatory fish decreases the suitability and quality of potential habitat for the Sierra Nevada yellow-legged frog.

NID's proposals to consult annually with the Forest Service, BLM, and Reclamation and to conduct annual employee training, as previously discussed under *General Protection Measures*, would help protect the Sierra Nevada yellow-legged frog.

Given the low probability of occurrence of this species and marginal habitat, and with these procedures in place, the project is not likely to adversely affect the Sierra Nevada yellow-legged frog.

Actions that can affect the proposed critical habitat for the Sierra Nevada yellow-legged frog include significant alteration of water chemistry or temperature; significant increase sediment deposition; significant alteration channel or lake morphology, geometry, or availability; and significant reductions or limitations of the availability of breeding or overwintering aquatic habitat (FWS 2013a)

Project operation can affect the 5 reservoirs and 7 stream reaches associated with the Yuba-Bear Project (see section 3.3.4.1) that are located within the proposed critical habitat as a result of reservoir fluctuations, reduced flows in river reaches, effects on water temperature, erosion and sedimentation, and fish stocking of reservoirs.

As discussed above, current operation and maintenance has little effect on existing habitat. Many of the reservoirs and stream reaches do not provide habitat conditions suitable for the frog. Much of the currently used habitat is located near project reservoirs but outside the zone of project influence. Further, the release of minimum flows, reductions in flow fluctuations, implementation of erosion and sediment control measures recommended by NID or specified by Forest Service and BLM conditions would minimize potential effects to frog habitat.

Although some of the reservoirs and stream reaches may be potentially suitable habitat, the presence of predatory fish makes those habitats unsuitable. The stocking of Jackson Lake, Sawmill Lake, Faucherie Lake, Bowman Lake, French Lake, all within the proposed critical habitat area, could contribute to the persistent of predatory fish in reservoirs and river reaches, which could preclude recolonization and limit the value of the habitat for conservation of the frog. However, many of these populations are self-sustaining.

We do not anticipate that continued operation of the Yuba-Bear Project would significantly alter water chemistry or temperature that would adversely affect individuals and their life cycle; significantly increase sediment deposition within stream channels or project reservoirs or disturb riparian foraging and dispersal habitat from project operation or recreational use; significantly alter channel or lake morphology or water availability; or significantly reduce or limit the availability of breeding or overwintering habitat. We conclude that proposed critical habitat would continue to serve its intended conservation role of the habitat and would not appreciably reduce the suitability of the critical habitat for the frog.

**West Coast DPS of the Pacific Fisher**

Project-related operation and maintenance activities, project structures, roads, and recreational use have the potential to affect the Pacific fisher.

FWS filed a 10(a) recommendation recommending that NID develop a wolverine and Pacific fisher management plan to protect these species within carnivore management areas, and that PG&E prevent the use of second-generation anti-coagulants within the project area.

*Our Analysis*

Few historic occurrences of Pacific fisher have been documented at Jackson Meadows reservoir, along the Milton-Bowman conduit, and at Sawmill Lake and potential habitat is widespread through the project area.

The Pacific fisher is sensitive to human disturbance and will avoid areas with high human presence. Disturbances from human activities and vegetation removal associated with operation and maintenance of project facilities that are located in potential habitat or are located in close proximity to historic sightings (PG&E and NID, 2011f, table 3.0-4) could affect the fisher or its habitat. Operation and maintenance activities within the Yuba-Bear Project include dam inspections, road maintenance, hazard tree removal, canal maintenance, servicing and repair of recreation facilities, vegetation management, and transmission line pole replacement (PG&E and NID, 2011f, table 3.0-4). These activities occur on an annual, monthly, weekly, daily, or as-needed basis. Disturbances from recreational use such as camping, hiking off-road travel, and use of day-use areas could also disturb the fisher. Given the limited scope of

these activities, they would be unlikely to result in substantial disturbance or displacement of individuals if they were to occur in the project area.

Vegetation removal associated with maintenance activities would be limited and mature trees would be removed only if considered hazardous. Effects to denning habitat, such as large snags, are expected to be low. Further, the removal of structural components from vegetation management would have minimal effect on prey species. Consequently, overall vegetation management effects to the fisher would be minimal.

If individuals crossed project access roads, they could be hit by road traffic associated with operation and maintenance of the project. This possibility is considered unlikely due to the low density of fisher in the action area, and the scattered stands of forest habitat in the area crossed by access roads.

Vegetation trimming may occur along project facilities and roads. Vegetation removal is limited and mature trees would be removed only if considered hazardous. Consequently, vegetation management effects to fisher would be minimal. Activities associated with the construction of the proposed parking areas at Sawmill Lake and at Pass Creek boat launch may affect Pacific fisher, which is sensitive to disturbances during the breeding season. Construction activities would require vegetation removal, grading, laying of asphalt, haul trucks, installation of campfire rings, and picnic tables, which would lead to an increase in noise and human activities during the construction phase.

The project could also affect wildlife movement through the project area. Wildlife passage points, however, are generally common throughout the Yuba-Bear Project study area and include footbridges, road crossings, elevated features, and tunnels. The Yuba-Bear Project contains 56 suitable passage points for Pacific fisher. Additionally, both of the Yuba-Bear Project's above-ground penstocks provide suitable passage throughout their entire length. Three of the conduits in the Yuba-Bear Project have specific segments that exceed the 0.5 mile passage criteria based on the maximum distance between passage points. The Milton-Bowman conduit is the only conduit located in close proximity to a fisher observation. This project feature is unlikely to impede movement because it is a tunnel. Overall, any effects to wildlife movement are expected to be minimal.

No mortalities for Pacific fisher have been reported as a result of project conduits. Most conduits have few wildlife entrapment points, and all consist of grizzlies (i.e., trashracks) installed at pipe, siphon, or tunnel intake locations. The Yuba-Bear Project has nine entrapment points. Types of wildlife escape points include vehicle ramps, low-angle banks–natural/gunite, and low-angle banks–gunite with benches. The Yuba-Bear Project has 57 escape points. Fisher mortality is expected to be minimal.

Measures previously discussed under *Wildlife Movement and Mortality* would benefit carnivores by improving movement through the project area.

Although Pacific fisher designated carnivore management areas overlap with some of the project areas, the existing populations of Pacific fisher do not overlap with the project boundary. The development of a Pacific fisher management plan, as recommended by FWS, would add limited protection to this species due to its lack of use of the available habitat within the project boundary.

NID is bound by federal, state, and local laws pertaining to the use of rodenticides as part of O&M activities. These products, if legally registered for use within the State of California and used as directed on the product labels, are suitable for use.

NID's proposals to meet annually with the Forest Service and BLM to review pertinent special-status species lists and to consult with the Forest Service and BLM on potential effects of new facilities

on special-status species on federal land, as previously discussed in the General Protection Measures section, would help protect the wolverine.

### 3.3.5 Recreation Resources

#### 3.3.5.1 Affected Environment

**Regional Recreational Resources**

Opportunities for recreation within the region surrounding the Yuba-Bear, Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects are plentiful. The projects partially lie within and adjacent to the Tahoe National Forest, which provides formal and informal recreation facilities and opportunities for the public. Regional recreational opportunities include camping, angling, motorized and non-motorized boating, swimming, hiking, scuba diving, picnicking, sightseeing, wildlife viewing, OHV use, hunting, snowmobiling, cross country skiing, and snowshoeing.

The projects are located in northern California along the western slope of the Sierra Nevada geomorphic province in Sierra, Nevada, and Placer Counties. Other FERC-licensed hydroelectric projects in the region surrounding the Yuba-Bear, Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects provide recreational resources similar to those available at the projects. FERC-licensed projects in the vicinity of the projects include YCWA's Yuba River Development Project (FERC No. 2246), South Feather Water and Power Agency's South Feather Power Project (FERC No. 2088), California Department of Water Resource's Oroville Facilities Project (FERC No. 2100), and PCWA's Middle Fork American River Project (FERC No. 2079).

The Yuba River Development Project provides developed and undeveloped recreation facilities, including campgrounds, picnic areas, boat launch ramps, a marina, overlook area, day-use area, and hiking trails. Recreational opportunities at the Yuba River Project include water skiing, wakeboarding, house boating, motorized and non-motorized boating, jet skiing, wildlife viewing, angling, hiking, and camping (YCWA, 2010).

The South Feather Power Project is located within the Plumas National Forest and provides two developed recreation areas, Little Grass Valley reservoir and Sly Creek. Recreational opportunities at the South Feather Power Project include camping, angling, hunting, picnicking, OHV use, mountain biking, water skiing, whitewater boating, snow skiing, snowmobiling, and hiking (FERC, 2009b).

The Oroville Facilities Project is located along the Feather River and several tributaries. Most of the surrounding lands are undeveloped, and developed areas are located near the Oroville dam. Recreational opportunities include camping, boating, hiking, bicycling, and OHV use. Limited whitewater boating occurs within the project boundary when reservoir levels are low, exposing several miles of river on the Upper North Fork arm (FERC, 2007).

The Middle Fork American River Project includes campgrounds, picnic areas, boat ramps, and a scenic vista. Recreational facilities occur around French Meadows reservoir and Hell Hole reservoir. South Fork Long Canyon diversion pool and Ralston afterbay contain individual recreation facilities. Recreation opportunities included at these recreation areas include hiking, mountain biking, equestrian use, OHV use, angling, and whitewater boating (PCWA, 2011).

There are a number of whitewater boating opportunities in the region surrounding the projects (American Whitewater, 2012). Sections of the Bear River in the region range from Class II to V whitewater. Sections of the North Fork American River in the region range from Class II to V+ whitewater; the Middle Fork American River ranges from Class I to V+ whitewater; and the South Fork

American River ranges from Class II+ to V+ whitewater. Sections of the North Fork Yuba River range from Class II-V whitewater; the Middle Fork Yuba River ranges from Class II-V whitewater; the South Fork Yuba River ranges from Class IV to V+ whitewater; and the Yuba River ranges from Class I to V whitewater. Sections of the Middle Fork Feather River range from Class II to II and V to V+ whitewater and the South Fork Feather River ranges from Class III to V+ whitewater.

The Pacific Crest Trail, which is not part of the projects, is a national scenic trail spanning 2,650 miles from Mexico to Canada through California, Oregon, and Washington (FERC, 2007). The trail traverses the boundary of the Jackson Meadows reservoir recreation area within the Yuba-Bear project boundary.

**Project Recreational Resources**

The elevation for the projects ranges from the recreation areas of White Rock Lake at 7,820 feet msl to 1,442 feet msl at Rock Creek reservoir.[22] There are 14 designated recreation areas within the project boundaries that contain developed and undeveloped recreational areas. Interconnecting trails and tributaries between reservoirs and non-project recreation facilities offer additional opportunities for day-users.

**Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects**

Drum-Spaulding Project recreation facilities are divided into nine recreational areas containing various recreation facilities/reservoirs and varying land ownership. PG&E manages all the recreation facilities regardless of whether they are located on PG&E or Forest Service land. Table 3-209 provides a summary of the existing recreation areas and recreation facilities available at the project. The table also indicates which recreation areas are located within the proposed Drum-Spaulding, Lower Drum, and Deer Creek Projects. All of the existing recreation facilities are located within the proposed project boundaries for the respective projects. The locations of each recreation area and the existing and proposed recreation facilities provided at each are shown in figures 3-111 and 3-112. Detailed maps showing the location of each existing and proposed facility within the recreation area are provided in appendix C.

*White Rock Lake Recreation Area (Upper Drum-Spaulding Project)*

The White Rock Lake recreation area contains White Rock Lake reservoir and is located in the east-central portion of the Tahoe National Forest about 6 miles north of Interstate 80 (I-80). White Rock Lake provides recreational opportunities for camping, hiking, angling, hunting, and small boating. Sixty percent of the lake shoreline is accessible by foot; steep bare granite

[22] All elevation data are in National Geodetic Vertical Datum of 1929 (NGVD 29) unless otherwise specified.

Table 3-209. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects recreation areas, land ownership, and recreation facilities within the project boundary. (Source: PG&E, 2011a, as modified by staff)

| Project Reservoir/Site | Land Ownership[a] | Facilities |
|---|---|---|
| **WHITE ROCK LAKE RECREATION AREA (Upper Drum-Spaulding Project)** | | |
| **White Rock Lake** | Forest Service/PG&E | 6 primitive campsites with steel fire rings |
| **FORDYCE LAKE RECREATION AREA (Upper Drum-Spaulding Project)** | | |
| **Meadow Lake** | Forest Service/PG&E | |
| Meadow Lake campground | Forest Service | 2 vault restrooms (3 stalls); 15 campsites with wood picnic tables, steel fire rings, gravel spurs; wildlife-resistant food lockers; parking spaces; 1 unimproved boat launch |
| Meadow Lake shoreline campsites | Forest Service/PG&E | 10 rustic campsites with picnic tables, fire rings, wildlife-resistant food lockers; parking spaces; 2 informal boat launches |
| Meadow Knoll group campground | Forest Service | 2 vault restrooms (4 stalls); 2 rustic group campsites consisting of 8 wood picnic tables, 2 wood preparation tables, and 4 steel fire rings; 20 parking spaces |
| **Lake Sterling** | Forest Service/PG&E | |
| Lake Sterling walk-in campground | Forest Service | 1 vault restroom (2 stalls); 6 rustic campsites; 10 parking spaces |
| **Fordyce Lake** | Forest Service/PG&E | 6 dispersed campsites with 8 rock fire rings |
| **LAKE SPAULDING RECREATION AREA (Upper Drum-Spaulding Project)** | | |
| **Lake Spaulding** | Forest Service/PG&E | |
| Lake Spaulding campground | PG&E | 2 vault restroom (4 stalls); 25 campsites with picnic tables, steel fire rings; storage units and tent pads |
| Lake Spaulding overflow campground | PG&E | 10 campsites |
| Lake Spaulding boat launch | PG&E | 1 vault restroom (2 stalls); 1, 2-lane concrete boat ramp; 67 parking spaces |
| Lake Spaulding picnic area | PG&E | 3 picnic area sites with wood picnic tables |

Table 3-209. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects recreation areas, land ownership, and recreation facilities within the project boundary. (Source: PG&E, 2011a, as modified by staff)

| Project Reservoir/Site | Land Ownership[a] | Facilities |
|---|---|---|
| **Bear Valley (non-reservoir)** | PG&E | |
| Bear Valley group campground | PG&E | 2 vault restrooms (4 stalls); 1 group campsite with fire ring; 12 picnic tables; 2 grills; 16 parking spaces |
| Sierra Discovery Trail | PG&E | 1 vault restroom (2 stalls); 4 picnic tables; 2 barbeque pits; wildlife-resistant trash receptacles; 9 parking spaces |
| Overflow parking | PG&E | 23 parking spaces |
| **Fuller Lake** | Forest Service/PG&E | |
| Fuller Lake day-use area and boat launch | Forest Service | 1 vault restroom (2 stalls); 1, 1-lane concrete boat launch; 14 parking spaces; 8 picnic areas with tables, fire rings, and grills |
| Fuller Lake angler access | PG&E | 1 vault restroom (1 stall); 6 parking spaces |
| **Rucker Lake** | Forest Service/PG&E | |
| Rucker Lake walk-in campground | Forest Service | 7 campsites with fire rings and wildlife-resistant food lockers; 4 picnic tables; 15 parking spaces |
| **Blue Lake** | Forest Service/PG&E | |
| Blue Lake primitive hike-in campsites | PG&E | 10 primitive campsites with fire rings; 15 parking spaces |
| **GROUSE LAKES RECREATION AREA (Upper Drum-Spaulding Project)** | | |
| **Carr Lake** | Forest Service/PG&E | |
| Carr-Feeley trailhead | Forest Service/PG&E | 30 parking spaces |
| Carr Lake walk-in campground | Forest Service | 1 vault restroom (2 stalls); 11 campsites |
| **Feeley Lake** | Forest Service | 1 informal unimproved boat launch |
| **Lower Lindsey Lake** | Forest Service/PG&E | |
| Lower Lindsey Lake trailhead | Forest Service | 20 parking spaces |
| Lower Lindsey Lake campground | Forest Service/PG&E | 1 vault restroom (2 stalls); 12 campsites with fire rings and picnic tables; 1 unimproved boat launch |

Table 3-209. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects recreation areas, land ownership, and recreation facilities within the project boundary. (Source: PG&E, 2011a, as modified by staff)

| Project Reservoir/Site | Land Ownership[a] | Facilities |
|---|---|---|
| **Middle Lindsey Lake** | PG&E | |
| Middle Lindsey Lake primitive hike-in campsites | PG&E | 3 primitive campsites with fire rings |
| **Upper Lindsey Lake** | PG&E | none |
| **Culbertson Lake** | Forest Service/PG&E/Private | |
| Culbertson Lake primitive hike-in campsites | Forest Service | 3 primitive campsites with steel fire rings |
| **Lower Rock Lake** | PG&E | |
| Lower Rock Lake primitive hike-in campsites | PG&E | 3 primitive campsites with steel fire rings |
| **Upper Rock Lake** | PG&E | |
| Upper Rock Lake primitive hike-in campsites | PG&E | 3 primitive campsites with steel fire rings |
| **KIDD LAKE RECREATION AREA (Upper Drum-Spaulding Project)** | | |
| **Kidd Lake** | PG&E/Private | |
| Kidd Lake group campground | PG&E | 2 vault restrooms (4 stalls); 3 group campsites with group barbeque; 20 parking spaces; 2 storage buildings |
| **Upper Peak Lake** | Forest Service/PG&E | none |
| **Lower Peak Lake** | Forest Service/PG&E | none |
| **LAKE VALLEY RECREATION AREA (Upper Drum-Spaulding Project)** | | |
| **Kelly Lake** | PG&E/Private | |
| Kelly Lake picnic area | PG&E | 2 vault restrooms (4 stalls); 5 picnic sites; 1 unimproved boat launch; 6 undeveloped parking spaces |
| **Lake Valley reservoir** | PG&E | |
| Lodgepole campground | PG&E | 3 vault restrooms (6 stalls); 35 campsites with each site containing a vehicle spur, fire ring, picnic table, and storage locker; 5 overflow parking spaces |
| Silvertip picnic area/boat launch | PG&E | 1 vault restroom (2 stalls); 1,1-lane concrete boat launch; 20 parking spaces; 10 picnic sites |

Table 3-209. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects recreation areas, land ownership, and recreation facilities within the project boundary. (Source: PG&E, 2011a, as modified by staff)

| Project Reservoir/Site | Land Ownership[a] | Facilities |
|---|---|---|
| **ALTA-DRUM RECREATION AREA (Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects)** | | |
| **Deer Creek forebay** | PG&E | |
| Deer Creek forebay access | PG&E | 5 parking spaces |
| **Drum forebay** | PG&E | Informal parking |
| **Drum afterbay** | PG&E | Informal parking |
| **Alta forebay** | PG&E | Informal parking |
| **Halsey afterbay** | PG&E | Informal parking |
| **Wise forebay** | PG&E | Informal parking |
| **HALSEY FOREBAY RECREATION AREA (Lower Drum Project)** | | |
| **Halsey forebay** | PG&E | |
| Halsey forebay picnic area | PG&E | 1 vault restroom (2 stalls); 9 picnic sites; 12 parking spaces |
| **ROCK CREEK RESERVOIR RECREATION AREA (Lower Drum Project)** | | |
| **Rock Creek reservoir** | PG&E | Informal parking |

[a] Land ownership at a reservoir includes land owned outside of designated recreation facilities.

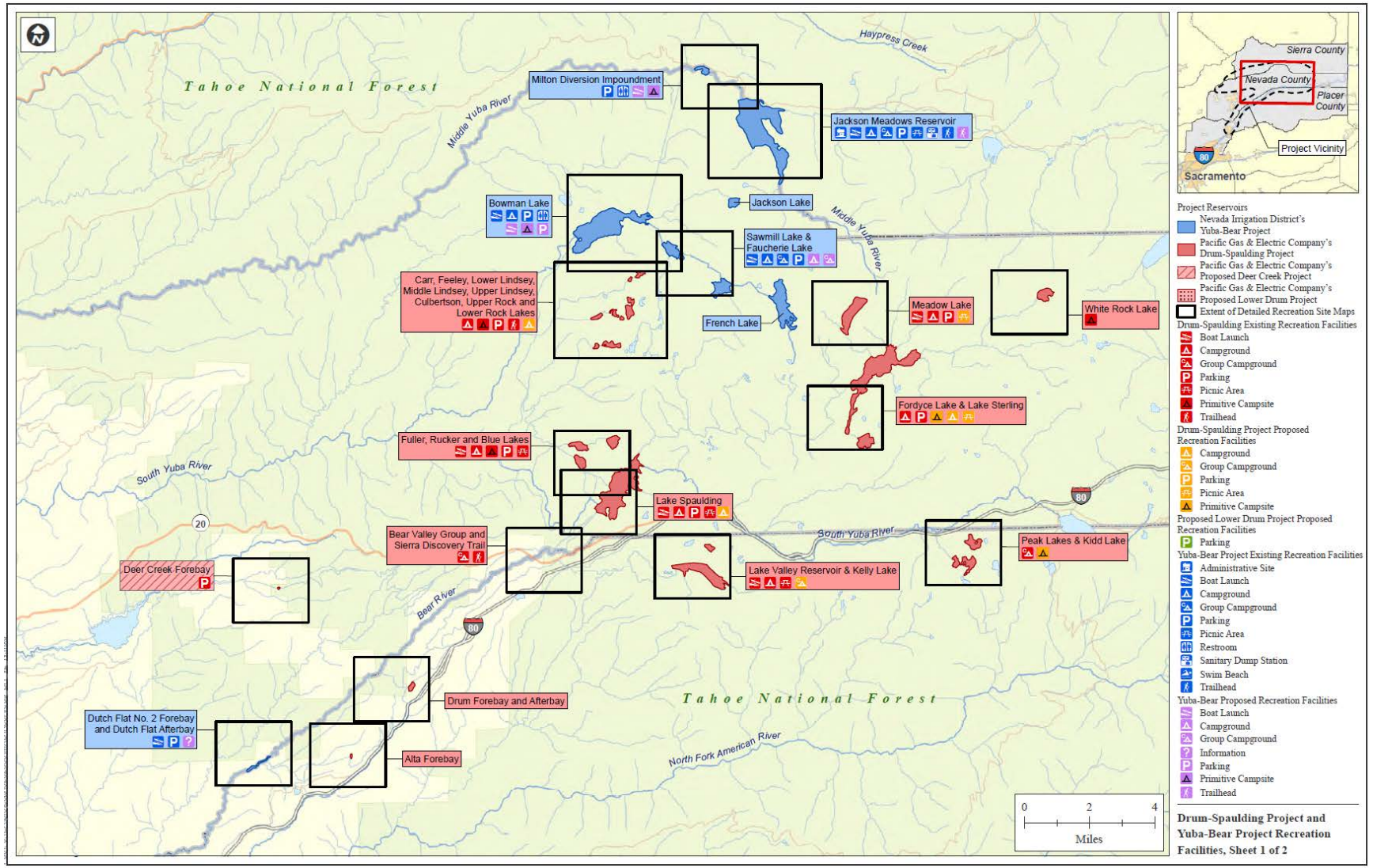


Figure 3-111. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects and Yuba-Bear Project recreation facilities part 1. (Source: staff)

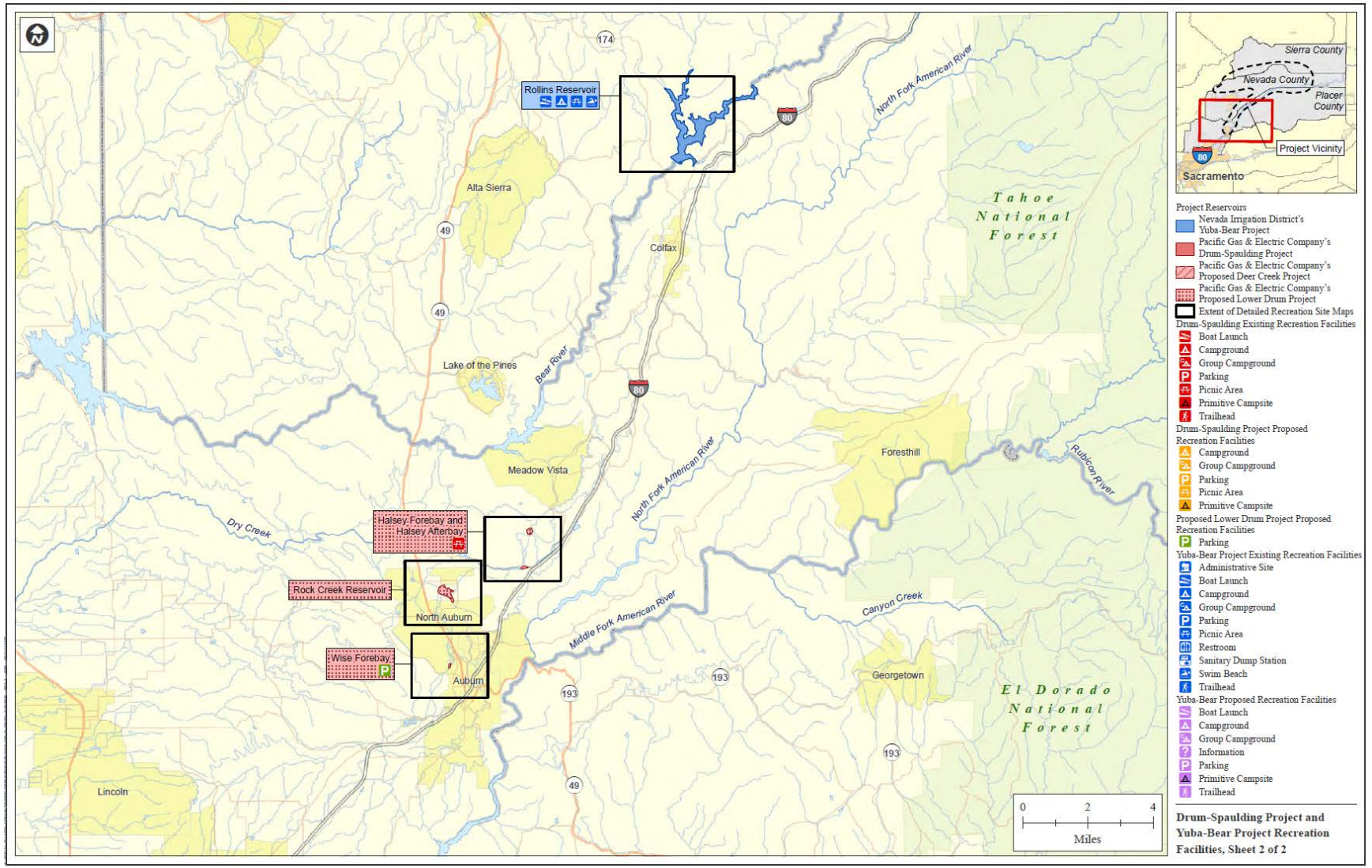


Figure 3-112. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects and Yuba-Bear Project recreation facilities part 2. (Source: staff)

terrain makes other shoreline areas difficult to access. Nearly 40 percent of the shoreline is accessible by four-wheel drive vehicles.

*Fordyce Lake Recreation Area (Upper Drum-Spaulding Project)*

The Fordyce Lake recreation area is located in the central portion of the Tahoe National Forest north of I-80 with elevation ranging from 6,200 to 7,800 feet msl. There are three recreation project reservoirs, Meadow Lake, Lake Sterling, and Fordyce Lake, consisting of five recreation facilities. Recreation opportunities at Meadow Lake include angling, swimming, boating, OHV use, and recreational vehicle (RV) camping. The entire shoreline is accessible by foot, and 60 percent is accessible by vehicles on access roads along the west shoreline. When possible, California Fish and Wildlife annually stocks Meadow Lake with rainbow trout.[23] Lake Sterling and Fordyce Lake provide recreational activities for camping, hiking, hunting, swimming, angling, and boating, and Fordyce Lake also provides opportunities for OHV use. The entire shoreline of Lake Sterling is accessible by foot and about 20 percent is accessible by vehicle. Sixty percent of the Fordyce Lake shoreline is accessible by foot and 30 percent is accessible by vehicle during high water periods. Undeveloped campsites exist along the west shoreline of the southern arm of the lake.

*Lake Spaulding Recreation Area (Upper Drum-Spaulding Project)*

Lake Spaulding recreation area consists of four project reservoirs, Lake Spaulding, Rucker Lake, Fuller Lake, and Blue Lake, and one non-reservoir recreation area (Bear Valley), in the east central portion of the Tahoe National Forest. Thick vegetation and steep granite bluffs make Lake Spaulding's shoreline only 40 percent accessible by foot with few beaches. Camping mostly occurs along the north and northeast shoreline near the mouth of South Yuba River and Fordyce Creek. Recreation opportunities available at Lake Spaulding include camping, picnicking, sightseeing, boating, swimming, angling, and waterskiing. Public access to about one-third of the northwest shoreline of Rucker Lake is restricted by private homes and a Tahoe National Forest permittee, Camp Liahona. Marsh areas also restrict shoreline access and vehicle access with about 50 percent of the shoreline accessible by foot and 15 percent accessible by vehicle. Typically, two-wheel-drive vehicles can only access Rucker Lake during dry summer months. A Nevada County ordinance prohibits internal combustion engines on Rucker Lake. Fuller Lake is the least remote and most popular reservoir in the Lake Spaulding recreation area and provides picnicking, angling, and boating opportunities, with a boating speed limit of 15 miles per hour (mph). More than 80 percent of the shoreline is accessible by foot, but much of the northern shoreline is privately owned, restricting public access. California Fish and Wildlife stocks brown or rainbow trout in Fuller Lake every other week from May through July.[24] Recreation opportunities at Blue Lake include camping, hiking, angling, and swimming for both day-use and overnight use by visitors. The entire shoreline of Blue Lake is accessible by foot but vehicle access (four-wheel-drive) is limited to the vicinity

[23] This stocking frequency is reported by PG&E in its license application filed in April 2011; however, the frequency of the fish stocking in this reservoir is unclear. PG&E reports in its reply to comments filed on September 14, 2012, that California Fish and Wildlife does not stock all of the project reservoirs every year but does not provide any additional details for fish stocking in this reservoir.

[24] This stocking frequency is reported by PG&E in its license application filed in April 2011; however, the frequency of the fish stocking in this reservoir is unclear. PG&E reports in its reply to comments filed on September 14, 2012, that California Fish and Wildlife does not stock all of the project reservoirs every year but does not provide any additional details for fish stocking in this reservoir.

of the parking area near the dam. Bear Valley is a non-reservoir area that is located off Bowman Lake Road via Highway 20 and consists of three developed recreation facilities.

*Grouse Lakes Recreation Area (Upper Drum-Spaulding Project)*

Designated as a Forest Service non-motorized area, the Grouse Lakes recreation area consists of 8 project reservoirs and more than 14 miles of trails. Recreation facilities are undeveloped in the Grouse Lakes recreation area, but opportunities exist for hiking, backpacking, mountain biking, horseback riding, camping, picnicking, swimming, and angling. The eight project reservoirs are Carr Lake, Feeley Lake, Lower Lindsey Lake, Middle Lindsey Lake, Upper Lindsey Lake, Culbertson Lake, Lower Rock Lake, and Upper Rock Lake. About 60 percent of Carr Lake's shoreline is accessible by foot; 90 percent of Feeley Lake is accessible by foot; about 80 percent of the Lower Lindsey Lake is accessible by foot; and 75 percent of Middle Lindsey Lake is accessible by foot. From the Lower Lindsey Lake trailhead, Upper Lindsey Lake is a 1.3-mile hike, and about 40 percent of the shoreline is accessible by foot due to a steep, rocky shoreline with vegetation. Culbertson Lake is a 1.3-mile hike from the Lower Lindsey Lake trailhead, and the majority of its shoreline is accessible by foot except for the eastern shoreline. Lower Rock Lake is a remotely situated 2.3-mile hike from the Lower Lindsey Lake trailhead and about 70 percent of its shoreline is accessible by foot. Upper Rock Lake is the most remote Grouse Lakes area reservoir, accessible by hiking 2.8 miles along the Lower Lindsey Lake trailhead. About 70 percent of the shoreline of Upper Rock Lake is accessible by foot.

*Kidd Lake Recreation Area (Upper Drum-Spaulding Project)*

Kidd Lake recreation consists of three project reservoirs, Kidd Lake, Upper Peak Lake, and Lower Peak Lake. Kidd Lake provides camping, hiking, boating, and angling opportunities. The reservoir has a 15-mph speed limit for boating and the entire shoreline of Kidd Lake is accessible by foot. Upper Peak Lake's shoreline is difficult to access (only about 25 percent of the shoreline is accessible by foot) due to steep, rocky terrain and heavy brush. The shoreline of Lower Peak Lake is more accessible than Upper Peak Lake, with about 70 percent accessible by foot and 25 percent accessible by vehicle. Recreational opportunities at the Upper and Lower Peak Lakes include hiking, undeveloped camping, angling, and boating. A non-project trailhead for the Palisades Creek Trail on Forest Service land is located near the Upper Peak Lake dam and provides access to the Wild and Scenic North Fork of the American River.

*Lake Valley Recreation Area (Upper Drum-Spaulding Project)*

Lake Valley recreation area consists of two project reservoirs, Kelly Lake and Lake Valley reservoir. Kelly Lake provides opportunities for picnicking, angling, swimming, and boating. Kelly Lake has a speed limit of 15 mph for boats. California Fish and Wildlife stocks Kelly Lake with rainbow trout annually, when possible.[25] About 60 percent of the Kelly Lake shoreline is accessible by foot, and the only vehicle access to Kelly Lake is along the east shore. Lake Valley reservoir provides opportunities for developed camping, picnicking, angling, swimming, and boating. California Fish and Wildlife stocks

[25] This stocking frequency is reported by PG&E in its license application filed in April 2011; however, the frequency of the fish stocking in this reservoir is unclear. PG&E reports in its reply to comments filed on September 14, 2012, that California Fish and Wildlife does not stock all of the project reservoirs every year but does not provide any additional details for fish stocking in this reservoir.

Lake Valley reservoir with rainbow trout from June through August.[26] Only about 40 percent of the shoreline of Lake Valley reservoir is accessible by foot due to steep terrain, and the only vehicle access is along the north shore of the reservoir.

*Alta-Drum Recreation Area (Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects)*

Alta-Drum recreation area includes six project reservoirs: Deer Creek forebay, Drum forebay, Drum afterbay, Alta forebay, Halsey afterbay, and Wise forebay. The Alta-Drum recreation area does not charge fees for use. All six reservoirs are accessible by vehicle. No swimming is allowed in these reservoirs for safety reasons. These reservoirs provide day-use opportunities only, including shoreline angling, picnicking, and walking.

*Halsey Forebay Recreation Area (Lower Drum Project)*—Halsey forebay recreation area consists of Halsey forebay, located 4 miles north of Auburn, California. No recreation use fee is charged at this recreation area, and no swimming is allowed for safety reasons. About 75 percent of the reservoir shoreline is accessible by foot and vehicle access is only at the developed parking area. Only day-use is allowed at Halsey forebay, and shoreline angling and picnicking are the primary activities. California Fish and Wildlife regularly stocks the reservoir.[27]

*Rock Creek Reservoir Recreation Area (Lower Drum Project)*

Located 2.5 miles north of Auburn, California, Rock Creek reservoir recreation area consists of Rock Creek reservoir. No fees are charged for recreational use, and vehicle access is restricted from the reservoir shoreline. Only day-use is allowed at Rock Creek reservoir, and opportunities include shoreline angling and walking.

**Yuba-Bear Project**

Yuba-Bear Project recreation facilities are divided into five recreational areas containing various recreation facilities/reservoirs and varying land ownership. Table 3-210 provides a summary of the existing recreation areas and recreation facilities available at the project. All of the existing recreation facilities are located within the proposed project boundary. The locations of each recreation area and the existing and proposed recreation facilities provided at each are shown in Figures 3-111 and 3-112. Detailed maps showing the location of each existing and proposed facility within the recreation area are provided in appendix C.

[26] This stocking frequency is reported by PG&E in its license application filed in April 2011; however, the frequency of the fish stocking in this reservoir is unclear. PG&E reports in its reply to comments filed on September 14, 2012, that California Fish and Wildlife does not stock all of the project reservoirs every year but does not provide any additional details for fish stocking in this reservoir.

[27] This stocking frequency is reported by PG&E in its license application filed in April 2011; however, the frequency of the fish stocking in this reservoir is unclear. PG&E reports in its reply to comments filed on September 14, 2012, that California Fish and Wildlife does not stock all of the project reservoirs every year but does not provide any additional details for fish stocking in this reservoir.

*Jackson Meadows Reservoir Recreation Area*

As summarized in table 3-210, the Jackson Meadows reservoir recreation area consists of 2 project reservoirs, Jackson Meadows reservoir, with 13 developed recreation facilities, and Milton diversion dam impoundment. Recreation opportunities at Jackson Meadows reservoir include camping, hiking/walking, angling, swimming, OHV use, and flat-water boating. The maximum boat speed on Jackson Meadows reservoir is 35 mph from sunrise to sunset and 10 mph sunset to sunrise. A 5-mph zone is located within 200 feet of the Woodcamp boat launch. California Fish and Wildlife stocks rainbow trout in the reservoir monthly from May through August. The Jackson Meadows sanitary dump station and Woodcamp interpretive trail are recreation facilities located at Jackson Meadows reservoir outside the project boundary. Milton diversion impoundment provides opportunities for day-use, angling, and camping. This reservoir is designated by California Fish and Wildlife as a fishing/special use area and the operation of internal combustion engines is restricted on this reservoir.

Table 3-210. Yuba-Bear Project recreation areas, land ownership, and recreation facilities within the project boundary. (Source: NID, 2011a as modified by staff)

| Recreation Area/Project Reservoir or Site | Land Ownership[a] | Facilities |
|---|---|---|
| **JACKSON MEADOWS RECREATION AREA** | | |
| **Jackson Meadows reservoir** | Forest Service, NID, private | |
| Aspen group campground | NID | 3 accessible vault restrooms (8 stalls); 35 parking spaces; 3 campsites with a water spigot, tables, fire rings, and grills; 2 wildlife-resistant dumpsters |
| Silvertip group campground | NID | 2 accessible vault restrooms (4 stalls); 15 parking spaces with informal parking; 2 campsites with tables and fire rings |
| East Meadow campground | Forest Service | 3 flush restrooms (9 stalls); 6 parking spaces with overflow parking; 46 campsites; 46 wildlife-resistant food lockers; and 2 wildlife-resistant dumpsters |
| Pass Creek campground | Forest Service | 2 flush and 1 vault restroom (10 stalls); 30 campsites including 9 overflow; 4 wildlife-resistant food dumpsters |
| Pass Creek boat ramp | Forest Service | 1 vault restroom (2 stalls); 2, 2-lane concrete boat launches; 43 parking spaces (23 main and 20 auxiliary); 1 wildlife-resistant food dumpster |
| Aspen picnic area | Forest Service | 2 vault restrooms (5 stalls); 30 informal parking spaces; 11 picnic sites; 2 wildlife-resistant food dumpsters |
| Jackson Meadows Vista Point | Forest Service | 1 vault restroom (1 stall); 8 parking spaces |
| Fir Tip campground | Forest Service | 1 flush restroom (2 stalls); 12 campsites; 1 wildlife-resistant dumpster |

Table 3-210. Yuba-Bear Project recreation areas, land ownership, and recreation facilities within the project boundary. (Source: NID, 2011a as modified by staff)

| Recreation Area/Project Reservoir or Site | Land Ownership[a] | Facilities |
|---|---|---|
| Findley campground | Forest Service | 1 flush restroom (4 stalls); 12 campsites; 1 wildlife-resistant dumpster |
| Woodcamp campground | Forest Service | 1 flush and 1 vault restroom (6 stalls); 20 campsites; 2 wildlife-resistant dumpsters |
| Woodcamp picnic area | Forest Service | 2 vault restrooms (5 stalls); 35 parking spaces with informal parking; 6 picnic sites; 1 wildlife-resistant dumpster |
| Woodcamp boat ramp | Forest Service | 1 vault restroom (2 stalls); 1-lane concrete boat launch; 36 parking spaces with informal parking |
| Jackson Point boat-in campground | Forest Service | 2 pit restrooms (2 stalls); 10 campsites |
| **Milton Diversion Impoundment** | Forest Service | 1 vault restroom (1 stall); parking; informal boat launch; 6 campsites with rock fire rings |
| **FRENCH LAKE RECREATION AREA** | | |
| **French Lake** | Forest Service, NID | 2 undeveloped campsites and fire rings |
| **BOWMAN LAKE RECREATION AREA** | | |
| **Bowman Lake** | Forest Service, NID | |
| Bowman Lake campground | NID | 1 restroom (1 stall); parking; 2 informal boat launch ramps; 11 rustic campsites with fire rings and picnic tables |
| Jackson Creek, Inflow, Milton-Bowman tunnel outlet, Big Rock, and McMurrary Road Junction sites | NID | 9 primitive campsites with steel fire rings |
| Rock Road Boat Ramp Site | NID | 1 informal boat launch; 2 undeveloped campsites |
| Tree Camp, Burnt Tree, Peninsula, and Graniteville Road sites | Forest Service | 4 primitive campsites with steel fire rings. |

Table 3-210. Yuba-Bear Project recreation areas, land ownership, and recreation facilities within the project boundary. (Source: NID, 2011a as modified by staff)

| Recreation Area/Project Reservoir or Site | Land Ownership[a] | Facilities |
|---|---|---|
| **Sawmill Lake** | Forest Service, NID | |
| North Shore site | NID | 13 dispersed campsites with 7 steel fire rings/grills, 1 wood picnic table, 7 rock fire rings, and 1 plywood table |
| Dam site | NID | 8 dispersed campsites with 6 steel fire rings/grills and 5 rock fire rings |
| Peninsula Site | Forest Service | dispersed camping area with 9 rock fire rings |
| East-North Shore site | Forest Service | Dispersed camping with rock fire rings; dispersed parking |
| **Canyon Creek** | Forest Service | |
| Canyon Creek campground | Forest Service | 2 vault restrooms (4 stalls); parking; 16 campsites with picnic tables and fire rings; 7 wildlife-resistant food lockers |
| **Faucherie Lake** | Forest Service/NID | |
| Faucherie Lake group campground | NID | 1 restroom building (2 stalls); 2 group campsites with 8 picnic tables, 2 steel fire rings, and 4/5 tent pads; 6 wildlife-resistant food lockers; 3 wildlife-resistant trash receptacles; 1 wildlife-resistant recycling receptacle; 6 parking spaces and overflow parking at day-use and boat launch |
| Faucherie Lake day-use area and boat launch | NID | 1 vault restroom (2 stalls); 1 informal 1-lane boat ramp; 14 parking spaces and 25 gravel parking spaces along road and in gravel lot |
| **DUTCH FLAT RECREATION AREA** | | |
| **Dutch Flat no. 2 forebay** | NID | 1 undeveloped parking area |
| **Dutch Flat afterbay** | BLM/NID/PG&E/ Private | 3 undeveloped parking areas; 1 informal boat launch |
| **Chicago Park forebay** | BLM/NID | None |
| **ROLLINS RESERVOIR RECREATION AREA** | | |
| **Rollins reservoir** | BLM/NID | |
| Orchard Springs campground | NID | 4 flush restrooms; 1, 2-lane concrete boat launch; 150 parking spaces; 101 campsites |
| Greenhorn campground | NID | 2 flush restrooms; 1, 2-lane concrete boat launch; 143 parking spaces; 3 picnic sites; 79 campsites |

Table 3-210. Yuba-Bear Project recreation areas, land ownership, and recreation facilities within the project boundary. (Source: NID, 2011a as modified by staff)

| Recreation Area/Project Reservoir or Site | Land Ownership[a] | Facilities |
|---|---|---|
| Peninsula campground | NID | 3 flush and 1 vault restroom; 1, 2-lane concrete boat launch; 50 parking spaces; 67 campsites |
| Long Ravine campground | NID | 4 flush restrooms including showers at 2 restrooms; 1, 2-lane concrete boat launch; 72 parking spaces; 85 campsites |

[a] Land ownership at a reservoir includes land owned outside of designated recreation facilities.

*French Lake Recreation Area*

The French Lake recreation area consists of one project reservoir, French Lake. There are no developed recreation facilities at French Lake, but hiking, backpacking, camping, and angling occur at the reservoir. French Lake is classified by Nevada County as a "small lake" with a maximum speed limit of 10 mph. Two undeveloped campsites are located near the dam on NID land.

*Bowman Lake Recreation Area*

The Bowman Lake recreation area includes three project reservoirs, Bowman Lake, Sawmill Lake, and Faucherie Lake, located along Canyon Creek. Recreational opportunities at Bowman Lake, which include camping, boating, angling, hunting, and picnicking, are dispersed along the shoreline from the dam to the inflow of Jackson Creek. There are no developed campgrounds or day-use facilities at Sawmill Lake, but several designated and dispersed recreation sites do exist at four general areas along the north shore of Sawmill Lake (Peninsula, East-North Shore, North Shore, and dam sites). Sawmill Lake is classified by Nevada County as a "small lake" with a maximum speed limit of 10 mph. California Fish and Wildlife stocks rainbow trout in Sawmill Lake once a year in conjunction with its "free fishing day" program.[28] Recreational opportunities available at Faucherie Lake include camping, picnicking, boating, angling, swimming, hiking, and backpacking. A project campground is located along Canyon Creek about 1.1 miles downstream of Faucherie Lake and 0.7 mile upstream of Sawmill Lake.

*Dutch Flat Recreation Area*

Three project impoundments are located in the Dutch Flat recreation area: Dutch Flat no. 2 forebay, Dutch Flat afterbay, and Chicago Park forebay. Dutch Flat no. 2 forebay and Dutch Flat afterbay are located just outside of the Tahoe National Forest. No developed recreation facilities are provided at this recreation area, but undeveloped parking areas are located at Dutch Flat no. 2 forebay and Dutch Flat afterbay, and an informal boat launch is located at Dutch Flat afterbay. Numerous day-use activities do

[28] This stocking frequency is reported by NID in its license application filed in April 2011; however, the frequency of the fish stocking in this reservoir is unclear. NID reports in its reply to comments filed on September 14, 2012, that California Fish and Wildlife stocked Sawmill Lake less than half the time from 2002 to 2009, and infrequently before that.

occur in this recreation area, including OHV use, angling, picnicking, biking, hiking, swimming, and walking.

*Rollins Reservoir Recreation Area*

The Rollins reservoir recreation area contains one reservoir, Rollins reservoir, with four developed recreation complexes: Orchard Springs, Greenhorn, Peninsula, and Long Ravine. Recreation at Rollins reservoir includes angling, swimming, boating, camping, hiking, and picnicking. Boating is a popular recreational activity at this reservoir. From sunrise to sunset, the maximum speed limit on the reservoir is 50 mph unless otherwise noted, and at all other times, the speed limit is 10 mph. Boats are prohibited in designated swimming areas, and a speed limit of 5 mph is in effect for designated boat launches, mooring areas, and angling areas. California Fish and Wildlife stocks rainbow trout in the reservoir every other week from February through May.

**Recreational Use**

To estimate visitation, NID and PG&E collected recreational use data using direct visual observations and recreation visitor use questionnaire forms during 2009 at each of the projects' reservoirs.[29] Recreational use data were collected during: (1) the peak recreation season (Memorial Day weekend through Labor Day weekend); and (2) during selected shoulder season months (September 8 through October 31, 2009) at selected reservoirs. Some project reservoirs were not accessible until after the Memorial Day weekend due to snowmelt.

Recreational uses at the projects include camping, angling, motorized and non-motorized boating, swimming, hiking, picnicking, sightseeing, wildlife viewing, OHV use, hunting, and winter activities. Based on NID and PG&E visitor use surveys, the primary recreation activities within project recreation areas were angling, hiking, and camping. Table 3-211 summarizes the primary recreation activities for each of the project recreation areas.

[29] As requested by the Forest Service, NID also conducted recreation surveys at recreation areas along Canyon Creek, which are not project facilities or within the project boundary. Those results are not included here but are included in NID technical memorandum 8-2b (NID, 2011b).

Table 3-211. Primary recreation activities by recreation area at the Yuba-Bear and Upper Drum-Spaulding and Lower Drum Projects. (Source: NID, 2011a; NID, 2011b; PG&E, 2011a; PG&E, 2011b)

| Activities | Yuba-Bear Project | | | | | Upper Drum-Spaulding and Lower Drum Projects | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jackson Meadows Reservoir | French Lake | Bowman Lake | Dutch Flat | Rollins Reservoir | White Rock Lake | Fordyce Lake | Lake Spaulding | Grouse Lakes | Kidd Lake | Lake Valley | Alta-Drum | Halsey Forebay | Rock Creek Reservoir |
| Angling | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ | √ |
| Camping | √ | √ | √ | | | √ | √ | √ | √ | √ | √ | | | |
| Picnicking | | | | | | | | √ | √ | | | √ | | |
| Swimming | √ | | √ | √ | | √ | | √ | √ | √ | √ | | | |
| Boating (any) | √ | | √ | | | √ | | √ | | √ | √ | | | |
| Viewing scenery, wildlife, nature | | √ | √ | | | | | | √ | | √ | | | |
| Hiking | √ | √ | √ | | | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| OHV use | √ | | | √ | | | √ | | | | | | | |

**Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects**

*Recreational Use Levels*

The 2009 recreational use data were used to calculate the peak season recreational use at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. The peak season recreational use was estimated at 85,351 recreation days[30] (RDs). Fifty-two percent of the RDs were day-use (44,121) with overnight use making up the other 48 percent (41,230 RDs). Table 3-212 provides estimated recreational use within the Drum-Spaulding Project area for each project reservoir.

[30] A recreation day is defined as any visit by an individual for any length of time during a 24-hour period.

Table 3-212. Summary of Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects peak season recreational use estimates by tiered level of use. (Source: PG&E, 2011a;PG&E, 2011b)

| Tier of Use | Project Reservoir | Peak Season Use Estimates (RDs) | | |
|---|---|---|---|---|
| | | Total | Day-Use | Overnight |
| Tier 1 (10,000 to 20,000 RDs) | Lake Valley reservoir | 18,184 | 6,566 | 11,618 |
| | Fuller Lake | 16,178 | 16,178 | 0 |
| | Lake Spaulding | 15,361 | 4,510 | 10,851 |
| Tier 2 (2,000 to 9,999 RDs) | Halsey forebay | 6,144 | 6,144 | 0 |
| | Meadow Lake | 5,077 | 396 | 4,681 |
| | Sierra Discovery Trail (non-reservoir) | 3,445 | 3,445 | 0 |
| | Kidd Lake | 3,229 | 0 | 3,229 |
| | Lower Lindsey Lake | 2,483 | 328 | 2,155 |
| | Upper and Lower Peak Lakes | 2,428 | 1,477 | 951 |
| | Fordyce Lake | 2,389 | 249 | 2,140 |
| Tier 3 (Less than 2,000 RDs) | Bear Valley group campground (non-reservoir) | 1,303 | 0 | 1,303 |
| | Rucker Lake | 1,166 | 219 | 947 |
| | White Rock Lake | 1,159 | 158 | 1,001 |
| | Carr and Feeley Lakes | 1,127 | 346 | 781 |
| | Drum forebay | 947 | 947 | 0 |
| | Wise forebay | 889 | 889 | 0 |
| | Lake Sterling | 860 | 172 | 688 |
| | Middle Lindsey, Upper Lindsey, Culbertson, and Rock Lakes | 851 | 587 | 264 |
| | Blue Lake | 847 | 226 | 621 |
| | Kelly Lake | 673 | 673 | 0 |
| | Halsey afterbay | 511 | 511 | 0 |
| | Rock Creek reservoir | 84 | 84 | 0 |
| | Deer Creek forebay | 16 | 16 | 0 |
| | Alta forebay | 0 | 0 | 0 |
| | Drum afterbay | 0 | 0 | 0 |
| | **Total** | **85,351** | **44,121** | **41,230** |

Recreational use at the project is expected to have an overall increase of 71 percent by 2050 to between 100,000 and 190,000 RDs. The annual peak season use is expected to be highest for Lake Valley reservoir and Fuller Lake with 30,000 and 40,000 RDs.

*Developed Recreation Facility Occupancies*

Most recreation areas in Northern California are typically at or near full capacity on holidays during the peak recreation season. The 2009 recreational use data were used to calculate the peak season (Memorial Day to Labor Day) occupancies of the developed recreation facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects and to project facility occupancies into the future. The 2009 occupancies for the developed project campgrounds and the 2050 projected occupancies are shown in table 3-213. All of the developed campgrounds are currently below 75 percent capacity except for the Bear Valley group campground, which is close to full capacity (92 percent) on weekends. Three campgrounds are projected to exceed full capacity and four others will be approaching full capacity for weekend use by 2050.

Table 3-213. Projected seasonal and weekend occupancy by 2050 at Upper Drum-Spaulding Project campgrounds for the peak season (Memorial Day to Labor Day). (Source: PG&E, 2011a; PG&E, 2011b)

| **Project Reservoir** | **Campground** | **Percent of Capacity** | | | |
|---|---|---|---|---|---|
| | | **2009 Occupancy** | | **2050 Projected Occupancy** | |
| | | **Seasonal** | **Weekend** | **Seasonal** | **Weekend** |
| Meadow Lake | Meadow Lake campground and shoreline campsites (25 sites)[a] | 32 | 54 | 50 | 84 |
| | Meadow Knoll group campground (2 sites) | 10 | 25 | 15 | 39 |
| Lake Sterling | Lake Sterling walk-in campgrounds (6 sites) | 10 | 32 | 16 | 50 |
| Lake Spaulding | Lake Spaulding campground (25 sites) | 29 | 56 | 45 | 86 |
| | Lake Spaulding overflow campground (10 sites) | 10 | 21 | 16 | 32 |
| Bear Valley (non-reservoir) | Bear Valley group campground (1 site) | 49 | 92 | 76 | 142 |
| Rucker Lake | Rucker Lake hike-in campground (1 site) | 33 | 68 | 50 | 105 |
| Carr Lake | Carr Lake campground (11 sites) | 14 | 31 | 21 | 48 |
| Lower Lindsey Lake | Lower Lindsey Lake campground (12 sites) | 23 | 60 | 36 | 92 |
| Kidd Lake | Kidd Lake group campground (3 sites) | 38 | 71 | 59 | 109 |
| Lake Valley reservoir | Lodgepole campground (35 sites) | 43 | 61 | 67 | 94 |

[a] Occupancy data for Meadow Lake campground and shoreline campsites were recorded for the combined 25 campsites and not separately for the 15 sites at Meadow Lake campground and the 10 sites at the shoreline campsites.

The Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects provide picnic/day-use areas and developed parking and boat launch areas. The 2009 occupancies and projected occupancies through 2050 are presented in tables 3-214 (picnic/day-use areas) and 3-215 (parking and boat launch areas). All of the day-use/picnic areas are currently below 15 percent capacity, and most are below 10 percent capacity except for the Halsey forebay picnic area. No picnic area is projected to be near full capacity by 2050. Most of the developed parking and boat launch areas are currently below 75 percent capacity except for the Fuller Lake angler access and the Carr-Feeley trailhead parking areas. The Fuller Lake angler access parking area is currently close to full capacity for seasonal use and exceeds full capacity on weekends. The Carr-Feeley trailhead is close to full capacity on weekends. Both of these parking areas are projected to be at or exceed full capacity for both seasonal and weekend use by 2050. In addition, the Silvertip day-use and boat launch area is projected to be almost at full capacity for weekend use by 2050.

Table 3-214. Projected seasonal and weekend occupancy by 2050 at the Upper Drum-Spaulding and Lower Drum Project picnic areas for the peak season (Memorial Day to Labor Day). (Source: PG&E, 2011a; PG&E, 2011b)

| **Project Reservoir** | **Picnic/Day-Use Area** | **Percent of Capacity** | | | |
|---|---|---|---|---|---|
| | | **2009 Occupancy** | | **2050 Projected Occupancy** | |
| | | **Seasonal** | **Weekend** | **Seasonal** | **Weekend** |
| Lake Spaulding | Lake Spaulding picnic area (3 sites) | 6 | 6 | 9 | 8 |
| Bear Valley (non-reservoir) | Sierra Discovery Trail (4 sites) | 6 | 4 | 8 | 6 |
| Fuller Lake | Fuller Lake day-use area (8 sites) | 4 | 8 | 6 | 12 |
| Kelly Lake | Kelly Lake picnic area (5 sites) | 4 | 2 | 5 | 2 |
| Lake Valley reservoir | Silvertip day-use area (10 sites) | 3 | 8 | 5 | 11 |
| Halsey forebay | Halsey forebay picnic area (9 sites) | 14 | 14 | 21 | 20 |

Table 3-215. Projected seasonal and weekend occupancy by 2050 at the Upper Drum-Spaulding and Lower Drum Project recreation parking and boat launch areas for the peak season (Memorial Day to Labor Day). (Source: PG&E, 2011a; PG&E, 2011b)

| Project Reservoir | Parking Facility | Percent of Capacity | | | |
|---|---|---|---|---|---|
| | | 2009 Occupancy | | 2050 Projected Occupancy | |
| | | Seasonal | Weekend | Seasonal | Weekend |
| Lake Sterling | Lake Sterling parking area (10 vehicles-at-one-time [VAOT]) | 33 | 44 | 50 | 67 |
| Lake Spaulding | Lake Spaulding boat launch area (67 VAOT) | 24 | 46 | 40 | 76 |
| Bear Valley (non-reservoir) | Sierra Discovery Trail (9 VAOT) | 21 | 24 | 35 | 40 |
| Fuller Lake | Fuller Lake angler access (6 VAOT) | 84 | 110 | 106 | 138 |
| | Fuller Lake day-use and boat launch area (14 VAOT) | 42 | 60 | 53 | 77 |
| Blue Lake | Blue Lake hike-in campsites parking (15 VAOT) | 14 | 25 | 19 | 35 |
| Carr Lake and Feeley Lake | Carr-Feeley trailhead (30 VAOT) | 61 | 91 | 99 | 147 |
| Lower Lindsey Lake | Lindsey Lake trailhead (20 VAOT) | 6 | 11 | 9 | 18 |
| Lake Valley reservoir | Silvertip picnic area and boat launch (20 VAOT) | 44 | 65 | 67 | 99 |
| Halsey forebay | Halsey forebay picnic area (12 VAOT) | 24 | 33 | 35 | 48 |
| Kelly Lake | Kelly Lake | 7 | 12 | 10 | 17 |
| Drum forebay | Drum forebay | 8 | 10 | 10 | 13 |
| Halsey afterbay | Halsey afterbay | 6 | 8 | 8 | 10 |
| Rock Creek | Rock Creek reservoir | 1 | 1 | 2 | 2 |

**Yuba-Bear Project**

*Recreational Use Levels*

The 2009 recreational use data were used to calculate the peak season recreational use at the Yuba-Bear Project. The peak season recreational use was estimated at 157,599 RDs. Most of the

recreational use was overnight use rather than day-use (64 percent of the RDs were overnight use). Rollins reservoir and Jackson Meadows reservoir are highly developed recreation areas that together accounted for 86 percent of all recreation use at the Yuba-Bear Project (table 3-216). Project reservoirs with less than 1,000 RDs (e.g., Dutch Flat afterbay, Dutch Flat no. 2 forebay, and French Lake) accounted for about 1 percent of the total estimated recreational use at the project.

Table 3-216. Summary of Yuba-Bear Project peak season recreational use estimates by tiered level of use.[a] (Source: NID, 2011a; NID, 2011b)

| Tier of Use | Project Reservoir | Peak Season Use Estimates (RDs) | | |
|---|---|---|---|---|
| | | Total | Day-Use | Overnight |
| Tier 1 (Greater than 5,000 RDs) | Rollins reservoir | 115,455 | 45,065 | 70,389 |
| | Jackson Meadows reservoir | 20,185 | 3,414 | 16,770 |
| Tier 2 (1,000 to 5,000 RDs) | Chicago Park forebay and powerhouse | 4,103 | 3,517 | 586 |
| | Bowman Lake | 5,372 | 648 | 4,723 |
| | Faucherie Lake | 4,671 | 1,136 | 3,534 |
| | Sawmill Lake | 3,547 | 339 | 3,206 |
| | Milton diversion impoundment | 2,591 | 863 | 1,728 |
| Tier 3 (Less than 1,000 RDs) | Dutch Flat afterbay | 973 | 823 | 149 |
| | Dutch Flat no. 2 forebay | 381 | 318 | 63 |
| | French Lake | 324 | 117 | 206 |
| **Total** | | **157,599** | **56,237** | **101,351** |

[a] The recreation use estimates included in this table are from the final license application dated April 2011, which in some instances differ from the results of the 2009 recreation use and visitor surveys presented in NID's technical memorandum 8-2b (NID, 2011b).

Recreational use at the project during the peak season is projected to increase to nearly 270,000 RDs by 2050, a 71 percent increase in overall recreational use. The recreational use at Rollins reservoir may increase to more than 200,000 RDs by 2050, a 74 percent increase in use, and recreational use at Jackson Meadows may grow to nearly 32,000 RDs, a 50 percent increase in use. Both of these recreation areas are highly developed.

*Developed Recreation Facility Occupancies*

The 2009 recreational use data were used to calculate the peak season (Memorial Day to Labor Day) occupancies of the developed recreation facilities at the Yuba-Bear Project and to project facility occupancies into the future. The 2009 occupancies for the developed project campgrounds and the 2050 projected occupancies are shown in table 3-217. All of the developed campgrounds are currently below 75 percent capacity for seasonal use. Faucherie Lake group campground is currently at full capacity on weekends, and three campgrounds at Rollins reservoir are close to full capacity on weekends. The Faucherie Lake group campground and the three campgrounds at Rollins reservoir are projected to exceed full capacity for weekend use by 2050 and to be at full capacity or approaching full capacity for seasonal

Table 3-217. Projected overall peak season occupancies for Yuba-Bear Project campgrounds through 2050 (Memorial Day to Labor Day). (Source: NID, 2011a; NID, 2011b)

| Project Reservoir | Campground | Percent of Capacity | | | |
|---|---|---|---|---|---|
| | | 2009 Data | | 2050 Projection | |
| | | Seasonal | Weekend | Seasonal | Weekend |
| Jackson Meadows reservoir[a] | East Meadow campground (46 sites) | 33 | -- | 50 | -- |
| | Pass Creek campground (30 sites) | 28 | -- | 43 | -- |
| | Findley campground (14 sites) | 20 | -- | 31 | -- |
| | Fir Top campground (12 sites) | 29 | -- | 44 | -- |
| | Woodcamp campground (20 sites) | 33 | -- | 51 | -- |
| | **Combined family campgrounds (122 sites)** | **30** | -- | **46** | -- |
| | Aspen group campground (3 sites)[b] | -- | -- | -- | -- |
| | Silvertip group campground (2 sites) | 41 | -- | 63 | -- |
| | **Combined group campgrounds (5 sites)** | **41** | -- | **63** | -- |
| Faucherie Lake | Faucherie Lake group campground (2 sites) | 66 | 100 | 101 | 154 |
| Canyon Creek[c] | Canyon Creek campground (16 sites) | -- | -- | -- | -- |
| Rollins reservoir | Orchard Springs campground (101 sites) | 35 | 62 | 54 | 96 |
| | Greenhorn campground (79 sites) | 59 | 90 | 91 | 139 |
| | Peninsula campground (67 sites) | 63 | 90 | 97 | 139 |
| | Long Ravine campground (85 sites) | 67 | 95 | 103 | 146 |
| | **Combined family campgrounds (332 sites)** | **55** | **83** | **84** | **128** |

[a] Weekend data were not collected in June for Jackson Meadows reservoir by the Forest Service. Therefore, weekend occupancy for 2009 could not be accurately calculated without June occupancy information. Seasonal data were recorded by Tahoe National Forest concessionaires on a weekly basis.
[b] Data were not collected by Tahoe National Forest concessionaires in 2009 for Aspen group campground.
[c] Occupancy data were not recorded for Canyon Creek.

use by 2050. The fourth campground at Rollins reservoir is projected to be close to full capacity for weekend use by 2050. Most of the developed parking and boat launch areas are currently below 75 percent capacity, except for the Pass Creek boat launch (83 percent capacity) and Long Ravine boat launch (119 percent) on weekends. Both of these boat launches are projected to exceed full capacity by 2050 for weekend use and be close to full capacity for seasonal use by 2050. Several other boat launches are expected to exceed or be close to full capacity by 2050. The Yuba-Bear Project provides developed

parking areas at seven boat launches, two picnic areas, and one picnic area/swim beach. The 2009 occupancies and projected occupancies through 2050 are presented in table 3-218.

Table 3-218. Project overall peak season occupancies for Yuba-Bear Project parking areas by reservoir through 2050 (Memorial Day to Labor Day). (Source: NID, 2011a; NID, 2011b)

| Project Reservoir | Parking Facility | Percent of Capacity | | | |
|---|---|---|---|---|---|
| | | 2009 Data | | 2050 Projection | |
| | | Seasonal | Weekend | Seasonal | Weekend |
| Jackson Meadows reservoir | Pass Creek boat launch (23 VAOT high water[a]) | 60 | 83 | 99 | 138 |
| | Pass Creek boat launch (43 VAOT, low water[b]) | 36 | 67 | 60 | 111 |
| | Woodcamp boat launch (36 VAOT) | 10 | 8 | 16 | 13 |
| | **Combined boat launches (59 VAOT, high water)** | **31** | **38** | **50** | **63** |
| | **Combined boat launches (79 VAOT, low water)** | **24** | **40** | **40** | **66** |
| | Woodcamp picnic area (35 VAOT) | 6 | 6 | 8 | 9 |
| | Aspen picnic area (30 VAOT) | 4 | 7 | 6 | 10 |
| | **Combined picnic areas (65 VAOT)** | **5** | **6** | **7** | **9** |
| Faucherie Lake | Faucherie Lake day-use area and boat launch (14 VAOT) | 23 | 52 | 36 | 82 |
| Rollins reservoir | Orchard Springs boat launch (150 VAOT) | 19 | 40 | 31 | 66 |
| | Greenhorn boat launch (108 VAOT) | 50 | 76 | 82 | 126 |
| | Peninsula boat launch (50 VAOT) | 34 | 51 | 63 | 96 |
| | Long Ravine boat launch (72 VAOT) | 56 | 119 | 93 | 199 |
| | **Combined boat launches (380 VAOT)** | **37** | **67** | **61** | **112** |
| | Greenhorn picnic area and swim beach (35 VAOT) | 16 | 24 | 23 | 34 |

[a] High water: Memorial Day – July.

[b] Low water: August – Labor Day.

**Usable Periods of Project Boat Launch Ramps**

The boat ramps at the projects are usable under existing project operations during different periods of the recreation season, depending on the median daily reservoir water surface elevation. A boat ramp is considered usable if the median daily reservoir water surface elevation is no less than 3 feet above the end of the constructed ramp, per the California Boating design guidelines.

**Upper Drum-Spaulding Project**

The Upper Drum-Spaulding Project has three developed formal boat ramps. Table 3-219 summarizes the minimum usable water surface elevation under existing project operations and the usable period for each developed boat ramp by water year type. The Fuller Lake boat ramp is usable year-round. Under existing project operations, the Lake Spaulding boat ramp is usable from May 1 through September 30 in all water year types, except critically dry years when the boat ramp is not usable for any period. The Silvertip boat ramp at Lake Valley reservoir is not usable during critically dry years, but is usable from May 1 through July 1 in wet and above normal years, June 1 through July 1 in below normal years, and mid-June only in dry years.

Table 3-219. Usable periods of Upper Drum-Spaulding Project boat ramps by water year type under existing project operations. (Source: PG&E, 2011a and PG&E, 2011c)

| Boat Launch | Minimum Usable Water Surface Elevation (feet msl) | Boat Ramp Usable Period by Water Year Type | | | | |
|---|---|---|---|---|---|---|
| | | Wet | Above Normal | Below Normal | Dry | Critically Dry |
| Lake Spaulding Boat Ramp | 4,942.9 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30[a] | -- |
| Fuller Lake Boat Ramp | 5,328.9 | Year-round | Year-round | Year-round | Year-round | Year-round |
| Silvertip Boat Ramp | 5,783.1 | May 15 – July 1 | May 15 – July 1 | June 1 – July 1 | mid-June | -- |

[a] At Lake Spaulding, the boat ramp is unusable briefly during the middle of September in dry water years, but becomes usable again in late September

**Yuba-Bear Project**

The Yuba-Bear Project has six developed formal boat ramps. Table 3-220 summarizes the minimum usable water surface elevation under existing project operations and the usable period for each developed boat ramp by water year type. At Jackson Meadows reservoir, Pass Creek boat launch is usable the entire peak season (Memorial Day to Labor Day) and through September in all water year types except dry and critically dry years; the Woodcamp boat launch is usable for the entire peak season in only above normal and wet years. At Rollins reservoir, three of the boat launches are usable for the entire recreation season (May 1 through September 30) in all water year types except in critically dry years.

Table 3-220. Usable periods of Yuba-Bear Project boat ramps by water year type under existing project operations. (Source: NID, 2011a; NID 2011c, as modified by staff)

| Boat Launch | Minimum Usable Water Surface Elevation (feet msl) | Boat Ramp Usable Period by Water Year Type | | | | |
|---|---|---|---|---|---|---|
| | | Wet | Above Normal | Below Normal | Dry | Critically Dry |
| **Jackson Meadows Reservoir** | | | | | | |
| Pass Creek boat launch | 5,996.5 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 15 | -- |
| Woodcamp boat launch | 6,016.0 | May 1 – Sept. 15 | May 1 – Sept. 1 | May 1 – Sept, 1 | May 1 – July 15 | -- |
| **Rollins Reservoir** | | | | | | |
| Orchard Springs boat launch | 2,133.0 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Aug 15 |
| Greenhorn boat launch | 2,133.0 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Aug 15 |
| Peninsula boat launch | 2,146.0 | May 1 – Sept. 15 | May 1 – Sept. 15 | May 1 – Sept. 15 | May 1 – Sept. 15 | May 1 – July 15 |
| Long Ravine boat launch | 2,137.0 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Sept. 30 | May 1 – Aug 15 |

### River Recreation

PG&E and NID investigated flow relationships for both whitewater boating and non-whitewater boating recreation activities (i.e., angling, swimming, and tubing) from 2008 through 2010. Information was gathered from stream reaches that are potentially affected by the Yuba-Bear and Drum-Spaulding Projects. All project-affected river reaches were considered for potential whitewater boating and non-whitewater boating opportunities.

#### Whitewater Boating

Thirteen stream reaches underwent a whitewater boating investigation as part of the Recreation Flow Study. The quality of boating along these reaches depends on the quantity of flow within the river. Project operations affect the number of days when boatable flows exist in these reaches. Table 3-221 summarizes the boatable flow ranges for the evaluated stream reaches for different types of watercraft (hardshell kayaks, rafts, and inflatable kayaks). The average number of boatable days per year for each type of watercraft under existing flow conditions (or the no-action alternative) is also summarized in table 3-221. The average number of days is based on hydrological data for the period 1976 through 2008 across all water year types.

Table 3-221. Project-affected stream reaches with existing or potential whitewater boating opportunities. (Source: NID, 2011a; PG&E, 2011a; NID, 2011c; PG&E, 2011c, as modified by staff)

| River | Study Reach | Boatable Flow Ranges and Number of Boatable Days Under Existing Flow Conditions by Watercraft Type | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hardshell Kayak (cfs) | Hardshell Kayak (average days per year) | Raft (cfs) | Raft (average days per year) | Inflatable Kayak (cfs) | Inflatable Kayak (average days per year) |
| Middle Yuba River | Milton diversion dam to Plumbago | 300-400 | 1.5 | n/a[a] | — | n/a | — |
| | Plumbago to YCWA's Our House diversion dam | 800-1,000 | 7.9 | 800-1,200 | 12.1 | 400-700 | 35.0 |
| South Yuba River | Langs Crossing to Jolly Boys Mine[b] | 250-400 | 5.3 | n/a | — | n/a | — |
| | Jolly Boys Mine to Golden Quartz[b] | 1,100-1,200 | 1.8 | 700-1,000 | 7.6 | 700-1,000 | 7.6 |
| | Golden Quartz to Washington | 1,000-2,200 | 19.7 | 1,000-2,200 | 19.7 | 250-350 | 17.9 |
| | Washington to Edwards Crossing | 700-2,200 | 36.1 | 900-3,200 | 26.5 | 250-350 | 21.2 |
| | Edwards Crossing to Purdon Crossing | 800-2,200 | 38.3 | 800-2,200 | 38.3 | 300-700 | 54.2 |
| | Purdon Crossing to Highway 49 | 600-1,500 | 46.1 | 800-2,200 | 42.5 | n/a | — |
| | Highway 49 to Bridgeport | 500-1,100 | 47.3 | 800-1,100 | 17.4 | n/a | — |
| Fordyce Creek | Fordyce Lake dam to Lake Spaulding | 350-550 | 20.3 | 400-550 | 9.2 | 350-550 | 20.3 |

Table 3-221. Project-affected stream reaches with existing or potential whitewater boating opportunities. (Source: NID, 2011a; PG&E, 2011a; NID, 2011c; PG&E, 2011c, as modified by staff)

| River | Study Reach | Boatable Flow Ranges and Number of Boatable Days Under Existing Flow Conditions by Watercraft Type | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hardshell Kayak (cfs) | Hardshell Kayak (average days per year) | Raft (cfs) | Raft (average days per year) | Inflatable Kayak (cfs) | Inflatable Kayak (average days per year) |
| Canyon Creek | French Lake dam to Bowman Lake | 120-150 | 2.7 (French Lake Dam to Faucherie Lake)<br>6.1 (Faucherie Lake Dam to Sawmill Lake) | n/a | — | n/a | — |
| | Artic Mine to South Yuba River | 300-400 | 5.5 | n/a | — | 300-400 | 15.5 |
| Bear River | Highway 174 to Ben Taylor Road | 600-1,000 | 41.4 | n/a | — | n/a | — |

[a] "n/a" indicates that the study reach is not boatable by this type of watercraft based on the results of the boater surveys.

[b] The study reach was from Langs Crossing to Golden Quartz, but data from the study determined that the study reach is actually two separate reaches: Langs Crossing to Jolly Boys Mine and Jolly Boys Mine to Golden Quartz.

PG&E and NID have the reliable ability to provide augmented or controlled flows in 3 of the 13 reaches: 2 reaches on Canyon Creek (French Lake dam to Bowman Lake and Artic Mine to South Yuba River) and 1 reach on the Bear River (Highway 174 to Ben Taylor Road). To provide reliable flows in the boatable range for most types of watercraft, the reservoir water levels must be up on the spill gates for most reaches. The time period for these flows is generally limited to the spring season when natural runoff is at its peak and is dependent on the water year.

**Non-Whitewater Boating**

There are numerous opportunities for low-flow recreational activities such as angling, swimming, tubing, and mining. All stream reaches potentially affected by the projects were considered in the non-whitewater boating element of the Recreation Flow Study. The study found that angling is of high quality and/or popular along several study reaches, including the Middle Yuba River from Jackson Meadows dam to Milton diversion impoundment, Canyon Creek immediately downstream of Bowman Lake and at the confluence with the South Yuba River, and the South Yuba River near the town of Washington and

upstream of the Golden Quartz area. Swimming and tubing are also popular non-whitewater activities that occur along reaches of the Middle Yuba River, South Yuba River, and Bear River. Table 3-222 summarizes non-whitewater recreational opportunities and acceptable flow ranges determined by the Recreation Flow Study for various stream reaches at the projects.

Table 3-222. Summary of non-whitewater recreational opportunities and acceptable flow ranges. (Source: NID and PG&E, 2011)

| Stream Reach | Estimated Acceptable Flow Range (cfs) |
|---|---|
| **Middle Yuba River** | |
| Tyler Foote Crossing (RM 26.4) | Swimming (34+), angling (34-225), and recreational mining (34+) |
| **South Yuba River** | |
| Langs Crossing (RM 40.0) | Swimming (8-10+) |
| Golden Quartz day-use and picnic areas | Swimming (8-10+), angling (8-10+), and recreational mining (8-10+) |
| Washington bridge | Swimming (12-15+) and angling (12-15+) |
| Edwards Crossing (RM 15.3) | Swimming (35+) and tubing (>35) |
| Purdons Crossing (RM 11.1) | Swimming (35+) |
| Highway 49 bridge crossing (RM 7.1) | Swimming (35+) and angling (35+) |
| Bridgeport at the South Yuba River State Park | Swimming (35+) and recreational mining (35+) |
| **Bear River** | |
| Bear River campground and day-use area | Swimming (156-575), recreational mining (156-325), and tubing (325+) |
| Dog Bar Road crossing (RM 3.1) | Swimming (156+), recreational mining (156+), and tubing [after mid-June (156+)] |
| **North Fork of the North Fork American River** | |
| Lake Valley Gap Fire area (RM 14.9) – bridge crossing site | Angling (5-25) |
| Lake Valley Gap Fire area (RM 14.9) – North Fork campground | Angling (5-70) and recreational mining (5+) |
| **Lindsey Creek** | |
| Lindsey Creek (Lower Lindsey dam to Bowman Lake Road) | Dispersed camping and equestrian use (1) (stream not likely used for any recreational activities regardless of flow due to significant vegetation in the stream) |

### 3.3.5.2 Environmental Effects

**Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects Fish Stocking**

One of the primary recreational activities associated with the project is angling. California Fish and Wildlife currently stocks several of the project reservoirs to enhance the recreational fishery. PG&E proposes to pay California Fish and Wildlife up to $15,000 annually for the stocking of fish in Lake Spaulding. California Fish and Wildlife recommends in its recommendation 17 and the Forest Service recommends in its 10(a) recommendation 8 that PG&E fund on an annual basis the stocking of fish at the Upper Drum-Spaulding Project in Blue, Carr, Culbertson, Feeley, Fordyce, Fuller, Lower Lindsey, Upper Lindsey, Meadow, Lower Rock, Upper Rock, White Rock, and Rock Creek Lakes; Lake Sterling; Lake Valley; and Lake Spaulding; and at the proposed Lower Drum Project in Halsey forebay. Fish species and size class stocking targets would be determined by California Fish and Wildlife, but California Fish and Wildlife and the Forest Service recommend a maximum number of fingerings and/or catchable fish that would be stocked in each of the 17 reservoirs. These agencies also recommend PG&E annually consult with California Fish and Wildlife to obtain fish stocking targets, fish species, discuss fish acquisition, and verify the completion of the previous year's stocking commitment. Finally, California Fish and Wildlife and the Forest Service recommend that at PG&E's discretion, PG&E would: (1) acquire the fish directly from approved fish hatcheries, or (2) reimburse California Fish and Wildlife for the cost of the stocking program.

In a response letter dated September 14, 2012, to California Fish and Wildlife and the Forest Service, PG&E states it would be appropriate to reimburse California Fish and Wildlife for the annual fish stocking in Lake Spaulding, Halsey forebay, Lake Valley reservoir, and Fuller, Lower Lindsey, and Blue Lakes up to the maximum levels included in the agencies' recommendations. However, PG&E disagrees with stocking all 17 reservoirs as recommended by California Fish and Wildlife and the Forest Service. PG&E states that there is no nexus between project operations and fish stocking. Further, stocking 17 reservoirs annually would cost nearly $200,000 each year while PG&E's proposed fish stocking program is more closely tailored to recreational use of the project, and is far more economic and feasible. PG&E states that the rationale provided by the agencies does not support stocking the reservoirs on an annual basis because the averages calculated by the agencies included only the years in which stocking occurred. Those averages did not take into account the years that California Fish and Wildlife did not stock all of the reservoirs. Finally, PG&E states that it should not be responsible for the act of stocking since that responsibility is mandated to California Fish and Wildlife by California law.

*Our Analysis*

Angling is one of the most popular activities associated with the project, and stocking fish in project reservoirs would help ensure that the recreational fishery is maintained for the term of the new license. Based on recreation studies completed during the relicensing process, the demand for angling at the project is projected to increase about 23 percent over the term of a new license. Maintaining the existing stocking numbers in those reservoirs that receive high recreational use and high angling pressure would help meet the estimated future demand for angling at the project.

Lake Spaulding, Lake Valley reservoir, and Fuller Lake receive high recreational use while Halsey forebay (Lower Drum Project), Fordyce, Lower Lindsey, and Meadow Lakes receive moderate recreational use (PG&E, 2011a). Lake Sterling and Carr, Culbertson, Blue, Feeley, Rock Creek, Upper Lindsey, Upper Rock, Lower Rock, and White Rock Lakes receive low recreational use (PG&E, 2011a). About half or more of the visitors to Lake Spaulding, Halsey forebay, Lake Valley reservoir, Lower Lindsey Lake, and Fuller Lake, participated in angling. Because of the high level of recreational angling that occurs at these reservoirs coupled with the moderate to high recreational use, these reservoirs would most benefit from annual fish stocking. Other reservoirs receiving moderate recreational use (Fordyce

and Meadow Lakes) would also benefit from regular, periodic fish stocking. Periodic review of angling use levels with recreational use data over the term of the new license would also help inform potential modifications to the lakes and reservoirs to be stocked on an annual or periodic basis.

The existing frequency that California Fish and Wildlife stocks the project reservoirs is unclear. PG&E notes that California Fish and Wildlife does not stock all of the reservoirs on an annual basis nor does California Fish and Wildlife publicize this information. Lake Sterling and Blue, Rock Creek, and White Rock Lakes are not currently stocked, although Lake Sterling and Blue and White Rock Lakes were stocked between 2000 and 2011. California Fish and Wildlife has noted that stocking is dependent on a number of factors, including the availability of fish. Stocking fish in remote reservoirs that receive low recreational use and low angling pressure on a periodic basis versus annually may be more appropriate. Many of the reservoirs recommended for fish stocking in California Fish and Wildlife's 10(j) and the Forest Service's 10(a) recommendations would require aerial stocking due to either the remoteness or access to the reservoir. However, based on cost information provided by the Forest Service, aerial stocking is a cost-effective method for stocking these remote reservoirs located at higher elevations. These reservoirs include Carr, Culbertson, Feeley, Lower Lindsey, Upper Lindsey, Meadow, Lower Rock, Upper Rock, and White Rock Lakes and Lake Sterling. Most of these reservoirs receive low recreational use, except for Lower Lindsey and Meadow Lakes, which receive moderate recreational use.

Developing a fish stocking plan that would include: annual fish stocking in Lake Spaulding (Upper Drum-Spaulding Project), Halsey forebay (Lower Drum Project), Lake Valley reservoir (Upper Drum-Spaulding Project), Fuller Lake (Upper Drum-Spaulding Project), and Lower Lindsey (Upper Drum-Spaulding Project); fish stocking every other until the first Form 80 reporting year in Fordyce (Upper Drum-Spaulding Project) and Meadow (Upper Drum-Spaulding Project) Lakes; and address fish stocking in additional reservoirs at the Upper Drum-Spaulding Project (Carr, Culbertson, Feeley, Upper Lindsey, Lower Rock, Upper Rock, Rock Creek, Blue and White Rock Lakes and Lake Sterling) based on changes in recreational use and angling pressure would provide the means for a coordinated fish stocking program. A fish stocking plan that also includes annual consultation would help address any changes in California Fish and Wildlife fish stocking management targets and the availability of hatchery fish and allow the flexibility to increase or decrease stocking numbers, change fish stocking sizes, and change the frequency of stocking a particular reservoir over the term of a new license. All of the reservoirs recommended for stocking by California Fish and Wildlife in recommendation 17 and the Forest Service in recommendation 8 would be included in the fish stocking plan, although not every reservoir would be stocked annually. Developing a fish stocking plan that also includes a summary report of fish stocking activities conducted would help ensure that the project reservoirs with high recreational use and angling pressure are stocked regularly to support continued recreational fishing opportunities.

Although the responsibility of fish stocking is mandated to California Fish and Wildlife by California law, we note that PG&E is ultimately responsible for the management of all project reservoirs and project reaches and would be responsible for ensuring the stocking of fish required under a new license.

**Recreation Plan**

PG&E filed a Recreation Plan on April 12, 2011, with its license application, and a revised Recreation Plan on August 29, 2012. In November 2013, a revised Recreation Plan dated September 2013 (PG&E, 2013a) was filed with FERC. PG&E proposes to implement the Recreation Plan within 1 year of license issuance. The September 2013 Recreation Plan would: (1) provide recreation facilities that meet the needs of project-related recreation consistent with federal, state, and local legal requirements; (2) monitor recreation use over the term of the license to meet recreation user demand and

to provide quality recreation experiences while minimizing the effects of recreation use; and (3) enhance the accessibility of project-related recreation facilities for visitors with disabilities. The September 2013 Recreation Plan includes a number of provisions for improvements and upgrades at existing recreation facilities as well as measures to construct new facilities. Proposed new facilities and changes to existing facilities are summarized in table 3-223. The September 2013 Recreation Plan also includes a provision for PG&E to provide a contact for the Forest Service, whenever planning or constructing recreation facilities and routine and other maintenance activities are taking place on NFS lands. Provisions of the September 2013 Recreation Plan apply to all the existing Drum-Spaulding Project developments including those that comprise the Upper Drum-Spaulding (Spaulding No. 3, Spaulding No. 1 and No. 2, Alta, Drum No. 1 and No 2, Dutch Flat No. 1), Lower Drum (Halsey, Wise, Wise No. 2, Newcastle), and Deer Creek (Deer Creek) Projects.

Forest Service condition 53 specifies that, upon FERC approval, PG&E implement the September 2013 Recreation Plan.

Although BLM's final conditions do not require a Recreation Plan, BLM condition 48 is generally the same as a provision of the September 2013 Recreation Plan for providing a licensee contact, whenever planning or constructing recreation facilities and routine and other maintenance activities are taking place on federal lands.

California Fish and Wildlife recommends in its recommendation 16 that PG&E consult with the Forest Service and BLM to finalize the proposed Recreation Plan and submit it for Forest Service and BLM approval. The provisions of this recommendation are similar to those that have been included in the September 2013 Recreation Plan that has been agreed to by PG&E and the Forest Service.

By letter dated December 20, 2013, PG&E confirmed its concurrence with Forest Service final condition 53, which includes the September 2013 Recreation Plan, and BLM condition 48.

California Fish and Wildlife's recommendation 16 is similar to the September 2013 Recreation Plan; however, California Fish and Wildlife's recommendation includes several recreation facility provisions that were in the preliminary Forest Service conditions but were removed from the final Forest Service conditions. Table 3-223 summarizes notable differences between the recreation facilities included in the September 2013 Recreation Plan and California Fish and Wildlife's recommendation 16.

We analyze specific provisions in the September 2013 Recreation Plan and California Fish and Wildlife's recommendation 16 in the following areas: (1) recreation plan implementation and organization; (2) recreation facility construction and modification; (3) trails and access developments; (4) water system developments; (5) recreation facility operation and maintenance; (6) recreation monitoring; (7) recreation development review; (8) project patrols/law enforcement; (9) public information and education; and (10) boat ramp extensions.

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| **Upper Drum-Spaulding Project** | | |
| **White Rock Lake** | | |
| *White Rock Lake Primitive Campsites* | | |
| • Within 5 years, enhance primitive campsites, including defining and armoring each campsite, installing vehicle barrier and information board, and grading road.<br>• Annually monitor camping area for bear encounters. | • Same provision<br>• Same provision | • Same provision<br>• Same provision |
| *White Rock Lake Directional Signs* | | |
| • Install directional signs. | • Same provision | • Same provision |
| **Meadow Lake** | | |
| *Directional and Informational Signage* | | |
| • Within 5 years, install new directional signs; provide resource protection signs and posters and regulations on information boards at recreation sites | • Same provision | • Same provision, except prohibits camping along the shore except within developed sites and barricade parking areas |
| *Undeveloped Boat Ramps* | | |
| • Within 5 years, place aggregate on the two boat launches, delineate launch areas with boulders, and provide information board at each ramp | • Same provision | • Same provision |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| **PG&E September 2013 Recreation Plan** | **Forest Service Condition 53 September 2013 Recreation Plan Provisions** | **California Fish and Wildlife Recommendation 16 Recreation Plan Provisions** |
|---|---|---|
| *Meadow Lake Day-use Area (New Facility)* | | |
| • Within 5 years, develop small day-use area adjacent to existing undeveloped boat ramp (at the Meadow Lake campground entrance) that includes 3 picnic tables, gravel parking for up to 8 vehicles, an interpretive display on historical and/or cultural resource protection, and day-use only signage | • Same provision | • Same provision |
| *Meadow Lake Shoreline Campground* | | |
| • Within 5 years, reconstruct the campground as a Development Scale 2 campground, including vault toilets; relocate and reinforce vehicle barriers to improve vehicle management at each campsite; define and armor campsites; replace entrance information board if not already completed under existing license term; provide pedestrian trail from Meadow Knoll group campground to the lake. | • Same provision | • Same provision, except to be completed within 8 years |
| *Meadow Lake Campground* | | |
| • Within 5 years, replace information boards, if not already completed under existing license term. Within 15 years, reconstruct campground as a Development Scale 3 campground, including redesign/relocate spurs and campground roads; close non-essential routes; delineate roads with barriers; develop a potable water source. | • Same provision | • Same provision |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| *Meadow Knoll Group Campground* | | |
| • Within 20 years of license issuance, reconstruct the group campground; gravel and barrier road and spurs; clean up down logs and slash. | • Same provision | • Same provision |
| **Lake Sterling** | | |
| *Lake Sterling Primitive Campsites (New)* | | |
| • Install 3 primitive campsites and information board within 5 years.<br>• Project patrol person would monitor and limit camping in this area to the 3 primitive campsites | • Same provision | • Same provision, but recommends at least 3 primitive campsites and monitoring of use and human waste and does not specifically recommend project patrol person |
| *Lake Sterling Walk-in Campground Conversion* | | |
| • Convert campground to Development Scale 3 day-use area within 10 years. | • Same provision | • Same provision |
| **Fordyce Lake** | | |
| *Fordyce Lake Primitive Campground (New Facility)* | | |
| • Within 5 years, install 7 to 10 primitive campsites with vault toilet and directional signs, replace information board. | • Same provision | • Same provision, except recommends facility developed within 3 years and recommends 10 campsites |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| *Fordyce Lake OHV Signage* | | |
| • Install and maintain barriers and signage on NFS land on southern arm of lake and install and maintain signing on PG&E land on southern arm of lake to address resource damage below high water mark within 1 year.<br>• Within 1 year, pursue Nevada County ordinance to prohibit motorized vehicle use below high water line at Fordyce Lake. | • Same provision<br>• Same provision | • Same provision, except does not limit barriers to NFS land<br>• Same provision |
| • Within 3 years, improve information board signage, provide patrol person at Fordyce Lake and Lake Sterling, install regulatory signage, dismantle and restore dispersed recreation sites, and limit camping to designated sites only. | • Same provision | • Same provision |
| **Lake Spaulding** | | |
| *Lake Spaulding Campground* | | |
| • Within 10 years, retrofit/relocate accessible campsite; replace campsite components as necessary; install animal-resistant food lockers; repave campground roads and paved spurs and pave native surfaces.<br>• No comparable provision<br>• No comparable provision | • Same provision<br>• No comparable provision<br>• No comparable provision | • Same provision<br>• Provide showers within 10 years at Lake Spaulding campground or at other campground within one-half hour drive from Lake Spaulding campground<br>• Widen campground circulation roads within 10 years |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| *Lake Spaulding Boat Launch* | | |
| • Replace existing restrooms with accessible restrooms; provide accessible parking spaces and access to restrooms; create 1 accessible picnic site within 5 years.<br>• Improve paved access road to boat launch, where possible, within 5 years.<br>• Provide educational material on information board within 5 years. | • Same provision<br>• Same provision<br>• Same provision | • Same provision, except within 10 years and includes widening of road to boat launch<br>• Same provision, except within 10 years<br>• Same provision, except within 10 years |
| *Lake Spaulding Boat-In Campground (New Facility)* | | |
| • Within 5 years, construct a 12-unit boat-in campground; install a boat mooring system; dismantle user-created shoreline fire rings. | • Same provision | • Same provision |
| • Within 5 years, pump toilet once a year; may fund the Forest Service to pump toilet or may fund Forest Service to purchase and operate a vault-pumping system installed on Forest Service boat | • Same provision | • Similar provision, except does not specify Forest Service or frequency |
| **Bear Valley** | | |
| *Bear Valley Group Campground* | | |
| • Grade/level the group area; provide 2 accessible campsites; install new animal-resistant food lockers within 5 years. | • Same provision | • Same provision, except does not recommend schedule for completion |
| *Sierra Discovery Trail* | | |
| • Repair or replace the existing boardwalk within 3 years. | • Same provision | • Same provision, except does not recommend schedule for completion |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| **Fuller Lake** | | |
| *Fuller Lake Day-Use Area and Boat Launch (Developmental Scale 3 Facilities)* | | |
| • Reconstruct day-use area and boat launch within 5 years. | • Same provision | • Same provision |
| • Install courtesy dock at boat ramp within 5 years. | • Same provision | • Same provision |
| • Improve/expand information board signage within 5 years. | • Same provision | • Same provision |
| • Expand the turnaround/existing parking to create total of 15 trailer parking spaces within 5 years. | • Same provision | • Same provision |
| • Within 5 years, provide 15-20 single vehicle parking spaces and install accessible fishing pier, restroom, and one van-accessible parking space. | • Same provision | • Same provision but includes improving fish habitat at fishing pier |
| • No comparable provision | • No comparable provision | • Provide trail system information on bulletin board at all trail system entry access points, including Fuller Lake angler access, penstock access road intersection with Bowman Road, Rucker Lake trailhead, and Blue Lake trailhead. |
| • No comparable provision | • No comparable provision | • If monitoring determines additional parking is needed at Spaulding Lake trail access point (share with Fuller angler access parking), construct trailhead with toilet and parking for at least 10 vehicles |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| *Fuller Lake Angler Access* | | |
| • Upgrade angler access area within 5 years; regrade and place gravel on parking area; develop accessible parking space. | • Same provision | • Same provision |
| **Rucker Lake** | | |
| *Rucker Lake Campground* | | |
| • Within 2 years, install/maintain directional signs; rehabilitate campground features; provide 6 additional campsites; define and further develop trail between parking and camping area. | • Same provision | • Same provision except within 1 year |
| *Rucker Lake Campground Conversion* | | |
| • Within 10 years convert to a 20-unit, drive-in, universally accessible campground; convert 2 sites to picnic sites; provide water, septic, and power at host site; provide potable water with distribution system; rehabilitate campsites east of new picnic sites and designate parking.<br>• Develop the informal boat launch as an accessible formal car-top boat launch within 10 years.<br>• After conversion of campground to a drive-in campground, update exhibit G drawings to remove the campground hike-in parking area from the project boundary. | • Same provision<br>• Same provision<br>• Same provision as PG&E | • Same provision<br>• Same provision<br>• Convert existing campground parking area into trailhead with parking within 10 years |
| **Blue Lake** | | |
| • No comparable provision | • No comparable provision | • Improve Blue Lake dam access road to Maintenance Level 3 standard within 5 years |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| *Blue Lake Primitive Hike-In Campsites* | | |
| • Construct a pedestrian, native surface trail from parking area to hike-in sites within 5 years. | • Same provision | • No comparable provision |
| • Rehabilitate existing primitive campsites. | • Same provision | • No comparable provision |
| **Carr Lake** | | |
| *Carr Lake Walk-in Campground* | | |
| • Reconstruct campground as Development Scale 2 within 5 years; including replace existing toilet with accessible toilet, designate parking spaces for Carr Lake campers, and rehabilitating the existing campsite facilities. | • Same provision | • Same provision |
| • Convert campsite on northern tip of the lake into an informal boat launch within 5 years. | • Same provision | • Same provision |
| • Within 5 years, construct a trail at a grade meeting FSORAG from existing campsites (sites 1-5) to non-project toilet (to be constructed) at Carr-Feel trailhead (non-project facility) and construct trail at a reasonable grade from new campsites near the dam to non-project toilet (to be constructed) at Carr-Feel trailhead. | • Same provision | • Same provision, except trails to be 5 percent grade or less |
| • No comparable provision | • No comparable provision | • Install accessible toilet at southern end of parking area within 5 years |
| • Develop 5-6 new, walk-in campsites on west side of lake on PG&E land near the dam within 5 years. | • | • Same provision, except recommends the new campsites should be on a ridge on west side of lake overlooking lake |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| *Carr-Feeley Trailhead* | | |
| • After FERC approval of Recreation Plan, update exhibit G drawings to remove Carr-Feeley trailhead from project boundary | • Same provision | • No comparable provision |
| • No comparable provision | • No comparable provision | • Within 10 years, install 3 picnic sites (1 accessible) on western edge of parking area with accessible parking space; increase trailhead/campground parking capacity by 15 vehicles, and maintain as Development Scale 2 facility |
| **Lower Lindsey Lake** | | |
| *Lower Lindsey Lake Campground* | | |
| • Replace information board with kiosk; improve campsite vehicle spurs; convert campsite east of boat launch to picnic site; gravel boat launch/designate as a car-top boat launch within 3 years. | • Same provision | • Same provision to be completed within 2 years |
| • Install directional signage for campground within 3 years. | • Same provision | • Same provision to be completed within 2 years |
| • Within 15 years, redesign and reconstruct campground as Development Scale 2. | • Same provision | • Same provision |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| *Lindsey Creek Campground (New Facility)* | | |
| • Within 10 years of license issuance or when triggers indicate that a new campground facility is needed at Lindsay Lake: Construct a 20- to 25-unit drive-in (Development Scale 3) family campground on the south side of Lindsey Creek with potable water and water distribution to trailhead and Lindsey Lake campground; access road and campground road would be gravel Maintenance Level 3 road; rock barriers; accessible vault toilets; pay station and information panel; host site. | • Same provision | • Same provision |
| *Lower Lindsey Lake Trailhead* | | |
| • After FERC approval of Recreation Plan, update exhibit G drawings to remove Lower Lindsey Lake trailhead from project boundary | • Same provision | • Within 5 years, expand existing parking capacity by a minimum of 10 spaces; install accessible toilet; install 3 picnic sites; provide information panels; maintain as a Development Scale 3 facility |
| **Middle Lindsey, Culbertson, Lower Rock, and Upper Rock Lakes** | | |
| *Middle Lindsey, Culbertson, Lower Rock, and Upper Rock Lakes Walk-in Campsites* | | |
| • At Middle Lindsey, Culbertson, Lower Rock, and Upper Rock Lakes provide the following improvements (at a minimum of 3 campsites per each reservoir), signage to primitive campsites, define each primitive campsite, replace steel fire rings as needed within 5 years. | • Same provision | • Same provision |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| • No comparable provision | • No comparable provision | • Monitor to determine need for additional dispersed campsites |
| **Kidd Lake** | | |
| *Kidd Lake Group Campground* | | |
| • Upgrade one campsite to meet current accessibility guidelines; install animal-resistant food lockers; improvements to group campfire areas within 5 years. | • Same provision | • No comparable provision |
| **Lower Peak Lake** | | |
| *Lower Peak Lake Primitive Campsites (New Facility)* | | |
| • Install up to 5 campsites along shoreline of Lower Peak Lake; install directional signs; fund Forest Service to construct extension of Lower Peak Lake Access Road or cooperate with Forest Service to develop an alternative public access option to the proposed primitive campsites within 3 years. | • Same provision | • No comparable provision |
| • Install an information board within 3 years. | • Same provision | • Replace trailhead bulletin boards within 5 years. |
| • No comparable provision | • No comparable provision | • Construct/maintain non-motorized trail connecting campsites to trailhead on south side of Lower Peak Lake within 5 years. |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| **Upper Peak Lake** | | |
| • No comparable provision | • No comparable provision | • Construct/maintain pedestrian trail from trailhead near Upper Peak Lake dam to the lake; install gate to prevent vehicle access to shoreline within 5 years. |
| **Kelly Lake** | | |
| *Kelly Lake Picnic Area* | | |
| • Remove the 2 pit restrooms within 3 years. | • Same provision | • No comparable provision |
| • Replace 3 picnic tables and remove 2 picnic tables within 3 years. | • Same provision | • Same provision |
| • Replace vehicle barriers around the parking area; add directional signs to Kelly Lake. | • Same provision | • Same provision; except includes secure/formalize public road access to reservoir. |
| **Lake Valley Reservoir** | | |
| *Lodgepole Campground* | | |
| • Within 2 years, retrofit water spigots to accessible standards; install animal-resistant lockers. | • Same provision | • Same provision |
| *Lake Valley Group Campground (New Facility)* | | |
| • Within 5 years, develop a group campground for 50 to 100 people and may provide group camping opportunities in increments of 25 to 50 people at Lake Valley reservoir. | • Same provision | • Same provision, includes determining, during design, if a suitable location is available within the project boundary or expand boundary to include final location |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| *Silvertip Picnic Area and Boat Launch* | | |
| • Widen access road; reconfigure parking area for up to 15 single and 10 double spaces; provide accessible parking within 5 years. | • Same provision | • Same provision |
| • Replace/relocate restroom within 5 years. | • Same provision | • Same provision |
| • Install up to 5 additional picnic sites with 1 accessible picnic unit within 5 years. | • Same provision | • Same provision |
| • Extend the boat ramp to provide launching through Labor Day for all water year types, except critically dry, within 5 years. | • Same provision | • Same provision |
| **Drum Forebay** | | |
| • Within 2 years, install directional signs to and from the I-80 junction to the forebay. | • Same provision | • No comparable provision |
| **Alta Forebay** | | |
| • Within 2 years, install directional signs to and from the Alta Bonnynook Road/Baxter Road junction to the forebay. | • Same provision | • No comparable provision |
| **Bear River Trail** | | |
| • No comparable provision | • No comparable provision | • Cooperate with trail planners for trail along Bear River; provide perpetual public access of trail and roads across PG&E lands; support trailhead development, sanitation, and signage. |

Table 3-223. Notable facility differences between the provisions of PG&E September 2013 Recreation Plan, Forest Service condition 53 September 2013 Recreation Plan, and California Fish and Wildlife recommendation 16. (Source: staff)

| PG&E September 2013 Recreation Plan | Forest Service Condition 53 September 2013 Recreation Plan Provisions | California Fish and Wildlife Recommendation 16 Recreation Plan Provisions |
|---|---|---|
| **Deer Creek Project** | | |
| **Deer Creek Forebay** | | |
| • Within 2 years, install directional signs to and from the Highway 20 junction to the forebay. | • Same provision | • No comparable provision |
| **Lower Drum Project** | | |
| **Wise Forebay** | | |
| *Wise Forebay Parking Area (New Facility)* | | |
| • Install parking area for up to 5 vehicles (one accessible spot); install information board; install fencing between the parking lot and adjacent private property within 5 years. | • Same provision[a] | • No comparable provision |
| **Halsey Forebay** | | |
| *Halsey Forebay Picnic Area* | | |
| • Upgrade picnic site adjacent to accessible restroom to accessible standards with parking and develop accessible fishing station within 5 years. | • Same provision[a] | • No comparable provision |

[a] Forest Service 4(e) conditions may not apply to this facility because it is located in the proposed Lower Drum Project. The Lower Drum Project, as proposed, would not include any NFS lands.

*Recreation Plan Implementation and Organization*

The September 2013 Recreation Plan, agreed to by both PG&E and the Forest Service, provisions are similar to the provisions for the recreation plan included in California Fish and Wildlife recommendation 16. Where differences do exist between the proposed plan and recommendations made in the California Fish and Wildlife measure, the differences are mostly related to detailed facility configuration, development scale for modifications, or the schedule for completion.

Our Analysis

The September 2013 Recreation Plan would provide benefits to the public generally within 1 to 10 years of license issuance. In some specific instances, California Fish and Wildlife has recommended a shorter or longer time frame for completion of a particular facility modification or addition, but in most instances, the differences in timing are within 1 to 3 years. Overall, the implementation schedule of the

September 2013 Recreation Plan with all of the facility modifications and enhancements included would benefit the recreating public and is reasonable and generally consistent with California Fish and Wildlife's recommendations.

*Recreation Facility Construction and Modification*

The September 2013 Recreation Plan proposes a number of upgrades, modifications, and additions to existing facilities to enhance recreational use at the project. The proposed modifications are listed in table 3-224. Most of the measures proposed are modifications to existing facilities, but the September 2013 Recreation Plan also proposes to construct several new recreation facilities as well, including: (1) Meadow Lake day-use area (Upper Drum-Spaulding Project), (2) Lake Sterling primitive campsites (Upper Drum-Spaulding Project) (3) Fordyce Lake primitive campground (Upper Drum-Spaulding Project), (4) Lake Spaulding boat-in campground (Upper Drum-Spaulding Project), (5) Lindsey Creek campground (Upper Drum-Spaulding Project) (6) Lower Peak Lake primitive campsites (Upper Drum-Spaulding Project), (7) Lake Valley group campground (Upper Drum-Spaulding Project), and (8) Wise forebay parking area (Upper Lower Drum Project). California Fish and Wildlife recommendation 16 is consistent with PG&E's proposal to construct these new facilities, except that California Fish and Wildlife does not recommend the Lower Peak Lake primitive campsites or Wise forebay parking area nor does it recommend removal of Carr-Feeley trailhead and Lower Lindsey Lake trailhead from the project boundary. In the following section, we analyze the more significant recreation facility proposals included in the September 2013 Recreation Plan, including: (1) animal-resistant locker additions; (2) accessible facility additions or modifications; (3) campground or campsite additions or modifications, including the addition of campsites or campgrounds to alleviate crowding, and the formalization of dispersed campsites; (4) road, parking, and vehicle barrier additions or modifications; and (5) trail and trailhead additions or modifications

*Animal-Resistant Storage Lockers and Trash Facilities*

Currently, not all campground and campsites located at the PG&E recreation sites are equipped with food storage lockers. The September 2013 Recreation Plan proposes installation of animal-resistant storage lockers at all walk-in campground campsites within 2 years and the installation of animal-resistant lockers at all remaining (Development Scale 2 and above) campgrounds where food storage lockers are missing. These campgrounds include: Fordyce Lake primitive campground, Lake Spaulding campground, Lake Spaulding boat-in campground, Bear Valley group campground, Rucker Lake campground (replace smaller food lockers), Blue Lake primitive hike-in campsites, Carr Lake walk-in campground, Lindsey Creek campground, Kidd Lake group campground, Lower Peak Lake primitive campsites, Lake Valley group campground, and Lodgepole campground (all located at the Upper Drum-Spaulding Project). The September 2013 Recreation Plan proposes the installation of animal-resistant trash facilities at existing facilities with trash facilities within 5 years. The following facilities are managed as pack-it-in/pack-it-out facilities: White Rock Lake, Meadow Lake, Lake Sterling, Rucker Lake (until reconstruction), Blue Lake, Carr Lake, Lower Lindsey Lake, Middle Lindsey Lake Culbertson Lake, Upper and Lower Rock Lakes, and Kelly Lake at the Upper Drum-Spaulding Project; Deer Creek forebay (proposed Deer Creek Project); and Halsey forebay (proposed Lower Drum Project). PG&E would implement pack-it-in/pack-it-out policies at Fordyce and Lower Peak Lakes (Upper Drum-Spaulding Project) and the new access at Wise forebay (proposed Lower Drum Project).

California Fish and Wildlife recommendation 16 recommends the installation of metal animal-resistant food storage lockers, similar to the September 2013 Recreation Plan, and the replacement of all existing plastic food storage lockers with metal food storage lockers at campgrounds where lockers are missing. California Fish and Wildlife recommends the installation of animal-resistant food lockers at the same campgrounds as those included in the September 2013 Recreation Plan except for campgrounds at

Blue Lake, Kidd Lake, Lower Peak Lake, and Lake Valley. California Fish and Wildlife also recommends the installation of animal-resistant trash facilities at existing facilities with trash facilities.

Our Analysis

The installation of animal-resistant food storage lockers and animal resistant trash facilities at existing facilities with trash facilities, as proposed in September 2013 Recreation Plan, would have little to no adverse impact on the recreation sites, or on project resources, and would be a benefit to recreation users. The use of animal-resistant storage lockers and animal-resistant trash facilities would discourage wildlife from frequenting campsites and recreation facilities, significantly reducing the potential for human-wildlife interactions, and would improve camper and recreation user safety. Installation of animal-resistant storage lockers at all walk-in campground campsites, including those located at Blue Lake, Kidd Lake, Lower Peak Lake and Lake Valley, would also benefit both recreationists and wildlife.

*Accessible Facilities*

PG&E's current recreation sites do not all include accessible facilities for those visitors with disabilities. The September 2013 Recreation Plan proposes to improve accessibility by adding a number of accessible facilities and improvements at the project's existing recreation sites, including accessible campsites, campgrounds, trails, vault restrooms, restrooms, parking, picnic tables, a car-top boat launch, a fishing pier, an accessible fishing station, and accessible routes around picnic areas and campgrounds. Table 3-223 provides a detailed summary of accessibility improvement proposals. In most cases, California Fish and Wildlife (recommendation 16) has recommended similar accessibility improvements to those proposed by the September 2013 Recreation Plan. In addition, California Fish and Wildlife recommends accessibility improvements at the Carr Lake walk-in campground and at Carr Lake trailhead (see table 3-223 for specific details).

Our Analysis

The provision of accessible recreation as proposed by the September 2013 Recreation Plan is consistent with the Commission's policy on recreation facilities at licensed projects under which licensees are expected to consider the needs of all populations, including those with disabilities, in the design and construction of such facilities.[31] Providing accessible facilities, where feasible, and improving access for all populations at the project would provide additional access to the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects for persons with disabilities and would help address growing recreation demand at the projects.

The September 2013 Recreation Plan includes a provision to remove the Carr-Feeley trailhead from the project boundary for the Upper Drum-Spaulding Project. California Fish and Wildlife recommendation 16 includes a provision to install a fully accessible picnic site, including an accessible parking space, on the western edge of the Carr-Feeley trailhead parking area. During the relicensing recreational use study, PG&E found that while this trailhead parking area was heavily used, the vast majority of this use was for hiking and backpacking for non-project lakes (beyond Carr and Feely Lakes). Roughly 10 percent of the total use at the trailhead was attributed to the Drum-Spaulding Project reservoirs (Carr or Feeley Lakes). Since this trailhead parking area does not appear to serve a project purpose and is proposed for removal from the project boundary, installation of accessible facilities at this

[31] See 18 CFR § 2.7 (2010).

site do not appear to be necessary to improve access for all populations to the Upper Drum-Spaulding Project.

The September 2013 Recreation Plan includes a provision to replace the existing two single-unit toilets with a single-unit accessible toilet at the Carr Lake walk-in campground. California Fish and Wildlife recommendation 16 includes this provision, but also includes the installation of a double-unit accessible toilet at the southern end of the parking area for the Carr Lake walk-in campground. Since an accessible toilet would already be provided at this recreation facility under the September 2013 Recreation Plan, it does not appear that an additional accessible toilet at the Carr Lake walk-in campground is necessary.

*Campgrounds and Campsites*

At PG&E's project reservoir and recreation sites, camping is one of the most popular recreation activities. Camping within the project area occurs at both developed campgrounds and at designated dispersed campsites. There is also some camping that occurs at unimproved, undesignated campsites dispersed around several reservoirs. Some of the campgrounds and campsites at PG&E's project reservoirs are in need of improvements associated with old or worn facilities, camping in non-designated sites, and in some cases, overcrowding or anticipated future demand. The September 2013 Recreation Plan includes provisions that would provide improvements, modification, or upgrades to existing campgrounds and campsites located at many project recreation sites. The September 2013 Recreation Plan also proposes the addition of new campgrounds, including a new campground at Lindsey Creek, a new group campground at Lake Valley, a new boat-in campground at Lake Spaulding, a new primitive campground at Fordyce Lake, and new primitive campsites at Lower Peak Lake and Lake Sterling, all located at the Upper Drum-Spaulding Project. Table 3-223 provides a detailed summary of the September 2013 Recreation Plan provisions to improve, modify, expand, and reconstruct campgrounds and campsites at the projects. California Fish and Wildlife recommendation 16 recommends similar campground and campsite proposals at most of the recreation sites. However, for some recreation sites, California Fish and Wildlife recommendations for campsite and campground improvements at the Upper Drum-Spaulding Project differ notably from those proposed by PG&E and specified by the Forest Service in the September 2013 Recreation Plan, including those at Meadow Lake (prohibit camping along shoreline except within designated campsites and provide a schedule for reconstructing the Meadow Lake shoreline campground), Fordyce Lake primitive campground (install 10 primitive campsites within 3 years), Lake Spaulding (maintain toilet at boat-in campground, does not specify frequency or Forest Service as the third party for maintenance), Lower Peak Lake (California Fish and Wildlife does not include provision to develop new primitive campsites), and Rucker Lake (provide a schedule for rehabilitating existing campground features within 1 year and convert existing campground parking area into trailhead with parking within 10 years) (see table 3-223).

Our Analysis

For most of the Upper Drum-Spaulding project campgrounds, the September 2013 Recreation Plan and California Fish and Wildlife agree on improvement measures to be implemented, particularly where improvements are based on current use and anticipated future demand. At a number of sites, such as Meadow Lake, for example, the September 2013 Recreation Plan specifies to reconstruct and/or expand the campgrounds over time to accommodate anticipated increases in campground use and to meet future demand. In other instances, the September 2013 Recreation Plan proposes modifications to campgrounds or campsites to improve the current condition of the campground facilities and/or to consolidate dispersed camping into designated areas, with improved facilities. Improvements such as these would benefit recreation users at the project by providing safe and usable camping facilities that are designed to accommodate use by individuals, small groups, and in some cases, larger groups or families.

Proposed modifications or expansions to existing campgrounds would also ensure that camping demand at the project is met now and into the future, over the new license term.

At some sites, the September 2013 Recreation Plan proposes the consolidation of camping into improved campgrounds and campsites, including designating primitive campsites, and dismantling some dispersed, non-designated campsites. As a policy, PG&E would limit camping to designated campsites around project reservoirs on PG&E lands and PG&E would also work with the Forest Service to pass a Forest Order to limit camping to designated campsites on NFS lands within ¼ mile of the following reservoirs at the Upper Drum-Spaulding Project: Fordyce, Rucker, Lower Lindsey, Carr, Meadow, Peak and within 500' of the Lake Spaulding boat-in campground. For example, at Fordyce Lake, the September 2013 Recreation Plan proposes to develop a primitive campground and limit camping to designated campsites. At Middle Lindsey, Culbertson, Lower Rock, and Upper Rock Lakes, the September 2013 Recreation Plan proposes to make minor improvements to existing primitive campsites. The September 2013 Recreation Plan proposes to develop up to five new primitive campsites along the shoreline at Lower Peak Lake and to install three primitive campsites at Lake Sterling. At all these sites, upgrading and developing primitive campsites and eliminating others would consolidate camping and reduce human effects around the undeveloped portions of the reservoir, thereby helping to preserve the quality of the remote recreation experience at these lakes. Installation of signage would help confine use to designated areas, would reduce the potential for camping in informal, unimproved campsites, and would reduce human use effects on the reservoir shoreline by eliminating or reducing the number of informal campsites, such as vegetation impacts and shoreline erosion as discussed in section 3.3.3.2.1, *Terrestrial Resources, Environmental Effects, Vegetation*. California Fish and Wildlife's recommendation that PG&E prohibit camping along the shoreline of Meadow Lake except within designated campsites is consistent with the designated camping policy provisions in the September 2013 Recreation Plan agreed to by the Forest Service and PG&E.

At Lindsey Lake, the Lower Lindsey Lake campground is a developed campground with relatively high use levels. In 2009, peak season campground occupancy was 23 percent for the season and 60 percent on weekends. By 2050, occupancy projections are 36 percent seasonally and 92 percent on weekends. To help address the anticipated increase in use at Lower Lindsey Lake, the September 2013 Recreation Plan proposes the development, within 10 years or when triggers indicate that a new campground is needed at Lower Lindsey Lake, of a new 20- to 25-unit campground at Lindsey Creek. Given the current level of demand and projected future demand, development of the new Lindsey Creek campground would improve recreational use at Lower Lindsey Lake by providing additional camping facilities to meet existing and future user needs.

At Lake Valley reservoir, the Lodgepole campground is a developed campground with 35 campsites and is in good condition, and the September 2013 Recreation Plan does not include any provisions for specific modifications or upgrades to the existing campground facilities. However, use levels at the existing campground are relatively high. In 2009, peak season campground occupancy was 43 percent for the season and 61 percent on weekends. By 2050, occupancy projections are 67 percent seasonally and 94 percent on weekends. To help address the anticipated increase in use at Lake Valley, the September 2013 Recreation Plan proposes the development within 5 years of a new group campground for 50 to 100 people at Lake Valley reservoir. Lake Valley is a good location for a new group campground because it provides a natural setting, gentle terrain, and good road and shoreline access. The proposed new campground would alleviate existing use pressure at the Lodgepole campground. Although a new group campground would increase recreational use and human activity at Lake Valley reservoir with all the accompanying potential for effects on shoreline resources, increased use is likely to continue over the term of a new license. The use is best accommodated and would have the least effect on project resources at a formal group campground that would consolidate use to a smaller area. In addition, the installation of a new group campground at Lake Valley would be anticipated to

relieve some of the camping use pressure at both the Bear Valley group campground and the Kidd Lake group campground.

At Lake Spaulding, the September 2013 Recreation Plan proposes the installation of a new boat-in campground. The new campground would be intended to replace undeveloped, user-created campsites that currently exist along the shoreline. The September 2013 Recreation Plan also proposes to pump the toilet at the proposed campground once a year, which may be accomplished through funding to the Forest Service to purchase, operate, and maintain a vault-pumping system. Lake Spaulding receives a moderate amount of recreation use. Weekend occupancy of the Lake Spalding campground is 56 percent and is projected to rise to 86 percent by 2050. The addition of a boat-in primitive campground would help to alleviate some of the use pressure at the existing campground and would reduce informal camping along the shoreline with its accompanying effects on shoreline resources. Provisions for a boat mooring system and toilet pumping once a year would help to minimize effects on the shoreline associated with projected increase in recreational use over the term of the license. However, we note that the Commission only has authority over its licensees, and therefore, PG&E would ultimately be responsible for pumping the toilet installed at the campground.

At Fordyce Lake, there are currently no developed recreation facilities. The September 2013 Recreation Plan proposes to install 7 to 10 primitive campsites at Fordyce Lake within 5 years. California Fish and Wildlife recommendation 16 is consistent with this proposal; however, California Fish and Wildlife recommends 10 primitive campsites be constructed within 3 years. Based on the 2009 relicensing studies, a substantial demand for primitive ca0mping in this area exists. From the 2009 relicensing studies, 89.6 percent of the visitors stay overnight. The majority of visitors commented on the general lack of facilities at Fordyce Lake. Of the visitors surveyed for the potential of the addition of new recreation facility campsites, 14.6 percent highly preferred campsites and 29.2 percent slightly preferred the addition of new campsites. Developing the proposed 7 to 10 primitive campsites would help to meet existing demand and would reduce the user effects generally associated with dispersed camping at undeveloped sites. Given the current level of demand, campsite development within 3 years would improve recreational use at this project development by providing improved camping facilities to meet existing user needs.

At Rucker Lake, the Rucker Lake campground is in poor to fair condition and the September 2013 Recreation Plan proposes to make significant modifications and improvements. To address immediate needs, the September 2013 Recreation Plan proposes to add six campsites and to develop a trail between the parking area and the campground. Over the longer term, the September 2013 Recreation Plan proposes to convert the existing campground to a 20-unit campground with designated picnic sites and designated parking. In 2009, the walk-in campground peak season occupancy was 33 percent for the season and 68 percent on weekends, and by 2050, it is projected to reach 50 and 105 percent, respectively. The provision in the September 2013 Recreation Plan to make initial modifications to the recreation area within 2 years should be adequate to meet recreation demand in the near term. Expanding the campground, as proposed in the September 2013 Recreation Plan within 10 years, would ensure that the facility meets potential future recreation demand.

At Meadow Lake, the shoreline campground (10 campsites) is in poor condition with deteriorating picnic tables and damaged fire rings/grills. The use impact is significant around the campsites with obvious signs of tree cutting and large areas of bare ground. In 2009, the peak season campground occupancy levels were 32 percent for the season and 54 percent on weekends. Reconstructing the campground within five years, as proposed, instead of within eight years as recommended by California Fish and Wildlife would provide improved facilities for recreation users in the near term.

*Recreation Site Roads, Parking and Vehicle Barriers*

An important component of many of the project recreation sites are roads and parking areas. Currently some of the recreation site circulation roads and parking areas are in need of improvement to address issues associated with location, condition, use, and crowding. The September 2013 Recreation Plan proposes modifications, improvements, or upgrades to recreation site roads and parking areas to address these issues at several of the project recreation sites (see table 3-223 for specific details). At nearly all of the sites, California Fish and Wildlife recommendation 16 recommends road and parking improvements similar to those included in the September 2013 Recreation Plan, but includes additional provisions at Lake Spaulding, Blue Lake, Upper Peak Lake, and Kelly Lake for road and parking improvements. At Lake Spaulding, California Fish and Wildlife recommends widening the road to the boat launch and the widening the campground circulation roads (see table 3-223 for specific details). California Fish and Wildlife recommends improving the Blue Lake dam access road at Blue Lake to maintenance level 3 and that PG&E secure and formalize public road access to Kelly Lake. At Upper Peak Lake, California Fish and Wildlife recommends installing a gate on the road from a trailhead for a new trail to the reservoir.

Our Analysis

In general, expanding and widening parking areas, spurs, and access roads, such as that proposed by the September 2013 Recreation Plan, would help improve the utilization of the parking areas and help meet the anticipated increase in demand. Parking expansion in combination with the widening of the access road would likely result in some change in the character of the recreation site, but such differences would be small and would not be likely to affect the recreational experience of the user. In addition, repaving parking areas and access roads would help reduce the potential for road-related congestion and would create a safer situation for vehicle traffic. Adding or replacing vehicle barriers and the installation of gates at parking areas and along access roads would keep vehicles out of undesirable locations. Expanding parking areas and turnarounds near boat launches would help reduce or eliminate vehicle congestion at some sites and would meet the anticipated increase in use projected over the term of a new license. Widening of existing roads and spurs and expansion of parking areas would generally improve vehicle access to the project reservoirs.

At Lake Spaulding boat launch, the September 2013 Recreation Plan provision to provide three accessible parking spaces and improve the access road to the boat launch parking area would benefit the recreating public by improving vehicular access to the boat launch, and creating a safer situation for vehicle traffic. California Fish and Wildlife's additional recommendation for widening of the road to the boat launch and the circulation roads at the campground would have little additional benefit to recreation users over what would be provided by PG&E's proposal.

California Fish and Wildlife recommends improving the Blue Lake dam access road at Blue Lake to maintenance level 3 standard, but the September 2013 Recreation Plan does not include a similar provision. Although the Blue Lake dam access road is used for recreational access, its primary function is to provide access to the dam. Currently, the road is maintained at maintenance level 2, which allows access for high clearance and four-wheel drive vehicles as necessary to access the project facilities. Maintaining the Blue Lake dam access road at maintenance level 3 would allow access for all types of vehicles from passenger cars to large commercial vehicles. Since the primary purpose of this road is to provide access to the dam, maintaining the road at maintenance level 2 would be sufficient to allow access to the project facilities.

At Kelly Lake, the September 2013 Recreation Plan provision to replace vehicle barriers would keep vehicles out of undesirable locations. California Fish and Wildlife recommends PG&E secure and formalize public road access to Kelly Lake and notes in its rationale that increased signage for Kelly Lake

would likely result in increased recreational use. In general, visitors to Kelly Lake rated road access during the Recreation Use Study as acceptable via Crystal Lake Road from I-80. Although, recreational use at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects is expected to increase in the future, the provisions in the September 2013 Recreation Plan for recreation monitoring and annual recreation coordination meetings would provide opportunities to evaluate the access road to Kelly Lake in the future.

At Upper Peak Lake, California Fish and Wildlife recommends installing a gate on the road from a trailhead for a new trail to the reservoir. In the September 2013 Recreation Plan, the Forest Service and PG&E have not included a comparable provision for the gate or trail. Because this gate is not recommended in the September 2013 Recreation Plan and California Fish and Wildlife does not provide rationale for this recommendation, there does not appear to be a clear justification for this gate on the road.

*Host Sites*

Construction of host sites is proposed in the September 2013 Recreation Plan at specific recreation campgrounds at the Upper Drum-Spaulding Project. These specific sites include: Rucker Lake campground (convert Rucker campground into a 20-unit campground with 1 host site within 10 years); Lindsey Creek campground (provide a host site with water, septic, and power); and Lake Valley group campground (develop host site within 5 years). California Fish and Wildlife recommends host sites at Rucker Lake campground and Lindsey Creek campground.

Our Analysis

Updating and providing host sites at campgrounds would improve public safety and campground management. However, the Commission cannot ensure that a host is present at every campground, or that public safety would be improved as a result of providing host sites. The responsibility for recreation facility monitoring is that of the licensee. The proposed upgrades of host sites may be useful for attracting hosts, but the Commission has no way to ensure that the presence of a host would accomplish a project purpose or improve a project effect.

*Trails and Access Developments*

There are numerous trails located within the project area. Some of these trails lie fully within the existing Drum-Spaulding Project boundary and connect project-related facilities. Other trails may lie outside or partially outside the project boundary and connect a project facility to a non-project facility or connect two or more non-project facilities. In addition, there are several trailheads located within the project boundary. Often these trailheads are associated with project recreation facilities such as parking areas, campgrounds, or day-use areas. In some cases, these trailheads are for trails that connect a project facility to other non-project trails or facilities. As shown in table 3-224, the September 2013 Recreation Plan proposes to develop or make improvements to several trails located in the Upper Drum-Spaulding Project. California Fish and Wildlife recommends provisions for several trails or trail-related measures, which are also noted in the table. .

Most of the trails and trail-related improvements recommended by California Fish and Wildlife are similar to those proposed by the September 2013 Recreation Plan. However, at some sites California Fish and Wildlife recommendation 16 includes conditions/recommendations for trail-related facilities that are not proposed in the September 2013 Recreation Plan. For example, at Fuller Lake, California Fish and Wildlife recommends that PG&E construct a trailhead with toilet and parking for at least 10 vehicles. While this trailhead is located within the project boundary, the trail quickly leaves the project and connects Fuller Lake day-use area to an unidentified, non-project trail; therefore, it is difficult to

Table 3-224. Trails proposed for the Upper Drum-Spaulding Project in the September 2013 Recreation Plan or included California Fish and Wildlife recommendation 16 Recreation Plan provisions. (Source: staff)[32]

| Trail/Trailhead Location | September 2013 Recreation Plan Proposal (PG&E and Forest Service) | California Fish and Wildlife Recommendation 16 Trail Provisions | Trail Description | Location of Trail |
|---|---|---|---|---|
| Meadow Lake | Develop pedestrian trail. | Same provision | Connects Meadow Knolls campground to Meadow Lake | Fully within project boundary |
| Sierra Discovery Trail | Repair or replace the existing boardwalk within 3 years. | Same provision | A 1-mile, self-guided, loop trail in Bear Valley | Location of trail could not be determined[a] |
| Fuller Lake | No proposal | Construct trailhead with toilet and parking for at least 10 vehicles | Trailhead for trail that connects Fuller Lake day-use area to non-project trails | Partially within project boundary |
| Rucker Lake | Develop trail between existing parking and camping areas. | Same provision | Connects designated parking to walk-in campground | Location of trail could not be determined [a] |
| Rucker Lake | No proposal | Convert existing campground parking into trailhead with parking within 10 years. | Trailhead for trail that connects Rucker Lake campground to non-project trails | Partially within project boundary |
| Blue Lake | Construct pedestrian trail. | Same provision | Connects designated parking area to primitive campsites | Partially within project boundary |

[32] Staff made effort to determine if the trail is located within or outside the project boundary based on the September 2013 Recreation Plan, the license applications, and California Fish and Wildlife Response to Notice of Ready for Environmental Analysis, Federal Power Act Section 10(j) and 10(a) Recommendations, Drum-Spaulding Hydroelectric Project.

Table 3-224. Trails proposed for the Upper Drum-Spaulding Project in the September 2013 Recreation Plan or included California Fish and Wildlife recommendation 16 Recreation Plan provisions. (Source: staff)[32]

| Trail/Trailhead Location | September 2013 Recreation Plan Proposal (PG&E and Forest Service) | California Fish and Wildlife Recommendation 16 Trail Provisions | Trail Description | Location of Trail |
|---|---|---|---|---|
| Carr Lake | Develop trail connecting new walk-in campsites to non-project toilet (to be constructed) at the non-project Car-Feeley trailhead and develop trail connecting existing campsites to non-project toilet (to be constructed) at the non-project Car-Feeley trailhead. | Same provision | Connects new walk-in campsites | Fully within project boundary |
| Lower Peak Lake | No proposal | Construct non-motorized trail connecting campsites to trailhead.<br><br>Replace trailhead bulletin boards. | Connects new Lower Peak Lake campsites to trailhead for trail that connects to non-project trails | Partially within project boundary |
| Upper Peak Lake | No proposal | Construct pedestrian trail from gate to dam. | Connects anticipated parking at new gate to lake near dam | Location of trail could not be determined[a] |
| Bear River Trail | None | Cooperate with trail planners for trail along Bear River; provide perpetual public access of trail and roads across PG&E lands; support trailhead development, sanitation, and signage. | Trail would be a non-project facility along the Bear River partially outside the project boundary | Partially within project boundary |

[a] The location is either partially or fully within project boundary but could not be determined.

determine a project purpose. At Rucker Lake, California Fish and Wildlife recommends that PG&E convert the existing campground parking area into a trailhead with parking and at Lower Lindsey Lake,

California Fish and Wildlife recommends that PG&E install directional signs for trailheads and expand parking. At Lower Peak Lake, California Fish and Wildlife recommends that PG&E replace trailhead bulletin boards and construct a non-motorized trail connecting campsites to the trailhead. At Upper Peak Lake, California Fish and Wildlife recommends that PG&E construct a trail from the gate to the dam.

California Fish and Wildlife recommendation 16, BLM recommendation 1, and Foothills Water Network also recommend that PG&E assist with the development of a formal trail along Bear River (Bear River Trail). The Bear River Trail is a 33-mile riverine recreation trail proposed along the Bear River in Placer and Nevada Counties starting at the headwaters of the Bear River in Bear Valley and ending at NID's Combie reservoir. According to BLM, about 15.5 miles of the trail would be on PG&E property, 6 miles on NID property, 4.9 miles on NFS lands, 4.4 miles on BLM lands, 2.7 miles on Placer County lands (Bear River campground), and 3 miles on private lands. The Foothills Water Network provided detailed maps, photographs, and information outlining the proposed segments for the trail in support of the proposed trail.

The September 2013 Recreation Plan also includes provisions to, after Commission approval of the September 2013 Recreation Plan, update the exhibit G drawings to remove the Carr-Feeley and Lower Lindsey Lake trailheads from the project boundary.

Our Analysis

The Commission considers trails that connect two or more project recreation facilities to be necessary for project purposes. Some existing project trails connect project recreation facilities to other non-project trails or non-project recreation facilities. To the extent that such trails or trailheads already exist within the project boundary, they are considered a project facility. However, generally, new trails, trailheads or trail facilities that do not connect two project recreation facilities are not considered necessary for project purposes. For the most part, the trail provisions included in the September 2013 Recreation Plan seem consistent with trails that the Commission would consider necessary for project purposes. However, at some sites, it is not clear whether a proposed trail or trailhead facility is either wholly within the project boundary or is intended to connect two or more project recreation facilities.

The provisions in the September 2013 Recreation Plan to develop or improve trails or trailheads at the Upper Drum-Spaulding Project would benefit recreation users. New trails that are intended to connect two or more project recreation facilities would enhance recreational use at the project by providing improved walking/hiking access between project facilities and consolidating foot traffic to a designated trail. In addition, repair/replacement of portions of existing project trails, such as the boardwalk portion of the Sierra Discovery Trail, would help to ensure that the trail or trail facility remains safe and usable for the term of the new license. Additional trails proposed would also help to meet increased recreational demand at the project over the new license term.

At Fuller Lake, California Fish and Wildlife recommends that PG&E construct a trailhead with toilet and parking for at least 10 vehicles. This trailhead is for a trail that connects Fuller Lake day-use area to an unidentified trail, non-project trail; therefore, it is difficult to determine that the recommended trailhead additions serve a project purpose. At Rucker Lake, California Fish and Wildlife recommends that PG&E convert the existing campground parking into trailhead with parking. This trailhead would be for a trail that connects Rucker Lake campground to non-project trails; therefore, it is difficult to determine that the recommended trailhead serves a project purpose. California Fish and Wildlife also makes recommendations for improvements to trailheads at Lower Lindsey Lake and Lower Peak Lake. At both of these sites, the agencies' recommendations are related to trailheads for trails that quickly leave the project boundary and do not appear to connect two project facilities, and therefore are not necessary for project purposes. At Upper Peak Lake, California Fish and Wildlife recommends that PG&E construct a trail from the gate originally proposed to restrict vehicle access from the shoreline and dam.

Since the gate was originally proposed, PG&E and the Forest Service have reached agreement on the September 2013 Recreation Plan, which no longer includes this provision for a gate at Upper Peak Lake. Because access would not be restricted by a gate, there would be no need for the trail recommended by California Fish and Wildlife.

The September 2013 Recreation Plan includes provisions to update the exhibit G drawings to remove the Carr-Feeley and Lower Lindsey Lake trailheads from the project boundary. Both of these trailheads are for trails that quickly leave the project boundary and do not appear to connect two project recreation facilities, and therefore are necessary for project purposes. During the Recreation Use Study, PG&E found that visitors used the Carr-Feeley trailhead parking area heavily, but the vast majority of this use was for non-project lakes (beyond Carr and Feely Lakes), for hiking and backpacking. Roughly 10 percent of the total use at the Carr-Feeley trailhead was attributed to the project reservoirs (Carr or Feeley Lakes). The Recreation Use Study did not estimate what portion of the total use at this trailhead was for project lakes and what portion was for non-project recreational use.

The Bear River Trail is a riverine recreation trail proposed along the Bear River in Placer and Nevada Counties starting at the headwaters of the Bear River in Bear Valley and ending at NID's Combie reservoir. Based on the information provided, it appears that there is already an existing informal trail along the Bear River that is used to access the river and for hiking. According to information provided by BLM and Foothills Water Network, a portion of the trail would be on PG&E property but PG&E has commented that only 4.9 miles (14.2 percent) of the proposed trail is within the existing Drum-Spaulding Project boundary. From the information and detailed maps provided by the Foothills Water Network, the proposed location of the proposed trail would cross the project boundary and various canals and diversions. The intended purpose of the proposed trail is to provide a river trail that coincides or intersects in several locations with the project boundary, not to provide trail access to or between project recreation facilities. Although development of such a trail would provide benefit to recreation users within the region, based on the information provided, there does not appear to be a nexus between this trail and the proposed Drum-Spaulding, Lower Drum, and Deer Creek Projects. Although the Foothills Water Network and others have provided information regarding impacts of the existing Drum-Spaulding Project on the existing informal trail in this area, those impacts are not affecting recreation at the project or a designated formal trail. Further, the trail may provide access to certain areas of the project that are closed to the public due to concerns over public safety. Therefore, it would not be appropriate to require PG&E to formalize this trail or to carry out measures related to this trail.

*Boat Launches and Boat Ramps*

Boating is a popular recreation activity at the Drum-Spaulding Project reservoirs. PG&E provides boat launches and boat ramps at several of the project reservoirs. Boat launches include: Meadow Lake campground (informal); Meadow Lake shoreline campsites (informal); Lake Spaulding boat launch and day-use area (concrete); Fuller Lake day-use area and boat launch (concrete); Rucker Lake campground (informal); Lower Lindsey Lake campground (informal); and Silvertip picnic area and boat launch (concrete). In addition to the boat launches provided at the existing Drum-Spaulding Project, hand launching of non-motorized boats (canoes and kayaks) may also occur elsewhere at the existing Drum-Spaulding Project reservoirs. Boat launch facilities are in need of improvement to address issues associated with worn or deteriorating facilities, vehicle launching at sites intended for hand launching, as well as use-levels and crowding.

The September 2013 Recreation Plan proposes modification, improvements, or upgrades to existing boat launch and boat ramp facilities at Lake Spaulding boat launch and Fuller Lake, as well as improvements to informal and car-top boat launches at Meadow Lake, Rucker Lake, Carr Lake, and

Lower Lindsey Lake (see table 3-223 for details), all located at the Upper Drum-Spaulding Project . The California Fish and Wildlife recommendations are consistent with the September 2013 Recreation Plan.

Our Analysis

The September 2013 Recreation Plan provision to modify or upgrade existing boat launch and boat ramp facilities would benefit project recreation users. At the existing Lake Spaulding boat launch facility, the September 2013 Recreation Plan provision to meet accessibility guidelines would improve access at this site and be consistent with the Commission's policy on recreation facilities at licensed projects under which licensees are expected to consider the needs of all populations in the design and construction of such facilities. Similarly, the provision to enhance the Fuller Lake day-use area and boat launch, would improve access at this site by creating an accessible fishing pier and accessible picnic sites.

The September 2013 Recreation Plan provisions for modifying or improving informal and car-top boat launches at the Upper Drum-Spaulding Project would also greatly benefit recreation users. At Rucker Lake, the provision to convert the existing informal boat launch into an accessible formal car-top boat launch would provide better access for small boats at Rucker Lake, and would help to consolidate boat launching activities into a specified area. Similarly, the September 2013 Recreation Plan provision to convert a campsite at Carr Lake walk-in campground into an informal boat launch would improve boating access to Carr Lake and would consolidate boat launching into an improved site that is suited for that purpose.

*Boat Ramp Extensions*

The usability of existing boat ramps under a variety of reservoir water level conditions was an issued identified and addressed as part of the relicensing effort. PG&E evaluated the usability of boat ramps in relation to reservoir water depths, and based on the results of that assessment, the September 2013 Recreation Plan includes a provision to extend the boat ramp at the Silvertip boat launch at Lake Valley reservoir (Upper Drum-Spaulding Project) to provide launching capabilities through Labor Day for all water year types, except critically dry years. California Fish and Wildlife recommendation 16 recommends the same boat ramp extension.

Our Analysis

PG&E reports that the Silvertip boat ramp is currently functional when the reservoir is at or above elevation 5,783.1 feet msl. Water levels of the project reservoirs respond to the water year type, which is determined by the monthly natural flow for the entire water year. Table 3-225 provides the median water surface elevations for the project reservoirs with concrete boat ramps for different water year types based on tables provided by PG&E in its August 2012 supplemental filing to the amended license application.

Under PG&E's proposed streamflows, the Silvertip boat ramp would, on average, be unusable for the same periods as it would be under the no-action alternative. In all water year types, the boat ramp would, on average, be unusable for the majority of the peak recreation season (July 15 through September 30 in wet, above normal, and below normal water year types; and July 1 through September 30 in dry, critically dry, and extreme critically dry water year types). PG&E reports that critically dry/extreme critically dry water year types only occurred in 4 years (12 percent) out of the 33-year period of record (1976-2008) while all other water year types accounted for 88 percent. Although the majority of Lake Valley reservoir visitors responding to a survey conducted during the relicensing study indicated that they had no opinion or that water surface elevation was not an issue for launching a boat, Lake Valley reservoir received the highest total recreational use at the project. The proposed streamflows would not change the functional periods of the boat ramp from current conditions, but extending the ramp by approximately 7 vertical feet would make the boat ramp functional for the entire peak recreation season in

Table 3-225. Median water surface elevations for Lake Spaulding, Lake Valley reservoir, and Fuller Lake. (Source: PG&E, 2011a, as modified by staff)

| | No-Action Alternative (Elevation in feet msl) | | | | | | | PG&E's Amended Minimum Flow Releases (Elevation in feet msl) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Water Year Types** | **Jul 1** | **Jul 15** | **Aug 1** | **Aug 15** | **Sep 1** | **Sep 15** | **Sep 30** | **Jul 1** | **Jul 15** | **Aug 1** | **Aug 15** | **Sep 1** | **Sep 15** | **Sep 30** |
| **Lake Spaulding (Usable Boat Ramp Elevation 4,942.6)** | | | | | | | | | | | | | | |
| Wet | 5,013.9 | 5,009.5 | 4,999.5 | 4,989.5 | 4,976.1 | 4,969.1 | 4,988.8 | 5,014.2 | 5,009.8 | 4,999.5 | 4,988.7 | 4,969.3 | 4,958.9 | 4,970.1 |
| Above Normal | 5,004.7 | 5,007.0 | 4,995.7 | 4,981.1 | 4,967.4 | 4,958.8 | 4,970.6 | 5,012.6 | 5,007.1 | 4,990.6 | 4,977.4 | 4,956.7 | 4,943.8 | 4,957.1 |
| Below Normal | 4,989.1 | 4,985.8 | 4,985.7 | 4,976.7 | 4,965.3 | 4,958.4 | 4,968.0 | 5,006.4 | 5,002.3 | 4,988.5 | 4,975.9 | 4,958.1 | 4,947.9 | 4,960.8 |
| Dry | 4,966.4 | 4,955.7 | 4,956.2 | 4,947.0 | 4,935.0 | 4,927.7 | 4,939.2 | 4,990.4 | 4,979.7 | 4,965.7 | 4,952.9 | 4,934.3 | 4,923.8 | 4,935.1 |
| Extreme Critically Dry & Critically Dry | 4,914.3 | 4,906.4 | 4,905.8 | 4,899.9 | 4,894.0 | 4,897.5 | 4,908.8 | 4,929.6 | 4,923.2 | 4,914.4 | 4,905.6 | 4,903.9 | 4,904.8 | 4,907.2 |
| **Lake Valley Reservoir (Usable Boat Ramp Elevation 5,783.1)** | | | | | | | | | | | | | | |
| Wet | 5,783.8 | 5,782.6 | 5,781.1 | 5,780.1 | 5,778.9 | 5,778.1 | 5,777.1 | 5,784.0 | 5,782.6 | 5,781.0 | 5,780.1 | 5,778.9 | 5,778.1 | 5,777.1 |
| Above Normal | 5,783.7 | 5,782.6 | 5,781.1 | 5,780.1 | 5,778.9 | 5,778.0 | 5,777.0 | 5,783.6 | 5,782.5 | 5,781.0 | 5,780.1 | 5,778.9 | 5,778.0 | 5,777.0 |
| Below Normal | 5,783.5 | 5,782.6 | 5,781.1 | 5,780.1 | 5,778.9 | 5,778.0 | 5,777.0 | 5,783.2 | 5,782.1 | 5,780.8 | 5,780.1 | 5,778.9 | 5,778.0 | 5,777.0 |
| Dry | 5,781.0 | 5,780.0 | 5,788.9 | 5,778.0 | 5,776.9 | 5,776.0 | 5,774.9 | 5,780.0 | 5,779.1 | 5,777.8 | 5,778.0 | 5,776.9 | 5,776.0 | 5,774.9 |
| Extreme Critically Dry & Critically Dry | 5,773.2 | 5,772.2 | 5,771.0 | 5,770.0 | 5,768.9 | 5,768.1 | 5,766.6 | 5,770.9 | 5,769.8 | 5,768.5 | 5,770.0 | 5,768.9 | 5,768.1 | 5,766.6 |

Table 3-225. Median water surface elevations for Lake Spaulding, Lake Valley reservoir, and Fuller Lake. (Source: PG&E, 2011a, as modified by staff)

| | No-Action Alternative (Elevation in feet msl) | | | | | | | PG&E's Amended Minimum Flow Releases (Elevation in feet msl) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Water Year Types** | **Jul 1** | **Jul 15** | **Aug 1** | **Aug 15** | **Sep 1** | **Sep 15** | **Sep 30** | **Jul 1** | **Jul 15** | **Aug 1** | **Aug 15** | **Sep 1** | **Sep 15** | **Sep 30** |
| **Fuller Lake (Usable Boat Ramp Elevation 5,329.9)** | | | | | | | | | | | | | | |
| Wet | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 |
| Above Normal | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 |
| Below Normal | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 |
| Dry | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 |
| Extreme Critically Dry & Critically Dry | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 | 5,341.0 |

Note: Shaded cells indicate periods when the reservoir elevation would be below the bottom usable portion (3 vertical feet above the end of the paved ramp) of the existing ramp.

most water year types. Critically dry and extreme critically dry water year types occurred infrequently and the boat ramp would need to be extended by 15 vertical feet to be functional for the entire peak recreation season in these water year types.

PG&E reports that the Lake Spaulding boat ramp (Upper Drum-Spaulding Project) is currently functional when the reservoir is at or above elevation 4,942.6 feet msl. Under PG&E's proposed streamflows, the Lake Spaulding boat ramp would, on average, be unusable for the same periods as it would be under the no-action alternative. In most water years, the boat ramp would, on average, be functional for the majority of the peak recreation season. During critically dry and extreme critically dry water years, the boat ramp would be unusable from July 1 through September 30 and, during dry water years, would be unusable September 1 through September 30. Critically dry and extreme critically dry water years occurred infrequently, and the boat ramp would need to be extended by over 40 vertical feet to be functional for the entire peak recreation season in these water year types. Although dry water years occurred about one-quarter of the time (8 years out of the 33-year period of record), the existing boat ramp would be functional for almost the entire peak recreation season, which would be similar to current conditions. The majority of Lake Spaulding visitors responding to a survey conducted during the relicensing study indicated that that reservoir water level was not an issue for launching a boat, or that they had no opinion on the matter.

PG&E reports that the Fuller Lake boat ramp (Upper Drum-Spaulding Project) is currently functional when the reservoir is at or above elevation 5,328.9 feet msl. Under PG&E's proposed streamflows, the Fuller Lake boat ramp would, on average, be functional July 1 through September 30 (the same period as it would be under the no-action alternative) in all water year types.

*Recreation Facility Operation and Maintenance*

The September 2013 Recreation Plan outlines provisions agreed to by PG&E and the Forest Service for O&M of recreation facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. PG&E would continue to be responsible for operating and maintaining all project facilities located within the project boundaries of the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. The September 2013 Recreation Plan includes a provision for PG&E to develop an annual operating plan to provide details of the recreation facility operation and maintenance and update the plan annually for discussion at the annual recreation coordination meeting. On NFS lands within the project boundaries, the standards for operating and maintaining recreation sites would be consistent with current Forest Service standards and policies. The September 2013 Recreation Plan outlines PG&E's proposal to continue using a concessionaire for the O&M of project recreation facilities. Most project campgrounds have hosts who operate and maintain the campground and project recreation facilities at other nearby project reservoirs.

California Fish and Wildlife includes provisions in its recommendation 16 to address O&M that are generally similar to those included in the September 2013 Recreation Plan and the provision for the annual operating plan.

Our Analysis

O&M associated with the recreation facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects helps to ensure that these facilities and associated public recreational access are provided over the term of the license. PG&E is responsible for the management, operation, and routine maintenance of all recreation facilities within the project boundaries to provide safe and adequate public access to the projects. Although an annual operating plan between PG&E and the Tahoe National Forest would be developed under the September 2013 Recreation Plan, PG&E would ultimately be responsible for all existing and future project recreation facilities upon license issuance.

*Water System Developments*

The September 2013 Recreation Plan indicates that PG&E anticipates that all water systems at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects would need to be upgraded at least once during the license term, i.e., replacing the existing distribution piping, connections, and water hydrants, while maintaining the same system design and footprint, as needed. The September 2013 Recreation Plan identifies several specific provisions to develop water systems and potable water at recreation facilities at the Upper Drum-Spaulding Project, including: development of a potable water source at Meadow Lake campground; a water system with two to four water spigots at the proposed Lake Valley group campground; a potable water supply with distribution system at Rucker Lake campground; and a potable water supply at Lindsey Creek campground, and distribution of water to Lindsey trailhead and Lindsey Lake campground.

The September 2013 Recreation Plan proposes to ensure that recreation facilities on NFS land that provide drinking water, as well as future drinking water systems, be managed as public drinking water systems (i.e., serve at least 15 service connections or 25 persons) under the federal Safe Drinking Water Act., In addition, the September 2013 Recreation Plan includes a provision to evaluate, during the planning for water distribution system replacement, if the footprint should be reviewed to determine if there is a design or technology that can be reasonably implemented that would better serve recreation users. However, from the information provided, it is unclear as to exactly what this proposal entails.

California Fish and Wildlife recommendation 16 recommends that PG&E ensure recreation facilities that provide drinking water, as well as future drinking water systems, be managed as public drinking water systems (i.e., serve at least 15 service connections or 25 persons) under the Safe Drinking Water Act.. California Fish and Wildlife's recommendation is consistent with the provisions to develop water systems and potable water at project recreation facilities in the September 2013 Recreation Plan.

Our Analysis

Relicensing studies indicate the need for additional potable water at some of the Drum-Spaulding Project recreation facilities. Visitors reported a preference to have potable water at Meadow Lake, Lake Valley, Rucker Lake, and Lindsey Creek, where drinking water is not currently provided. Water systems are integral to the recreation sites they serve. Providing potable water would help address the needs at the Upper Drum-Spaulding Project sites by providing more sources of drinking water for visitors at the project. The addition of potable water would also enhance the recreational experience at these sites, and is consistent with facilities and services that recreation users would expect at similar regional recreation sites designated under the Forest Service Recreation Opportunity Spectrum (ROS) as "roaded natural" or "semi-primitive."

Although Forest Service policy states that all water systems be managed as public drinking water systems (i.e., serve at least 15 service connections or 25 persons) under the Safe Drinking Water Act, there is no guarantee that PG&E would be able to manage the public water systems located on NFS lands to serve 15 service connections or 25 persons at the projects. However, since PG&E and the Forest Service agreed to this provision in the September 2013 Recreation Plan, we assume that PG&E believes that it can manage the public water systems in accordance with this provision. Regulating and enforcing drinking water laws are outside the Commission's authority. In Sierra County, the California Department of Public Health regulates and enforces the drinking water quality laws and regulations. Nevada and Placer Counties regulate and enforce the drinking water laws and regulations through their own health departments.

During the planning for replacement of water distribution systems, provisions in the September 2013 Recreation Plan would evaluate if the footprint should be reviewed to determine if there is a design

that would better serve recreationists would help address the need for additional potable water at the projects. However, from the information provided, it is unclear as to exactly what this proposal entails.

*Recreation Monitoring*

The September 2013 Recreation Plan outlines detailed components of its proposed recreation monitoring for the term of a new license at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. The September 2013 Recreation Plan proposes a facility and social monitoring approach that uses monitoring indicators and standards, such as occupancy rate and user preferences. If monitoring shows that conditions exceed acceptable levels as defined by standards, and an "impact problem" is said to exist, appropriate management actions would be considered. The September 2013 Recreation Plan also proposes a recreation survey every 12 years to measure social indicators, such as perceived crowding of land and reservoir water surface areas, conflict between user groups, and information on users' recreation activities.

The September 2013 Recreation Plan outlines several methods to collect information on the recreation monitoring indicators and standards, including: collection of existing available daily annual occupancy information; a recreation observation survey that would include occupancy counts for non-holiday Saturday peak-use periods during FERC Form 80 monitoring years ; compiling every 6 years annual occupancy counts from non-holiday Saturdays from June 15 through August 15; and conducting a recreation user survey every 12 years during Form 80 monitoring years. As part of ongoing annual O&M activities, PG&E would assesses the amount of dumping and litter, user-created fire rings, human and pet waste at the project's developed and dispersed recreation sites, and off-road vehicle use outside of designated roadways and parking areas (within the FERC project boundaries), including below reservoirs' normal high water elevation.

The September 2013 Recreation Plan proposes to prepare a recreation monitoring report every 6 years, to coincide with the FERC Form 80 monitoring reports. The recreation monitoring report would summarize the data for the current monitoring period and, if appropriate, make management recommendations if monitoring indicators exceed established standards. The September 2013 Recreation Plan proposes to include results from the recreation user survey into the recreation monitoring report every 12 years. For recreation facilities on NFS land, PG&E would provide a draft of the final reports to the Forest Service and other applicable agencies, as appropriate, for review. In addition, PG&E would meet with the Forest Service and any other applicable land management agencies during the review period to discuss potential reasonable resource management measures on the respective land management agency's lands based on the report results. The September 2013 Recreation Plan proposes to file the final recreation monitoring reports, including evidence of consultation, with FERC concurrent with the Form 80 Report filing.

California Fish and Wildlife's recommendation 12 is generally the same as the recreation monitoring and reporting provisions included in the September 2013 Recreation Plan except that California Fish and Wildlife's recommendation includes developing the recreation use survey instrument with other resource agencies in addition to the Forest Service. California Fish and Wildlife also recommends that within 1 year of submission of the recreation resources report, PG&E would consult with the Forest Service to review this report and propose appropriate management actions.

Our Analysis

Collective recreational use at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects is expected to increase by about 23 percent over the next 30 years. The level and type of recreational use and recreation user preferences could change over the term of a new license. Regular monitoring of recreational use, surveying recreation users, and assessing facility capacity and recreation demand would

help to determine whether project recreation facilities meet demand and visitor needs over the term of the license, and whether recreational use is affecting other resources at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. The recreation monitoring measures for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects included in the September 2013 Recreation Plan and recommended by California Fish and Wildlife would meet the same overall goals.

Conducting recreation monitoring at all recreation facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects as proposed in the September 2013 Recreation Plan would be appropriate to provide project-wide information. Including other resource agencies, in addition to the Forest Service, in the development of the recreation use survey instrument would be appropriate. The proposed reports would provide the means to document the survey information and monitor other recreational management provisions, such as litter and human waste monitoring. Reporting the recreation monitoring results every 6 and 12 years concurrent with the Commission's Form 80 Report schedule would ensure that the Commission is updated on recreational use at the project. The results of those reports could be reviewed with the resources agencies at the annual recreation coordination meeting proposed in the September 2013 Recreation Plan.

*Recreation Development Review*

The September 2013 Recreation Plan includes a provision to meet, at least every 6 years, with the Forest Service to review the conditions of recreation facilities at the Upper Drum-Spaulding, Lower Drum, or Deer Creek Projects located on NFS land and to agree on necessary replacement and major maintenance (i.e., reconstruction) work, and to agree on the schedule for this work. For recreation facilities at the Upper Drum-Spaulding, Lower Drum, or Deer Creek Projects located on NFS lands, PG&E would use the Forest Service's standards for the frequency of rehabilitation or heavy maintenance as a guideline, but not as a prescription, for scheduling replacement and major maintenance work. Following the review, PG&E would develop a 6-year schedule for replacement and/or reconstruction of project recreation facilities on NFS lands that would be approved by the Forest Service prior to being filed with the Commission.

California Fish and Wildlife 10(a) recommendation 14 recommends that PG&E, the Forest Service, and BLM meet at least once every 6 years to review all project recreation facilities and to agree on necessary maintenance, rehabilitation, construction, and reconstruction work. This measure is generally the same as the provision in the September 2013 Recreation Plan, except that it includes BLM in the review process in addition to the Forest Service.

Our Analysis

Discussing all recreation facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects during the recreation development review meeting would ensure that reconstruction and rehabilitation activities are consulted upon and scheduled in a coordinated manner. It would also be appropriate for the 6-year schedule that is developed as a result of the recreation review to include all recreation facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. Although there are 10.6 acres of BLM lands within the existing project boundaries, none of the project recreation facilities occupy BLM lands. Therefore, requiring the inclusion of BLM for the review meeting would not be necessary. However, PG&E is free to consult with BLM or any other interested stakeholder about its proposed schedule. Notifying BLM of the schedule and any proposed work in the vicinity of BLM lands before construction begins would ensure that BLM is kept apprised of any work that could affect BLM lands.

*Project Patrols/Law Enforcement/County Services and Infrastructure*

The September 2013 Recreation Plan includes several provisions for project patrols. The September 2013 Recreation Plan includes a provision for a project patrol to monitor and limit camping at Lake Sterling to three primitive campsites. It also proposes to provide management presence through a person who would patrol Fordyce and Sterling Lakes during the peak recreation season to manage recreation use to minimize resource impacts and enforce appropriate regulations. The September 2013 Recreation Plan includes a provision for an annual operating plan that would include, among other provisions, campground hosts to patrol recreation facilities and designated primitive campsites at the project reservoirs during the peak recreation season. California Fish and Wildlife includes provisions in its recommendation 16 to address project patrols and campground hosts similar to those in the September 2013 Recreation Plan. California Fish and Wildlife also recommends that PG&E coordinate with the Forest Service within 1 year of license issuance to develop a plan to address the costs of managing project-related recreation on NFS lands.

Placer County recommends that PG&E contribute to the costs of increased county services and infrastructure, including public safety and roads, resulting from the proposed projects, such as law enforcement at the new campground at Lake Valley reservoir within Placer County. Placer County notes that PG&E and the County are trying to reach an agreement; however, if this agreement is not reached, PG&E should be required by the new license to compensate Placer County for the costs of any increased county services that have a nexus to the project.

Our Analysis

Project patrol provisions would help encourage visitors to the Drum-Spaulding, Lower Drum, and Deer Creek Projects, including campground users, OHV users, anglers, and boaters, to comply with regulations and project rules. A projected increase in the number of visitors over the term of the new license would likely increase the need for public services, including law enforcement and fire protection, which are provided by the Sheriff's offices in Nevada, Sierra, and Placer Counties. Project patrols would help reduce conflicts between recreation users and improve visitor safety by providing an authoritative presence to encourage compliance with regulations and project rules. Additional project patrol at the more remote areas of the projects would improve management of environmental resources by increasing visitor contact with enforcement agencies and help to educate visitors about appropriate and restricted uses. While recreation users to the proposed projects could result in increased usage of services and roads in Placer County, only about 35 percent of the existing Drum-Spaulding Project is located in Placer County and the majority of the project facilities located in Placer County are non-recreation facilities. Proposed project-related recreation improvements within Placer County are limited and generally involve upgrading existing facilities to accommodate existing uses. The new Lake Valley group campground is anticipated to relieve some of the existing group camping use pressure at other nearby project campgrounds located in Placer and Nevada counties.

Within the project areas, public safety and law enforcement duties are the responsibility of the Sheriff's offices in Nevada, Sierra, and Placer Counties; the California Highway Patrol; and federal agencies on federal lands. PG&E already provides law enforcement funding through county property taxes. Further, Forest Service law enforcement personnel from the Tahoe National Forest are responsible for enforcing regulations related to the management of NFS lands and resources.

The Commission has no way of ensuring that the hiring of a patrol person paid for by PG&E (in this case staffing or funding a seasonal or year-round employee) or providing funding to the Forest Service or Placer County would accomplish a project purpose or ameliorate a project effect. However, the Commission can enforce specific measurable actions, such as O&M provisions, including maintenance of project lands and project recreation facilities to address fire safety and vandalism and

other associated potential effects of dispersed recreation use within the project boundaries. While improved implementation of Forest Service and Nevada, Sierra, and Placer County standards and guidelines regarding recreational use would be beneficial, enforcement of those regulations would be outside the Commission's jurisdiction and responsibility.

California Fish and Wildlife recommendation 16 includes provisions for PG&E to develop a plan to provide funding for the Forest Service to address the costs of managing project-related recreation on NFS lands. This would be a good mechanism to determine sharing costs; however, PG&E is ultimately responsible for the O&M of the project recreation facilities.

*Public Information, Signage, and Education*

The September 2013 Recreation Plan includes a provision for PG&E to, within 2 years of license issuance, in coordination with the Forest Service for NFS lands, develop an information strategy that includes maps, signs, and a website(s) to provide information to enhance project recreation opportunities, protect the natural area, and interpret cultural resources. This strategy would include the signs proposed at each project recreation facility. For signs proposed on NFS land, PG&E would use existing Forest Service signs or develop new signs using Forest Service sign guidelines and receive Forest Service approval prior to installation. At boat launch sites, within 1 year of license issuance, PG&E would install water resource related messages, including lake surface regulations such as county speed limits, direction of travel, and motorized or internal combustion engine restrictions. At boat launches at applicable reservoirs and at other appropriate project entry points, PG&E would install, within 2 years of license issuance, information signs to prevent the spread of invasive aquatic species and waterborne pathogens at the project. An implementation schedule would be part of this strategy, with all actions implemented within 5 years of the license issuance.

California Fish and Wildlife includes provisions in recommendation 16 to address public information and education that are similar to those included in the September 2013 Recreation Plan, except that California Fish and Wildlife includes brochures as part of the information strategy and additional details about the information that would be provided on the information displays and in the educational materials.

Our Analysis

Visitors routinely use websites and visitor information boards to acquire information about developed recreation facilities and recreation resources to plan their visits. Providing a public website and signs for these venues that depict recreation resource, water resource, and resource protection information as proposed in the September 2013 Recreation Plan would increase visitor awareness of opportunities available at and near the Drum-Spaulding, Lower Drum, and Deer Creek Projects. Provisions in both the September 2013 Recreation Plan and California Fish and Wildlife's recommendation would meet this need. Because the combined Drum-Spaulding, Lower Drum, and Deer Creek Projects have an extensive footprint and spans multiple land jurisdictions it would be appropriate to consult with all affected agencies to develop the brochure recommended by California Fish and Wildlife. For the brochure to be useful, it would need to include non-project information for context and visitor orientation and require significant effort to develop. Although brochures are a useful tool to distribute project information, signs in combination with a public website as proposed in the September 2013 Recreation Plan would be just as effective and a less expensive method of providing the necessary information to the public without creating additional litter at the projects. It would be appropriate periodically to review signage, maps, and public website information.

In addition, development and implementation of an information strategy that includes signs, as proposed by the September 2013 Recreation Plan, would provide the means for a coordinated and

systematic development of signage and interpretative information associated with the Drum-Spaulding, Lower Drum, and Deer Creek Projects.

*Recreational Flows*

PG&E proposes several streamflow measures that would enhance whitewater boating opportunities and provide a special event flow at the Drum-Spaulding Project. As discussed in section 3.3.2.2, *Aquatic Resources*, PG&E proposes to implement a schedule of flow reductions during spill cessation at Lake Spaulding to minimize flow fluctuations in the South Yuba River (DS-AQR1 Part 7, *Spill Cessation and Minimization of Flow Fluctuations at South Yuba River*). PG&E's proposed measure states that the spill cessation schedule (table 3-182 and table 3-183) is intended to address recreation interests, including boating. In wet, above normal, and below normal water years if the spill flows below Lake Spaulding reach 250 to 420 cfs and the water surface elevation of Lake Spaulding is 5,005.6 or higher, PG&E proposes to provide a target flow once between May 2 and September 30 of 250 to 420 cfs from Lake Spaulding dam. The target flow would be implemented for no less than 6 consecutive days in wet water years, no less than 4 consecutive days in above normal water years, and no less than 2 consecutive days in below normal water years. PG&E would use good faith to implement the target flows prior to or during the Memorial Day weekend.

In addition, as discussed in section 3.3.2.2, *Aquatic Resources*, PG&E proposes to manage discharge from Fordyce Lake (Drum-Spaulding Project) after spills cease at Fordyce Lake and Lake Spaulding (DS-AQR1 Part 5, *Fordyce Lake Drawdown*). When Lake Spaulding has ceased spilling (or in a year when Lake Spaulding has not spilled) and as soon as there is sufficient storage space available in Lake Spaulding, PG&E proposes to begin a high target flow of about 475 to 250 cfs that is maintained until storage in Fordyce Lake reaches 29,000 acre-feet. Additionally, PG&E proposes to initiate a special event flow of about 50 cfs for about 10 days beginning at the end of the third week in August.

Forest Service condition 31 and California Fish and Wildlife recommendation 2.8 are consistent with PG&E's proposed measure DS-AQR1 Part 7. Forest Service condition 30 and California Fish and Wildlife recommendation 2.6 are consistent with PG&E's proposed measure DS-AQR1 Part 5.

The Foothills Water Network supports PG&E measure DS-AQR1 Part 7. The Foothills Water Network comments that this measure would improve whitewater recreation opportunities and, although the measure targets the Yuba Gap reach, the measure would improve boating opportunities for a 40-mile stretch of the river. The Foothills Water Network also supports PG&E measure DS-AQR1 Part 5, but recommends that the forecasted drawdown schedule of Fordyce Lake be publicized.

Our Analysis

Although PG&E does not provide recreation-specific flows, some of its proposed streamflows, discussed in section 3.3.2.2, *Aquatic Resources*, would enhance existing whitewater boating opportunities available at the Drum-Spaulding Project. Specifically, one part of the spill cessation schedule (table 3-182 and table 3-183) proposed by PG&E is intended to address recreation interests, including boating. Seven whitewater boating runs in South Yuba River downstream of Lake Spaulding dam were identified during the studies conducted during relicensing. Three boating runs begin upstream of the confluence with Canyon Creek, and boatability is affected primarily by the Drum-Spaulding Project releases from Lake Spaulding. The other four boating runs begin downstream of the confluence of Canyon Creek and the South Yuba River and are affected by both Yuba-Bear Project and Drum-Spaulding Project releases.

PG&E's proposed streamflows would generally maintain or enhance boating opportunities in the three whitewater boating runs affected primarily by the Drum-Spaulding Project. In the Langs Crossing

to Jolly Boys Mine run, PG&E's proposal would substantially increase boating opportunities for hardshell kayaks as compared to the no-action alternative in critically dry and extreme critically dry water year types, and generally maintain boating opportunities in other water year types. In the Jolly Boys Mine to Golden Quartz run, PG&E's proposal would generally maintain boating opportunities for hardshell kayaks as compared to the no-action alternative in all water year types. Although PG&E's proposal would result in fewer boating opportunities for rafts and inflatable kayaks in wet water year types in this run (about 5 total days from March through July), it would generally maintain boating opportunities for rafts and inflatable kayaks in most water year types. In the Golden Quartz to Washington run, PG&E's proposal would generally maintain boating opportunities for hardshell kayaks and rafts as compared to the no-action alternative in most water year types, except for wet water year types when the no-action alternative would result in substantially increased boating opportunities (about 14 days). However, PG&E's proposal would substantially increase boating opportunities in this reach as compared to the no-action alternative for inflatable kayaks in all water year types (ranging from about 7 to 22 days, depending on the water year type).

PG&E's proposed streamflows, in conjunction with NID's proposed streamflows, would generally maintain or enhance boating opportunities in the four whitewater boating runs downstream of the confluence of Canyon Creek and the South Yuba River, which are affected by releases from both the Drum-Spaulding Project and the Yuba-Bear Project. As compared to the no-action alternative, PG&E's and NID's proposed streamflows in the Washington to Edwards Crossing run would generally maintain or provide a few additional days of boating opportunities for most boat types in most water year types, except boating opportunities would be substantially increased for hardshell kayaks and inflatable kayaks in critically dry and extreme critically dry water year types, and substantially decreased for hardshell kayaks and rafts in wet water year types. In the Edwards Crossing to Purdon Crossing run, PG&E's and NID's proposed streamflows would substantially increase boating opportunities for all boat types in most water year types, as compared to the no-action alternative. PG&E's and NID's proposed streamflows would result in a substantial decrease in boating opportunities for hardshell kayaks in wet water year types, and generally maintain opportunities for inflatable kayaks in wet water year types and for hardshell kayaks and rafts in dry and above normal water year types.

PG&E's proposed streamflows, in conjunction with NID's proposed streamflows, would substantially increase boating opportunities in the Purdon Crossing to Highway 49 run for hardshell kayaks, as compared to the no-action alternative, except boating opportunities would be substantially decreased for hardshell kayaks in wet water year types and generally maintained for hardshell kayaks in below normal water year types. In the Purdon Crossing to Highway 49 run, PG&E's and NID's proposed streamflows would generally substantially increase or maintain boating opportunities for rafts, except for a substantial decrease in wet water year types. In the Highway 49 to Bridgeport run, PG&E's and NID's proposed streamflows would substantially increase boating opportunities for hardshell kayaks in most water year types, as compared to the no-action alternative, except boating opportunities would generally be maintained for hardshell kayaks in below normal and wet water year types. In the Highway 49 to Bridgeport run, PG&E's and NID's proposed streamflows would generally maintain boating opportunities for rafts in all water year types, except for critically dry and extreme critically dry water years.

PG&E's proposal to manage discharge from Fordyce Lake would result in high water releases early in the year and lower flows by the end of the summer. Fordyce Creek below Fordyce Lake dam was identified as a whitewater boating run during the studies conducted during relicensing. PG&E's proposal would substantially increase whitewater boating opportunities in Fordyce Creek compared to the no-action alternative for all watercraft types, particularly during the month of June. PG&E's proposal would increase boating opportunities for kayaks in all water year types and would increase boating opportunities

for rafts in all water year types, except for above normal water years, where boating opportunities for rafts would be maintained as compared to the no-action alternative.

The Foothills Water Network's recommendation for PG&E to publicize the forecasted drawdown schedule of Fordyce Lake would allow boaters to take advantage of suitable boating flows provided by the project. Although PG&E notes that its measure was intended to provide the needed operational flexibility without the need for an annual flow schedule, providing advance notice, when possible, to the public of the drawdown would allow boaters to better plan and take advantage of the boating flows provided in Fordyce Creek.

PG&E's proposed 10-day special event flow at the Drum-Spaulding Project near the end of August would provide increased recreational opportunity for OHV users. This special event flow would allow for OHV use of the Fordyce OHV Trail to cross Fordyce Creek.

*Recreation Flow Information*

PG&E originally proposed to make average daily streamflow information available to the public via the internet (may be accomplished through a third party) from May 1 through November 30 (measure DS-RR2, *Provide Recreation Flow Information*). PG&E originally proposed to provide streamflow information for the South Yuba River at Cisco (above Lake Spaulding), Fordyce Creek (below Lake Fordyce), the South Yuba River (below Lake Spaulding dam), Bear River (at Highway 20), and Bear River (below Drum afterbay).

The Foothills Water Network recommends that PG&E continue current, year-round gage operations at existing streamflow gages and provide data in 15-minute intervals. The Foothills Water Network indicates that PG&E currently provides 15-minute streamflow information for the South Yuba River at Cisco, Fordyce Creek (below Lake Fordyce), the South Yuba River (at Langs Crossing), and Bear River (below Drum afterbay).

Annual flow information taken at historic locations is important for scientific purposes and promoting understanding of the watershed, and is also utilized by numerous types of recreationists, including whitewater boaters and anglers. The Foothills Water Network also recommends that a gage be added below the confluence of Canyon Creek on the South Fork Yuba River to allow the public to see the combined effect of flow measures on these reaches.

In its reply to the Foothills Water Network's comments regarding providing year-round recreation flow information via the internet, PG&E reported that it currently already provides much of the information recommended by the Foothills Water Network and would continue to provide this information for the South Yuba River at Cisco (above Lake Spaulding), Fordyce Creek (below Lake Fordyce), the South Yuba River (below Lake Spaulding dam), Bear River (at Highway 20), and Bear River (below Drum afterbay).

Forest Service condition 54 specifies that PG&E develop a plan to provide real-time streamflow information in cfs to the public via the internet for certain project-related stream reaches, as soon as reasonably foreseeable, but no later than within a year after license issuance. The Forest Service specifies that plan would include the following project-related stream reaches: Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam (at Cisco Grove), South Yuba River below Lake Spaulding (at Lang's Crossing), and the Bear River at Highway 20. The Forest Service also specifies that PG&E coordinate with NID to include a method in the plan to provide real-time streamflow information to the public year-round for the South Yuba River immediately below Canyon Creek. The Forest Service specifies that the streamflow information would be from the streamflow gages used to document compliance with minimum and spill cessation streamflow requirements. The Forest Service

specifies that the flow information would be available to the public via the internet, which may be accomplished by a third party. The Forest Service notes a preference for the data to be reported in 15-minute intervals; however, data reported in no less than hourly intervals would be acceptable. Forest Service 10(a) recommendation 10 is identical to Forest Service condition 54 but recommends streamflow information for the following stream reaches: Bear River below Dutch Flat afterbay dam and Bear River below Rollins reservoir dam.

PG&E's alternative conditions for recreation flow information, filed on December 20, 2013, is the same as Forest Service condition 54, except that PG&E does not propose to coordinate with NID to provide real-time streamflow information to the public year-round for the South Yuba River immediately below Canyon Creek.

Our Analysis

Providing year-round real-time (15-minute as currently provided) streamflow data on the internet for Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam (at Cisco Grove), South Yuba River below Lake Spaulding (at Lang's Crossing), and the Bear River at Highway 20, as proposed by PG&E and specified by the Forest Service, would allow boaters to take advantage of suitable boating flows provided by the project. Providing the year-round real-time streamflow data on a single, public website would provide the public with a single website to obtain recreation-related information for the project. Because the streamflows are affected by special events, reservoir spill, and outages, providing as much advance notice of these occurrences, their duration, and expected travel time for flows would increase whitewater boating opportunities. Developing a plan to provide streamflow information for these reaches, as proposed and specified by the Forest Service, would be unnecessary since PG&E could simply provide the information on the internet.

The location for a new gage recommended by the Foothills Water Network would be 8.5 miles downstream of the project facilities, and flows at this location are influenced by factors beyond the control of PG&E. The public can determine recreation opportunities in this stretch of the South Fork Yuba River through trends from flow information available from PG&E on the South Yuba River just below Lake Spaulding dam and from information available from NID on Canyon Creek below Bowman dam. Additionally, PG&E and NID filed plans to monitor compliance (as an aquatic resources measure) with minimum flows in the new licenses. Under their proposals, continuous monitoring that is ongoing at existing gages under the existing license would continue uninterrupted and, where the gage capacity needs to be upgraded or a new gage would be required, they propose to design and install appropriate gages and implement monitoring within 1 year of license issuance. The proposed compliance monitoring would record flow data for the tributaries for this reach of the South Yuba River. By adding the flow data for the following proposed compliance monitoring locations, the public can estimate the flow on this reach of the South Yuba River: South Yuba River below Lake Spaulding (at Lang's Crossing), Canyon Creek below Bowman-Spaulding diversion dam, Texas Creek below Texas Creek diversion dam, Clear Creek below Bowman-Spaulding diversion conduit, Fall Creek below Fall Creek diversion dam, Trap Creek below Bowman-Spaulding diversion conduit, and Rucker Creek below Rucker Creek diversion gate. Coordinating with the Yuba-Bear Project licensee to provide the year-round real-time streamflow data for these compliance gages on a single, public website (could be a third-party website) would provide the public with a single website to obtain flow information for this reach (which has three whitewater boating runs) so that they can take advantage of whitewater opportunities on this reach and also be better informed on safe flows.

*South Yuba River Downstream of Lake Spaulding*

BLM condition 6 specifies that PG&E fund a portion of BLM recreation improvements on the South Yuba River downstream of Lake Spaulding by making a one-time payment of $95,000 within 90 days of the license becoming final for the Drum-Spaulding Project. BLM further specifies that PG&E provide $30,000 annually with adjusted Gross Domestic Product-Implicit Price Deflator (GDP-IDP) for operation, maintenance, and administration costs for BLM's management of public river access, lands, and river-related recreation facilities along the South Yuba River downstream of Lake Spaulding as well as BLM lands within the project boundary.

By letter dated December 20, 2013, PG&E agrees with BLM condition 6 and clarifies that this condition is now part of its proposal.

The Foothills Water Network recommends that the new license require trails and toilets at Edwards Crossing and Purdons Crossing and that PG&E provide $30,000 annually for the O&M, law enforcement patrolling, and administration of these areas.

Our Analysis

BLM does not specify the exact location on the South Yuba River of the improvements, O&M, and management that would be funded by the one-time and/or annual payments. Although, it does appear that these payments would likely fund some improvements, O&M, and management located outside the project boundary, including Edwards Crossing and Purdon Crossing, it is unclear if there would be a direct nexus to the Upper Drum-Spaulding, Lower Drum, or Deer Creek Projects. BLM's preliminary condition 6 specified that PG&E would enter into an agreement for recreation improvements at Purdon Crossing and Edwards Crossing and BLM had provided rational for that preliminary condition noting that the South Yuba diversion has caused the river to be lower in the spring and summer months causing these lands along the South Yuba River, including Edwards Crossing and Purdon Crossing, to be heavily impacted by recreational uses for hiking, swimming, and day-use activity. The Edwards Crossing and Purdon Crossing areas are located outside the project boundary over 25 miles downstream. Further, these areas do not serve a project purpose nor do they provide access to project facilities. Although providing facilities at Edwards Crossing and Purdon Crossing would provide benefit to recreation users downstream, there does not appear to be a nexus between these areas and the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. Therefore, it would not be appropriate to require PG&E to provide funding for improvements or annual funding for the facilities related to these areas.

**Yuba-Bear Project**

**Fish Stocking**

One of the primary recreational activities associated with the project includes angling. California Fish and Wildlife currently stocks several project reservoirs to improve the recreational fishery. NID proposes to pay California Fish and Wildlife annually for the stocking of up to 20,000 trout fry and 25,000 kokanee fry in Bowman Lake and the stocking of up to 10,000 catchable rainbow trout, 10,000 catchable brown trout, and 25,000 kokanee fry in Rollins reservoir. Payments would not exceed the then-prevailing statewide average cost to California Fish and Wildlife, without mark-up, for the production and stocking of trout and kokanee fry in similar reservoirs. NID's proposed measure includes provisions for California Fish and Wildlife, at its sole discretion, to change the number, species, and size of fish stocked in Bowman Lake and Rollins reservoir in any one year, but NID would only be responsible for reimbursing California Fish and Wildlife for the levels of stocked trout and kokanee fry proposed in NID's measures.

California Fish and Wildlife recommends in recommendation 17 and the Forest Service recommends in its 10(a) recommendation 12 that NID fund the stocking of fish in Bowman, Faucherie, French, and Sawmill Lakes, and Jackson Meadows and Rollins reservoirs on an annual basis. Fish species and size class stocking targets would be determined by California Fish and Wildlife. However, California Fish and Wildlife and the Forest Service recommend a maximum number of fingerings and/or catchable fish that would be stocked in each of the six reservoirs and annual consultation with California Fish and Wildlife to select fish species, obtain fish stocking targets, discuss fish acquisition, and verify the completion of the previous year's stocking commitment. California Fish and Wildlife and the Forest Service recommend that NID, at its discretion, would: (1) acquire the fish directly from approved fish hatcheries, or (2) reimburse California Fish and Wildlife for the cost of the stocking program.

In a response letter dated September 14, 2012, to California Fish and Wildlife and Forest Service, NID states it would be appropriate to reimburse California Fish and Wildlife for the annual fish stocking in Jackson Meadows, Bowman, and Rollins reservoirs up to the maximum levels included in the agencies' recommendations; however, stocking in French, Faucherie, and Sawmill Lakes should occur no more than once every 3 years. NID also notes that it should not be responsible for the act of stocking since that responsibility is mandated to California Fish and Wildlife by California law.

*Our Analysis*

Angling is one of the most popular activities associated with the project, and stocking fish in project reservoirs would help ensure that the recreational fishery is maintained for the term of the new license. Based on recreation studies completed during the relicensing process, the demand for angling at the project is projected to increase approximately 23 percent over the term of a new license. Maintaining the existing stocking numbers in those reservoirs that receive high recreational use and high angling pressure would help meet the estimated future demand for angling at the project for the term of the a new license.

Rollins and Jackson Meadows reservoirs receive very high recreational use and high angling pressure. Faucherie and Bowman Lakes receive a moderate amount of recreational use with a little over half of the visitors participating in angling at Faucherie Lake and approximately half of the visitors at Bowman Lake. Because of the high level of recreational angling that occurs at these reservoirs coupled with the moderate to high recreational use, these reservoirs would most benefit from annual fish stocking. Although anglers only comprised one-third of those visitors at Sawmill Lake, Sawmill Lake received a moderate level of recreational use while French Lake received very low recreational use. Sawmill Lake would also benefit from regular periodic fish stocking. Periodic review of angling use levels with recreational use data over the term of the new license would also help inform potential modifications to the lakes and reservoirs to be annually stocked or stocked periodically.

The existing frequency that California Fish and Wildlife stocks Faucherie Lake is unclear. NID notes that California Fish and Wildlife stocked French, Faucherie, and Sawmill Lakes less than half the time from 2002 to 2009, and infrequently before 2002. California Fish and Wildlife has noted that stocking is dependent on a number of factors, including the availability of fish. Sawmill and French Lakes are remote, high altitude reservoirs that would require aerial fish stocking. However, based on cost information provided by the California Fish and Wildlife, aerial stocking is a cost-effective method for stocking these remote reservoirs located at higher elevations.

Developing a fish stocking plan that would include annual fish stocking in Rollins and Jackson Meadows reservoirs, and Bowman and Faucherie Lakes, and fish stocking in Sawmill Lake every other year until the first Form 80 reporting year; and address stocking fish in additional reservoirs (French Lake) based on changes in recreational use and angling pressure would provide the means for a coordinated fish stocking program. A fish stocking plan that also includes annual consultation would

help address any changes in California Fish and Wildlife fish stocking management targets and the availability of hatchery fish and allow the flexibility to increase or decrease stocking numbers, change fish stocking sizes, and change the frequency of stocking a particular reservoir over the term of a new license. All of the reservoirs recommended for stocking by California Fish and Wildlife in recommendation 17 and the Forest Service in recommendation 12 would be included in the fish stocking plan, although not every reservoir would be stocked annually.

Although the responsibility of fish stocking is mandated to California Fish and Wildlife by California law, we note that NID is ultimately responsible for the management of all project reservoirs and project reaches and would be responsible for ensuring the stocking of fish if required under a new license.

**Recreation Plan**

This section evaluates the environmental effects of the proposed alternative conditions Recreation Plan filed by NID in response to Forest Service preliminary condition 41 by letter dated August 29, 2012 (Alternative Recreation Plan), Forest Service condition 57, Forest Service recommendation 14, California Fish and Wildlife recommendation 16, and BLM condition 25. By letter dated December 20, 2013, NID confirmed that the Alternative Recreation Plan included with its letter dated August 29, 2012 is its current proposal.

NID originally proposed to implement the Recreation Plan filed with its amended license application (NID, 2011a). On August 29, 2012, NID filed its response to Forest Service preliminary condition 41 in the form of alternative conditions and an Alternative Recreation Plan. By letter dated December 20, 2013, NID confirmed that the Alternative Recreation Plan is its current proposal. Many of NID's proposed alternative conditions are similar to the Forest Service condition 57 provisions and recommendation 14 and California Fish and Wildlife recommendation 16. The Alternative Recreation Plan would: (1) provide recreation facilities that meet the needs of project-related recreation and area consistent with federal, state, and local legal requirements; (2) monitor recreation use over the term of the license to help project-related recreation users achieve quality recreation experiences while minimizing recreation use effects; (3) and enhance the accessibility of project-related recreation facilities for visitors with disabilities. The Alternative Recreation Plan includes a number of provisions for improvements and upgrades at existing recreation facilities and measures to construct new facilities. Proposed modifications to existing facilities and proposed new developments are summarized in table 3-226.

Forest Service condition 57 specifies that NID consult with the Forest Service to develop a Recreation Plan and submit it for Forest Service approval. The Forest Service specifies that NID submit the Recreation Plan to the Commission following Forest Service approval. Once the Recreation Plan is approved by the Forest Service, the Forest Service would consider it complete. Forest Service condition 57 specifies 4(e) conditions for recreation facilities and Forest Service recommendation 14 recommends 10(a) recommendations for recreation facilities on NID lands. Additionally, the Forest Service conditions 54 (licensee contact to serve as a liaison with the agency whenever planning or constructing recreation facilities on federal lands) and 56 (annual recreation coordination meeting with resource agencies) are generally consistent with conditions BLM specifies should be included in the Recreation Plan.

BLM condition 25 specifies that NID consult with BLM to develop a Recreation Plan and submit it for BLM approval. BLM specifies that the Recreation Plan should address the following BLM conditions: 28 – Licensee Contact, 29 – Annual Recreation Coordination Meeting, 30 – Review of Recreation Developments, 31 – Recreation Survey and Monitoring, 32 – General Measures for All Recreation Sites, 33 – Vegetation Management in Recreation Sites, 34 – Dutch Flat Afterbay Day-Use Recreation Site, 35 – Chicago Park Powerhouse and Connecting Facilities and Roads, 36 – Recreation

Operation, Maintenance, and Administration, and 37 Recreation Plan Revision[33]. BLM does specify several 4(e) conditions related to specific recreation facilities (conditions 32 and 33 for Dutch Flat afterbay and Chicago Park powerhouse, respectively) and recommends 10(a) recommendation 1 for the Bear River trail.

California Fish and Wildlife recommends in its recommendation 16 that NID consult with the Forest Service and BLM to finalize the proposed Recreation Plan and submit it for Forest Service and BLM approval. California Fish and Wildlife recommends that once the Recreation Plan is complete, it would be included as part of the condition.

By letter dated December 20, 2013, NID confirmed its concurrence with Forest Service final conditions 54 (Licensee Contact) and 56 (Annual Recreation Coordination Meeting); and BLM final conditions 26 (Licensee Contact), 27 (Annual Recreation Coordination Meeting), 28 (Review of Recreation Developments), 29 (Recreation Survey and Monitoring), 30 (General Measures for All Recreation Sites), 31 (Vegetation Management in Recreation Sites), 32 (Dutch Flat Afterbay Day-Use Recreation Site), 33 (Chicago Park Powerhouse and Connecting Facilities and Roads), 34 (Recreation Operation, Maintenance, and Administration), and 35 (Recreation Plan Revision).

Table 3-226 summarizes notable differences between the recreation facilities in the proposed Alternative Recreation Plan and the recreation facility provisions included in Forest Service condition 57 and recommendation 14. Generally, California Fish and Wildlife's recommendation 16 is identical or almost identical to Forest Service condition 57; however, California Fish and Wildlife's recommendation includes several recreation facility provisions that were in the preliminary Forest Service condition 41 but have been modified in the final Forest Service condition 57.

We analyze specific provisions in the NID's Alternative Recreation Plan, Forest Service condition 57, Forest Service recommendation 14, BLM 4(e) conditions and 10(a) recommendation, and California Fish and Wildlife's recommendation 16 in the following areas: (1) recreation plan implementation; (2) facility construction and modification; (3) trails and access developments; (4) host sites; (5) recreation facility operation and maintenance; (6) water system developments; (7) recreation monitoring; (8) recreation development review; (9) project patrols/law enforcement; (10) public information and education; and (11) boat ramp extensions.

[33] These condition numbers do not match the BLM final condition numbers but we have listed them herein as they are identified in condition 25. The final BLM conditions identified in condition 25 are as follows: Condition 26 – Licensee Contact, Condition 27 – Annual Recreation Coordination Meeting, Condition 28 – Review of Recreation Developments, Condition 29 – Recreation Survey and Monitoring, Condition 30 – General Measures for All Recreation Sites, Condition 31 – Vegetation Management in Recreation Sites, Condition 32 – Dutch Flat Afterbay Day-Use Recreation Site, Condition 33 – Chicago Park Powerhouse and Connecting Facilities and Roads, Condition 34 – Recreation Operation, Maintenance, and Administration, and Condition 35 Recreation Plan Revision.

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| **Jackson Meadows Reservoir** | | | |
| *East Meadow Campground* | | | |
| · Construct/maintain pedestrian trail and upgrade host site to include septic or holding tank within 5 years. | · Same as Alternative Recreation Plan | NA | · Same as Forest Service |
| · Convert the two-unit flush toilet to a two-unit vault toilet within 5 years. | · Same as Alternative Recreation Plan | NA | · Same as Forest Service |
| · Expand the existing parking areas to 15-25 feet by 60 feet and provide gravel surfacing and install a second parking area with gravel surface, 30 feet by 60 feet within 5 years. | · Same as Alternative Recreation Plan | NA | · Same as Forest Service |
| · No comparable provision | · Lengthen/widen spurs and rehabilitate/reconstruct road within 15 years. | NA | · Same as Forest Service |
| *Pass Creek Campground* | | | |
| · Upgrade host campsite to include septic and hydrant for water. | · Upgrade host site within 8 years. | NA | · Same as Forest Service |
| Replace flush restroom buildings with vault models. | Replace flush toilet buildings with fully accessible flush toilets within 8 years. | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| **NID Alternative Recreation Plan** | **Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14** | **BLM 4(e) Conditions and 10(a) Recommen-dation** | **California Fish and Wildlife Recommenda-tions** |
|---|---|---|---|
| NA | Provide additional vehicle and trailer parking; lengthen and widen spurs (5 spurs that are 16 feet and 11 spurs that are 13 feet wide) within 15 years. | NA | Same as Forest Service |
| NA | Replace or rehabilitate vault toilets within 15 years. | NA | Same as Forest Service |
| *Pass Creek Overflow* | | | |
| Provide additional boat launch parking. If dual–use approach deemed effective, also install 1-vault restroom and removable site markers at campsites. | ·Install 1-unit vault restroom; provide additional boat launch parking; and install removable site markers at campsites, within 5 years. | NA | Same as Forest Service |
| · No comparable provision | · Provide picnic tables and fire rings around the edge of the parking area within 5 years. | NA | Same as Forest Service |
| *Pass Creek Boat Launch* | | | |
| · Construct/ maintain an accessible trail on the shoreline. | · Same as Alternative Recreation Plan | NA | Same as Forest Service and Recreation Plan |
| · No comparable provision | · Provide asphalt treatment on the high water launch; replace wooden barriers with boulders; provide more prominent signing regarding submerged stumps and rocks within 1 year. | NA | Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| **NID Alternative Recreation Plan** | **Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14** | **BLM 4(e) Conditions and 10(a) Recommen-dation** | **California Fish and Wildlife Recommenda-tions** |
|---|---|---|---|
| Provide at least one additional accessible parking space within 5 years. | Provide 21 additional parking spaces, accessible parking, and 6 RV overflow parking spaces within 5 years. | NA | Same as Forest Service |
| Same as Forest Service but also includes the following provision: prior to implementing basic improvements, the Forest Service and NID would evaluate the condition below the constructed end of the boat ramp and determine if providing access is safe and reasonable | Provide low-water boat launching access below the constructed ramp within 5 years. | NA | · Same as Forest Service |
| Reconstruct boat ramp and replace toilet within 15 years. | Same as Alternative Recreation Plan | NA | · Same as Forest Service |
| *Aspen Group Campground* | | | |
| NA | Improve barrier to prevent off-road use and mark accessible parking within 2 years. [a] | NA | Same as Forest Service |
| NA | · Reconstruct campground; widen road; expand parking areas within 10 years. [a] | NA | Same as Forest Service |
| *Aspen Picnic Area* | | | |
| · Replace the 4-unit vault restroom with 2-unit accessible vault restroom; and develop 2 additional accessible picnic sites | · Same as Alternative Recreation Plan | NA | · Same as Forest Service except within 5 years |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| within 8 years. | | | |
| · Construct a non-motorized trail from Aspen group campground to parking area at Aspen picnic area and designate accessible parking within 8 years. | ·Same as Alternative Recreation Plan | NA | · Same as Forest Service except within 5 years |
| · No comparable provision | · Reconstruct road within 8 years. . | NA | · Same as Forest Service except within 5 years |
| · No comparable provision | · Review appropriate number of sites based on demand and adjust number of sites within 8 years | NA | · Same as Forest Service except within 5 years |
| *Fir Top Campground* | | | |
| · Replace flush restroom buildings with vault models; unless reliable water source established, keep the flush toilets. | · Add a single unit vault toilet within 10 years. | NA | · Same as Forest Service |
| · No comparable provision | · Rehabilitate/reconstruct road; lengthen/widen spurs within 10 years. | NA | · Same as Forest Service |
| · No comparable provision | · Construct and maintain pedestrian native surface trails within 10 years. | NA | · Same as Forest Service |
| *Findley Campground* | | | |
| · Replace flush restroom buildings with vault models; unless reliable water source established, keep the flush toilets. | · Replace flush toilet with accessible toilet within 10 years. | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| · Repair sufficiently damaged roads within 3 years | ·Same as Alternative Recreation Plan. | NA | · Same as Forest Service |
| · No comparable provision | · Reconstruct campground with replacing retaining walls; providing additional trailer and vehicle parking; and reconstructing and widening circulation road within 10 years. | NA | · Same as Forest Service |
| *Woodcamp Campground* | | | |
| · Replace flush restroom buildings with vault models; unless reliable water source established, keep the flush toilets. | · Replace 1 wooden vault toilet with accessible vault toilet within 3 years. | NA | · Same as Forest Service |
| · Upgrade host campsite to include septic/holding tank/leach system and hydrant for water hook-up. | · Upgrade the host site to include septic within 10 years. | NA | · Same as Forest Service |
| · No comparable provision | · Lengthen/widen spurs; reconstruct road; provide additional parking within 10 years. | NA | · Same as Forest Service |
| *Woodcamp Boat Launch* | | | |
| · Upgrade boat launch including replacing the launch ramp. | · Upgrade to 2-lane launch ramp with an accessible courtesy dock and sidewalk within 5 years. | NA | · Same as Forest Service |
| · Pave parking area; widen and repave the facility circulation road; and replace the existing | · Same provision to be completed within 5 years | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| restroom building. | | | |
| *Woodcamp Picnic Area* | | | |
| · Same as Forest Service | · Reconstruct the road, develop within 5 years. | NA | · Same as Forest Service |
| · Same as Forest Service | · Same provision to be completed within 5 years | NA | · Same as Forest Service |
| *Silvertip Group Campground* | | | |
| · No comparable provision | · Within 5 years, replace unit marker; replace information signs; provide accessible routes in both group sites; regrade campsite areas; reconstruct interior campground roads and parking area (10 additional spaces); connect the non-motorized pedestrian trail from Woodcamp, Findley, and Firtop to Silvertip; replace wooden tables. [a] | NA | · Same as Forest Service |
| · No comparable provision | · Reconstruct campground within 20 years. [a] | NA | · Same as Forest Service |
| *Woodcamp Complex Trail System* | | | |
| · Construct connector pedestrian trails. | · Maintain trail annually. | NA | · Same as Forest Service |
| · Install trail and trailhead signage. | · Install a more-prominent trailhead sign and interpretive signs within 5 years. | NA | · Same as Forest Service |
| · No comparable provision | · Improve parking area within 5 years. | BA | · Same as Forest Service |
| *Jackson Point Boat-In Campground* | | | |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| · Relocate boat-in campsites and remove up to 4 campsites. | · Relocate sites that are currently not being used and remove unused facilities within 2 years. | NA | · Same as Forest Service |
| · Install animal-resistant food lockers at each relocated campsite, also including fire rings and tables | · Same provision to be completed within 2 years | NA | · Same as Forest Service |
| · Replace 2 toilets within 2 years | ·Same as Alternative Recreation Plan | NA | · Same as Forest Service |
| *Jackson Meadows Reservoir – Administration Center* | | | |
| · Remove from project boundary. If not used, Forest Service may require NID to demolish administrative facility, and/or remove some or all of the facilities and revegetate the site. | · If not used, Forest Service may require NID to demolish administrative facility, and/or remove some or all of the facilities and revegetate the site. | NA | · Same as Forest Service |
| · No comparable provision | · Provide landlord type maintenance or all facilities, except barracks. | NA | · Same as Forest Service |
| *Jackson Sanitary Dump Station* | | | |
| · Improve efficiency of facility; unless effort to improve fails, follow Forest Service's provisions. | · Provide RV dump station with a leach field and potable water. Existing dump station meets the needs for a dump station as long as it is properly functioning. | NA | · Similar to Forest Service but recommends that concurrent with decommissioning the existing dump station, NID would construct dump station |
| NA | · Retrofit riser within 2 years.[a] | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| NA | · Consider alternative uses for the site in the Recreation Development Plan, to be constructed as needed when the dump station is decommissioned.[a] | NA | · Same as Forest Service |
| *Jackson Meadows Vista* | | | |
| · No comparable provision | · Gravel the parking area within 5 years. | NA | · Same as Forest Service |
| · No comparable provision | · Rehabilitate or replace restroom building within 15 years. | NA | · Same as Forest Service |
| *Jackson Meadows Area − Additional Trail Construction* | | | |
| NA | · Install and maintain trailhead and directional signing on all trails in the Jackson Meadows area within 5 years. | NA | · Same as Forest Service |
| NA | · Construct and maintain a non-motorized trail from Vista Point and Aspen group campground to a lake overlook within 5 years. | NA | · Same as Forest Service |
| NA | · No comparable provision | NA | ·Construct and maintain a new non-motorized trail from the Woodcamp Complex to English dam; if not feasible to connect with the Woodcamp Interpretive Trail, provide trailhead facilities within 15 years. |
| NA | · Provide annual maintenance of these trails. | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| *Jackson Meadows Development Plan* | | | |
| NA | · Within 1 year, develop plan for facility expansion for approval by Forest Service that includes locations for the following: (1) group campground (at least 50 PAOT) facilities with potable water within 4 years; (2) remaining 50 PAOT group campground called for in Jackson Meadow Development Plan within 20 years; (3) a minimum of 20 additional family campsites with potable water within 8 years; and (4) remaining family campsites called for within 20 years | NA | · Similar to Forest Service, but recommendation for development plan does not include schedule for facility expansions and recommends a specific number of family campsites (57) |
| **Milton Diversion Impoundment** | | | |
| *Day-Use Area* | | | |
| · Develop shoreline day-use area with parking area. | · No comparable provision | NA | · No comparable provision |
| · Develop hand launch. | · Limit shoreline access to one car-top boat launch with barriers. | NA | · Same as Forest Service |
| *Primitive Campsites* | | | |
| · Develop six primitive, walk-in campsites with designated parking space. | · Develop three primitive site near boat launch and three primitive sites west of the boat launch area with parking within 3 years. | NA | · Same as Forest Service |
| · No comparable provision | · Determine need for food lockers each year. | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| *Jackson Creek Campground* | | | |
| NA | · Maintain the 3-panel sign. | NA | · Same as Forest Service |
| NA | · Redesign and reconstruct campground, including installing animal- resistant food lockers, constructing host campsite, evaluating the opportunity to accessibility to all campsites, and paving or graveling all campground roads, within 10 years. | NA | · Same as Forest Service, except does not include host campsite |
| NA | · Replace double-unit toilet with two single-unit accessible toilets. | NA | · Same as Forest Service |
| **French Lake** | | | |
| NA | · Grade and gravel the existing parking area and install large rock barriers to keep OHVs from accessing lake within 5 years. | NA | · Same as Forest Service |
| *French Lake Trail* | | | |
| NA | · Install and maintain trailhead sign within 5 years. | NA | · Same as Forest Service |
| **Bowman Lake** | | | |
| · Designate and appropriately sign the reservoir for day-use and camping in designated sites only. | · Same provision within 2 years | NA | · Same as Forest Service |
| · Dismantle all dispersed, non-designated campsites | · No comparable provision | NA | · No comparable provision |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| on the north shoreline. | | | |
| NA | · Prepare a corridor-wide recreation development and management plan for the Bowman Recreation Corridor in consultation with the Forest Service within 2 years. | NA | · Same as Forest Service |
| NA | · Provide minimum of one potable water system at one of the campgrounds in the Bowman Recreation Corridor within 5 years. | NA | · Same as Forest Service |
| *Designated Primitive Campsites* | | | |
| · Designate up to 10 primitive campsites along the shoreline. | · Eliminate all dispersed primitive campsites and restrict all camping to formal campground facilities within 5 years. | NA | · Same as Forest Service |
| *Inflow Day-Use Area* | | | |
| · Develop a gravel parking area for up to 10 vehicles with vehicle barriers and a 2-panel information board. | · Provide parking area within 5 years. [a] | NA | · Same as Forest Service |
| *Campground* | | | |
| NA | · Expand camping by 20 sites on in Tree Camp area within 5 years. | NA | · Same as Forest Service |
| NA | · Develop additional designated camping capacity adjacent to Bowman Lake campground by either (1) developing a 25 PAOT | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| | group campground or (2) 7-10 unit family campground adjacent to Bowman Lake campground. [a]<br><br>· If the Forest Service's 10(a) recommendation 14 to either construct a 25 PAOT group campground or 7-10 unit family campground adjacent to Bowman Lake campground is not included in the license, construct a drive-in 25 PAOT group campground on NFS lands on the east end of Bowman Lake. | | |
| NA | · Rehabilitate the existing facilities at Bowman campground within 5 years.[a] | NA | · Same as Forest Service |
| NA | · Limit camping to developed campgrounds and designated sites only within 7 years. | NA | · Same as Forest Service |
| *Shoreline Access Road (Informal Boat Ramp)* | | | |
| · Install gate at top of the road/informal boat ramp to prevent vehicles from using the ramp. | · Install gate at informal boat ramp within 2 years but allow people to carry their watercraft to launch. | NA | · Same as Forest Service |
| · Inform visitors of the formal boat ramp at the east end of the reservoir at Bowman Lake campground | · Install signs to formal boat ramp within 2 years. | NA | · Same as Forest Service |
| · Dismantle all dispersed campsites. | · No comparable provision | NA | · No comparable provision |
| **Bowman Recreation Corridor Trail Development** | | | |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| NA | · Within 2 years construct and maintain one of the following:<br>• at or near Sawmill Lake, construct a pedestrian bridge crossing over Canyon Creek or a walkway across Sawmill spillway [a]; or<br>• a primitive trail from Faucherie to Sawmill Lakes [a].<br>If neither of above recommendations are included in the new license, Forest Service specifies under condition 57 that NID construct trail from the group campground at Sawmill Lake to the Grouse Ridge Trail on the south side of Sawmill Lake. | NA | · Same as Forest Service |
| NA | · French Lake Trail − Construct and maintain one of the following:<br>• primitive trail from Faucherie Lake to French Lake; or<br>• primitive trail from Forest Service 843-37 Road to French Lake. Create a trailhead with parking for 6-10 vehicles near the start of the trail.<br>· Ensure perpetual public right | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| | to use the trails on licensee land; provide directional signs at trail entry points; provide annual maintenance on trails. | | |
| **Sawmill Lake** | | | |
| · Designate and appropriately sign the reservoir for day-use and camping in designated sites only, except on the south shoreline where boat-in and hike-in dispersed camping would be permitted. | · Post designated signage at vehicle access points. | NA | · Same as Forest Service |
| · Dismantle all dispersed campsites on the north shoreline. | · Dismantle all dispersed campsites not incorporated and converted into developed campsites. | NA | · Same as Forest Service |
| *Dam Day-Use Area* | | | |
| · Convert and sign the site for day-use only; remove all dispersed campsites; and install a 2-panel information board. | · Install information kiosk. | NA | · Same as Forest Service |
| *Sawmill Lake Family Campground (NID Land)* | | | |
| · Develop a rustic, 10-unit family campground (25 PAOT) with parking areas for 10 vehicles, a vault restroom, and a hand launch. | · Construct a 15-20 unit family campground, parking, and 1 vault toilet per 35 PAOT; provide signs to informal boat launch opportunity at the dam. [a]<br><br>· If Forest Service 10(a) recommendation for 15-20 unit family campground is not | NA | · Same as Forest Service, but does not include 10-unit family campground specification. |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| | included in license, Forest Service specifies, under condition 57, NID also construct 10-unit family campground (Development Scale 2). | | |
| *Sawmill Lake Group Campground (NFS Land)* | | | |
| · Develop a rustic group campground (25 PAOT) with a native surface parking areas for 10 vehicles with barriers, a 1-unit vault restroom, and a hand launch facility. | · Construct a group campground (25 PAOT) with barricade roadway and parking; vault toilet and barrier existing informal boat ramp to allow only car-top launching within 5 years. | NA | · Same as Forest Service |
| **Canyon Creek** | | | |
| *Canyon Creek Campground* | | | |
| · Install animal-resistant food lockers at campsites. | · Provide large food lockers for each site and 4 lockers for the 25 PAOT group camp within 5 years. | NA | · Same as Forest Service |
| NA | · Reconstruct campground and make accessible; redesign and convert the west end of the campground into a minimum of a 25 PAOT group site. | NA | · Same as Forest Service |
| NA | · Replace the two restrooms and provide walkway. | NA | · Same as Forest Service |
| NA | · Provide an information/interpretive display. | NA | · Same as Forest Service |
| NA | · Provide road surface treatment of all interior campground roads and spurs. | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| *Canyon Creek Dispersed Sites* | | | |
| NA | · Within 5 years create a 10-15 unit campground; incorporate the existing dispersed campsites; develop 4-7 additional campsites along Canyon Creek. | NA | · Same as Forest Service |
| NA | · Install 2 vault toilets within 5 years. | NA | · Same as Forest Service |
| NA | · Use existing spurs off main road as "campsite" spurs and create new spurs for new sites. | NA | · Same as Forest Service |
| NA | · Install a self-service pay station if NID wishes to recover some of the operating costs. | NA | · Same as Forest Service |
| NA | · Remove and restore remaining dispersed sites along Canyon Creek not at the campground within 5 years. | NA | · Same as Forest Service |
| **Faucherie Lake** | | | |
| *Faucherie Lake Day-Use and Boat Ramp* | | | |
| · Install barriers at the launch to provide hand launching only. | · Rehabilitate informal boat ramp, block at high water mark and sign for car-top launch only; designate load/unloading parking spaces within 10 years. [a] | NA | · Same as Forest Service |
| NA | · Add an information kiosk within 5 years. [a] | NA | · Same as Forest Service |
| NA | · Provide vegetative screening between the 2 group units or move units farther apart, if | NA | · Same as Forest Service |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| | feasible, within 10 years. [a] | | |
| NA | · Replace the toilet at the day-use area within 5 years.[a] | NA | · Same as Forest Service |
| *Faucherie Group Campground* | | | |
| NA | · Replace the toilets and picnic tables within 5 years.[a] | NA | · Same as Forest Service |
| NA | · Expand parking; sign van accessible parking space within 5 years.[a] | NA | · Same as Forest Service |
| NA | · Rehabilitate the remainder of the group campground facilities within 10 years. [a] | NA | · Same as Forest Service |
| *Faucherie Lake Dam Parking Area* | | | |
| · Install a gate at the dam access road | · Place gate on the west end of the dam within 2 years.[a] | NA | · Same as Forest Service |
| NA | · Provide signage and trailhead to serve the Sawmill and/or French Lake trails with information board within 5 years. [a] | NA | · Same as Forest Service |
| NA | · Rehabilitate day-use parking area and circulation road within 10 years. | NA | · Same as Forest Service |
| **Dutch Flat Afterbay** | | | |
| *Dutch Flat Afterbay Day-Use Area* | | | |
| · Develop a day-use area along the shoreline if suitable land is found.[b] | · No comparable provision | Condition 32: Within 90 days, make a good faith effort to purchase at fair | · Develop a day-use area along the shoreline if suitable land is found. |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| | | market value parcel of land or obtain lease or easement for property for day-use facility; if unsuccessful, provide a good faith effort to work out an agreement with PG&E, to develop a day-use area on PG&E property. | |
| **Langs Crossing** | | | |
| NA | · Install single vault toilet on NFS lands adjacent to Bowman Road to Langs Crossing within 5 years. | NA | · Work cooperatively to equitably share responsibility for parking area, vault toilet, and picnic site on NFS lands adjacent to Bowman Road to Langs Crossing within 5 years |
| **Bear River Trail** | | | |
| NA | · Cooperate with trail planners for trail along Bear River; provide perpetual public access of trail and roads across NID lands; support trailhead development, sanitation, and signage.[a] | 10(a) Recommenda-tion 1: Same as Forest Service, except recommends this measure within 5 years. | · Same as Forest Service |
| **Chicago Park Powerhouse** | | | |
| · No comparable | · No comparable provision[c] | Condition 33: Within 1 year, | · No comparable provision |

Table 3-226. Notable facility differences between the provisions of NID's Alternative Recreation Plan, Forest Service condition 57 and recommendation 14, BLM conditions and recommendations, and California Fish and Wildlife recommendation 16. (Source: staff)

| NID Alternative Recreation Plan | Forest Service Condition 57 Recreation Plan Provisions and 10(a) Recommendation 14 | BLM 4(e) Conditions and 10(a) Recommen-dation | California Fish and Wildlife Recommenda-tions |
|---|---|---|---|
| provision[c] | | sign an assistance agreement with BLM and develop a rehabilitation plan with BLM to block, gate, and rehabilitate roads and trails; NID provides the manpower, equipment, and materials; meet with BLM by November 15th of each year to discuss following year's projects. | |

[a] Provisions recommended by the Forest Service in 10(a) recommendation 14.

[b] By letter dated December 20, 2013, NID confirmed its concurrence with BLM final condition 32, which was not included in NID's Alternative Recreation Plan.

[c] By letter dated December 20, 2013, NID confirmed its concurrence with BLM final condition 33, which was not included in NID's Alternative Recreation Plan.

*Recreation Plan Implementation and Organization*

NID's Recreation Plan and Alternative Recreation Plan are similar to the plan outlined in Forest Service condition 57 and recommendation 14 and California Fish and Wildlife recommendation 16. Where differences do exist between the proposed plan and specifications made in the Forest Service condition, the differences are mostly related to detailed facility configuration or the schedule for completion.

Our Analysis

NID's proposed Alternative Recreation Plan would provide benefits to the public generally within 1-6 years. In some specific instances, the Forest Service has specified a shorter or longer time frame for completion of a particular facility modification or addition, but in most instances, the differences in

timing are within a year or two. In some of these instances, existing recreational use data suggest that completion of a facility modification or addition should occur sooner or later than specifically proposed by NID in the plan. However, taken as a whole, the implementation of the proposed plan with all of the facility modifications and enhancements included would be of great benefit to the recreating public and is generally consistent with the plan components specified by both the Forest Service and California Fish and Wildlife.

*Recreation Plan Facility Construction and Modification*

NID's Alternative Recreation Plan proposes a number of upgrades, additions, modifications, and reductions to existing facilities to enhance recreational use of the project. The proposed modifications are listed in table 3-227. Most of the measures proposed are modifications to existing facilities, but NID proposes to construct several new recreation facilities as well. In the following section, we analyze by recreation area the more significant recreation facility proposals included in NID's proposed plan, including: (1) animal-resistant locker additions; (2) accessible facility additions or modifications; (3) campground or campsite additions or modifications, including the addition of campsites or campgrounds to alleviate crowding, and the formalization of dispersed campsites; (4) road, parking, and vehicle barrier additions or modifications; and (5) trail and trailhead additions or modifications.

*Animal-Resistant Food Lockers*

Currently, not all campgrounds and campsites located at the NID recreation sites are equipped with food lockers. NID proposes to install animal-resistant food lockers at campgrounds and campsites located throughout the project where they do not currently exist, including campsites at the Jackson Point boat-in campground, and the Canyon Creek campground. Forest Service condition 57 specifies the installation of animal-resistant food lockers at these same campground and campsite locations, and in addition specifies animal-resistant lockers at Jackson Creek campground and that the need for animal-resistant food lockers at the Milton diversion impoundment should be evaluated each year. California Fish and Wildlife recommends provisions for animal-resistant food lockers similar to the Forest Service. None of the other agencies provided specifications or recommendations regarding animal-resistant food lockers.

Our Analysis

Installation of animal-resistant food lockers, as proposed and specified by the Forest Service, would have little or no adverse impact on the recreation sites, or on project resources, and would be a benefit to recreation users. Animal-resistant food lockers at all campsites would discourage wildlife from frequenting campsites, significantly reduce the potential for human-wildlife interactions, and improve camper safety. Installation of animal-resistant food lockers at all campsites, including dispersed primitive campsites, such as those located at the Milton diversion impoundment would benefit both recreationists and wildlife.

*Accessible Facilities*

Currently, not all of the NID recreation sites are equipped with accessible recreation facilities for those visitors with disabilities. To improve accessibility, NID proposes to add a number of improvements at the project's existing recreation sites, including accessible parking, trails, campsites, toilets, and picnic sites. Table 3-226 provides a detailed summary of accessibility improvement proposals. In addition to these proposed measures, Forest Service condition 57 specifies additional accessibility improvements at several sites, including: Pass Creek campground, Aspen group campground, Findley campground, Woodcamp campground, Woodcamp boat launch, Silvertip group campground, Jackson Creek campground, Canyon Creek campground, and Faucherie group campground (see table 3-226 for specific

details). Without exception, California Fish and Wildlife's recommendations regarding accessible facilities are the same as the Forest Service specifications.

Our Analysis

The provision of accessible recreation facilities is consistent with the Commission's policy under which licensees are expected to consider the needs of all populations, including those with disabilities, in the design and construction of such facilities. Providing accessible facilities, where feasible, would benefit all recreation users by improving access and would help address growing recreational demand at this project. Additional accessibility improvements specified by the Forest Service and recommended by California Fish and Wildlife would further enhance recreation accessibility at the project and would give disabled visitors even more access to the project and greater opportunities to participate in many of the recreational opportunities provided by the project.

*Campgrounds and Campsites*

Camping is one of the most popular recreational activities at the project reservoirs and recreation sites. Camping occurs at both developed campgrounds and at dispersed campsites, located throughout the project in various locations. There is also some camping that occurs at unimproved, undesignated sites dispersed around several of the reservoirs. Currently some campgrounds and campsites are in need of improvement to address issues associated with old or worn facilities, camping in non-designated sites, and, in some cases, crowding. To address these issues, NID proposes modifications, improvements, or upgrades to campgrounds and campsites located at a number of the project recreation sites. NID also proposes new camping facilities at some sites, including the development of a Sawmill Lake family campground and Sawmill Lake group campground (see table 3-226 for specific details). Forest Service condition 57 specifies similar campsite or campground improvements at several sites; however, the Forest Service specifies additional measures, beyond those proposed by NID, at several other sites including: Findley campground (reconstruct campground, replacing retaining walls); a Jackson Meadows development of a Jackson Meadows Development Plan that would include Jackson Meadows group campground (construct a group campground within 4 years and construct a remaining group campground within 20 years) and Jackson Meadows family campsites (construct additional family campsites); Jackson Creek campground (redesign and reconstruct campground); Bowman Lake campground (expand camping by 20 sites on NFS land, limit camping to developed campgrounds and designated sites only, and rehabilitate the existing campground facilities); Bowman Lake (if Forest Service recommendation 14, at Bowman Lake, to either develop a group campground or a family campground adjacent to Bowman Lake campground is not included in license, Forest Service specifies NID develop a group campground on NFS lands at Bowman Lake); Canyon Creek campground (reconstruct campground and convert the west end of the campground into a group site); and Canyon Creek dispersed sites (create a campground that incorporates dispersed campsites, and develop additional campsites along Canyon Creek) (see table 3-226). Additionally, Forest Service recommendation 14 recommends additional measures beyond those proposed by NID at Aspen group campground (reconstruct campground); Silvertip group campground (regrade campsite areas, and reconstruct campground); Bowman Lake (either develop a 25 PAOT group campground or 7-10 unit family campground adjacent to Bowman Lake campground); and Faucherie group campground (rehabilitate group campground facilities) (see table 3-226). California Fish and Wildlife's recommendations regarding campgrounds and campsites are generally the same as the Forest Service specifications and recommendations.

Our Analysis

For many of the project campgrounds, NID and the Forest Service agree on improvement measures to be implemented, particularly where improvements are based on current use and anticipated future demand. At some sites, NID proposes and the Forest Service specifies to modify the existing

campgrounds over time to expand facilities, accommodate anticipated increases in campground use, and meet future demand. In other instances, NID is proposing modifications to campgrounds or campsites to improve the current condition of the campground facilities and/or to consolidate dispersed camping into designated areas, with improved facilities. Improvements such as these would benefit recreation users at the project by providing safe and usable camping facilities that are designed to accommodate use by individuals, small groups, and in some cases, larger groups or families. Proposed modifications or expansions to existing campgrounds would also ensure that camping demand at the project is met now and into the future, over the new license term.

At some sites, NID is proposing the consolidation of camping into improved campgrounds and campsites, including designating primitive campsites, and dismantling some dispersed, non-designated campsites. For example, at Bowman Lake, NID proposes to designate improved campsites and dismantling other dispersed, non-designated campsites along the reservoir shoreline. At all such sites, upgrading primitive campsites and eliminating others would consolidate camping and reduce human effects around the undeveloped portions of the reservoir, thereby helping to preserve the quality of the more remote recreation experience provided at these lakes. Installation of signage would help confine use to designated areas, would reduce the potential for camping in informal, unimproved campsites, and would reduce human use effects on the reservoir shoreline by eliminating or reducing the number of informal campsites.

At Aspen group campground, the only modification proposed by NID is the construction of a pedestrian trail (discussed below). The Forest Service recommends the reconstruction of the campground with improved barriers and expanded parking. No recreational use estimates were provided by NID or the Forest Service for this facility, so it is unclear whether campground reconstruction in 10 years is necessary. However, future recreation monitoring at this site would ensure that information would be available to determine if additional improvements are needed at this site in 10 years.

Use levels at Findley campground are low to moderate with a 2009 average seasonal occupancy of 20 percent and a projected seasonal rate of 31 percent in 2050. NID proposes to replace the existing flush restrooms with vault restrooms, but does not propose to expand the campground or campsites. The Forest Service specifies reconstruction of the campground within 10 years. Given the relative modest use levels at this site, it is not clear that reconstruction of this campground can be justified, at this time. However, NID's proposal to monitor recreation use would ensure that the information would be available to assess whether campground reconstruction would be needed in 10 years.

At Silvertip group campground, the Forest Service recommends a number of improvements not proposed by NID, including regrading campsite areas, and reconstructing the campground in 20 years. Recreational facilities at this site are in fair condition, and use at this campground is moderate, with a seasonal average occupancy of 41 percent in 2009 and a projected seasonal occupancy of 63 percent in 2050. Upgrades to the campsite areas recommended by the Forest Service would benefit recreation users by improving existing conditions at this campground, though it is not clear that upgrades of the campsites is needed in the near term. Over the longer term, recreation monitoring proposed by NID would ensure that the information is available to assess the need for reconstructing the campground, as specified by the Forest Service, in 20 years.

At Jackson Meadows reservoir, the Forest Service specifies the development of Jackson Meadows Development Plan that would include the construction of a group campground within 4 years, construction of the remaining group campground within 20 years, and the addition of at least 20 additional family campsites within 8 years. At Jackson Meadows reservoir, use of the existing family campgrounds is moderate, with a seasonal occupancy for the combined family campgrounds of 30 percent in 2009 and a projected combined seasonal occupancy of 46 percent in 2050. East Meadows and

Woodcamp campgrounds receive the highest use (seasonal occupancy of 33 percent in 2009 at each campground), which is projected to increase by approximately 50 percent or more at both sites by 2050. Use at Silvertip, the group campground, is moderate with a seasonal occupancy of 41 percent in 2009 and a projected seasonal occupancy of 63 percent in 2050. July had the highest monthly occupancy of all the months, ranging from 38 percent occupancy (Findley campground) to 80 percent occupancy (Silvertip group campground). Recreational use data were only available for the Silvertip group campground. Construction of an additional group campground and additional family campsites would provide recreation users with additional opportunities for camping at Jackson Meadows reservoir to help meet future needs.

Forest Service specifies several measures at Jackson Creek campground, a non-project Development Scale 3campground facility, including the redesign and reconstruction of the campground within 10 years. Use of this campground is low, with less than 1 campsite (0.4 campsite) observed, on average, during the relicensing study and a maximum of 3 campsites observed. Use is highest on holidays (0.7 campsite observed on average/ 2 campsites maximum observed) and weekend days (0.6 campsite observed on average /2 campsites maximum observed), as compared to weekdays (0.1 campsite observed on average/1 campsite maximum observed). Since this campground is located on NFS land outside the project boundary near Jackson Creek and does not provide direct access to the project lands or waters, it does not have a clear nexus to the project. Upgrades to this campground would serve to meet recreational needs in the general area of the project but would not specifically address recreational use at the project.

At Bowman Lake, in addition to proposals made by NID for designating primitive campsites, and dismantling all dispersed, non-designated campsites, the Forest Service specifies expanding the campground by 20 sites within 5 years and (if Forest Service recommendation 14, at Bowman Lake, to either develop a group campground or a family campground adjacent to Bowman Lake campground is not included in license, Forest Service specifies NID construct a drive-in 25-PAOTcampground on NFS lands at Bowman Lake. Although use data were not provided for this site, there is no evidence that expansion of the campground or new campgrounds are needed in the near term. Upgrading 10 primitive campsites and eliminating others would consolidate camping use in areas most suited for camping. Installation of signage would help confine use to designated areas and reduce effects on the reservoir shoreline. Consolidation of camping/campsites into designated campground areas would benefit project resources by reducing the shoreline impacts associated with dispersed camping at undesignated and unimproved sites. NID's proposal to monitor recreation use over the term of the license would ensure that there is information available to decide whether there is a need for additional campsites and campgrounds at Bowman Lake.

Currently there are no developed recreational facilities at Sawmill Lake other than an informal day-use area and boat ramp and some dispersed campsites. NID proposes the development of two new campgrounds at Sawmill Lake: the Sawmill Lake family campground and the Sawmill Lake group campground. NID proposes the development of a 10-unit family campground with parking, a restroom, and a hand-carry boat launch. NID also proposes the development of a rustic group campground (25 PAOT) with parking areas and barriers, a restroom, and a hand-carry boat launch. The Forest Service recommendation and specification condition for these two areas is similar, but the Forest Service recommends construction of a 15- to 20-unit family campground and specifies, if this recommendation is not included in the new license, the construction of a 10-unit family campground. All of the upgrades proposed by NID and specified or recommended by the Forest Service would provide additional, developed camping in this area of the project that did not exist previously. Because NID proposes to build both a 10-unit family campground and a group campground, the Forest Service's condition to provide a 15- to 20-unit family campground does not appear necessary in the near term. NID also proposes to designate appropriate camping areas and install signage indicating the designated areas and

the Forest Service specifies dismantling all dispersed campsites not converted into developed, designated campsites. Dismantling dispersed campsites would have the advantage of further consolidating use in designated areas that would help minimize effects of human activity on project resources.

Currently, there are no dispersed sites along Canyon Creek within the project boundary. There are six to eight existing dispersed campsites to the east of the Canyon Creek campground outside of the FERC boundary. The Forest Service specifies construction within 5 years of a 10- to 15-unit dispersed campground as Development Scale 2[34]. Although the addition of a 10- to 15-unit dispersed campground would provide more opportunities for camping at this site, the proposed dispersed campsites would be outside the project boundary and they do not provide direct access to the project. Additional dispersed camping in this area would serve to meet recreational needs in the general area of the project but would not specifically address recreational use at the project.

The Forest Service also specifies reconstruction of the existing Canyon Creek campground, located a mile downstream of Faucherie Lake on Canyon Creek, as Development Scale 3 with a new group campsite and accessible campsites; replacement of the restrooms; and upgrades to campground roads and spurs. Use levels at the nearby Faucherie group campground are nearing capacity, and the improvements specified by the Forest Service at the Canyon Creek campground would create a new 25 PAOT group campsite in the area that would provide additional opportunities for group camping in the vicinity of Faucherie Lake.

The Faucherie Lake group campground accommodates 50 (PAOT) at 2 group sites. The Forest Service recommends several improvements at this site, including replacement of toilets and picnic tables and expanded parking with accessible spaces. The Forest Service also recommends rehabilitating the remaining campground facilities within 10 years. Use of the Faucherie group campground is high, with a seasonal average occupancy of 66 percent and a weekend rate of 100 percent. Projected future use rates for 2050 are 101 percent seasonally and 154 percent on weekends. The Forest Service recommendations for improvements and expansions would help accommodate the heavy use at this site.

*Recreation Site Roads, Parking, and Vehicle Barriers*

Roads and parking areas are an important component of many of the project recreation sites. Currently, some of the recreation site circulation roads and parking areas are in need of improvement to address issues associated with location, condition, use, and crowding. To address these issues, NID proposes modifications, improvements, or upgrades to recreation site roads and parking areas at several project recreation sites (see table 3-226 for specific details). Forest Service condition 57 specifies similar road, parking, and vehicle barrier improvements and measures at some of the sites including Pass Creek overflow, Woodcamp boat launch, Woodcamp picnic area, Findley campground (repair damaged roads),

[34] The Forest Service Outdoor Recreation Accessibility Guidelines dated May 22, 2006, include the Forest Service Recreation Site Development Scale Definitions. Development Scale 0 means no site modification. Development Scale 1 means there is almost no site modification (i.e., rustic or rudimentary improvements designed for protection of the site rather than comfort of the users). Development Scale 2 means minimal site modification (i.e., rustic improvements designed primarily for protection of the site rather than the comfort of the users). Development Scale 3 means moderate site modification (i.e., facilities about equal for protection of natural site and comfort of users). Development Scale 4 means heavy site modification (i.e., some facilities designed strictly for comfort and convenience of users). Development Scale 5 means extensive site modification (i.e., facilities mostly designed for comfort and convenience of users and usually include flush toilets).

and Sawmill Lake. At many other sites, Forest Service condition 57 specifies additional measures related to recreation site roads, parking, and vehicle barriers including: East Meadow campground (lengthen/widen spurs and reconstruct circulation road); Pass Creek campground (provide additional parking, lengthen/widen spurs); Pass Creek boat launch (provide additional parking spaces, replace vehicle barriers); Aspen picnic area (reconstruct road); Fir Top campground (reconstruct road and lengthen/widen spurs); Findley campground (provide additional parking and reconstruct/widen circulation road); Woodcamp campground (lengthen/widen spurs, reconstruct road, and additional parking); Woodcamp complex trail system (improve parking); Jackson Meadows vista (gravel parking area); French Lake (grade and gravel existing informal parking area located outside the locked gate); Canyon Creek campground (provide road surface treatment on all interior campground roads and spurs); and Canyon Creek dispersed sites (use existing spurs off main road as campsite spurs and create new spurs for new sites) (see table 3-226 for specific details). Additionally, Forest Service recommendation 14 recommends additional measures beyond those proposed by NID at: Aspen group campground (expand parking and widen road); Silvertip group campground (reconstruct campground roads and a parking area); Faucherie Lake day-use area and boat ramp (designate load/unloading parking spaces); Faucherie Lake dam parking area (rehabilitate parking area and circulation road); and Faucherie group campground (expand parking) (see table 3-226). In the NID alternative recreation plan, NID proposes similar campground improvements to those outlined in its proposed Recreation Plan. California Fish and Wildlife's recommendations regarding recreation site roads and parking areas are generally the same as the Forest Service specifications and recommendations, except that California Fish and Wildlife also includes a recommendation for Langs Crossing (provide parking area).

Our Analysis

In general, expanding and widening parking areas, spurs, and access roads, such as that proposed by NID at some of the recreation sites, would help improve the utilization of the parking areas and help meet the anticipated increase in demand. Proposed parking expansion in combination with the widening of the access road may result in some change in the character of the recreation site, but such differences would be small and would not be likely to affect the recreational experience of the user. In addition, repaving parking areas and access roads would help reduce the potential for road-related congestion and would create a safer situation for vehicle traffic. Adding or replacing vehicle barriers and the installation of gates at parking areas and along access roads would keep vehicles out of undesirable locations. Expanding parking areas and turnarounds near boat launches would help reduce or eliminate vehicle congestion at some sites and would meet the anticipated increase in use projected over the term of a new license. Widening of existing roads and spurs and expansion of parking areas would generally improve vehicle access to the project reservoir.

At the East Meadow campground, where NID proposes to expand the existing parking area, the Forest Service additionally specifies road reconstruction, including lengthening and widening of spurs, within 15 years. The expansion of roadways specified by the Forest Service does not appear to be needed at this time based on the low to moderate use levels observed at this site. Moreover, the recreation monitoring and reporting proposed by NID in the Recreation Plan would ensure that information would be available to determine if additional road expansions or improvements are needed at this site in 15 years.

Although NID proposes a number of upgrades to the Pass Creek campground, no specific upgrades to roads, parking, or spurs are proposed. Forest Service condition 57 specifies additional trailer parking and the lengthening and widening of spurs. Pass Creek campground is in good condition and has partially accessible facilities. Use rates are low to moderate, with a 2009 seasonal occupancy of 28 percent and a projected occupancy for 2050 of 43 percent seasonally. Use levels do not appear to

necessitate the increased spur length and width, and such expansion would unnecessarily increase road surfaces throughout the campground.

The Forest Service specifies the addition of 21 parking spaces and 6 RV parking spaces at Pass Creek boat launch within 5 years. Use levels at the Pass Creek boat launch are high during both high and low water periods, with weekend occupancy in 2009 of 83 percent (high water) and 67 percent (low water) and projected weekend rates in 2050 of 138 percent (high water) and 111 percent (low water). Based on these use rates, the Forest Service specification to provide additional parking, including both accessible parking and RV parking, is reasonable and would help to meet the anticipated increase in use over the term of the license.

The Forest Service recommends the improvement of vehicle barriers to prevent off-road use, marking of accessible parking, and expansion of parking areas at Aspen group campground within 10 years. Installing vehicle barriers would benefit project resources by preventing OHV use in undesignated areas, which can affect vegetation, habitats, and potentially cultural resources. Providing accessible parking would also improve accessibility at this site. No recreational use estimates were provided by NID or the Forest Service for this facility, so it is unclear whether the Forest Service condition for campground reconstruction in 10 years is necessary. However, future recreation monitoring at this site would ensure that information would be available to determine if additional improvements are needed at this site in 10 years.

At Aspen picnic area, the Forest Service specifies reconstruction of the road within 8 years. The picnic area tends to be under-utilized. The weekend occupancy levels at the two picnic area parking areas were at or below 7 percent in 2009; and projected to reach no more than 10 percent by 2050. In 2009, 94 percent of recreation users at this site rated the roads as acceptable. Reconstruction of the road specified by the Forest Service does not appear to be needed at this time based on the low to moderate use levels observed at this site. Moreover, the recreation monitoring and reporting proposed by NID in the Alternative Recreation Plan would ensure that information would be available to determine if road reconstruction is needed at this site in 8 years.

At Fir Top campground, the Forest Service specifies rehabilitation/reconstruction of the campground road and widening/lengthening spurs. The existing condition of the Fir Top campground is fair, and use is low to moderate with seasonal use at 29 percent in 2009 and projected to increase to 44 percent by 2050. The Forest Service specification for campground road and spur improvements would benefit recreation users by improving road conditions and providing larger spurs for campground users, but the low to moderate use estimates provided for this facility do not appear to warrant road reconstruction. Routine road maintenance within the project recreation facilities, such as that proposed by NID would be sufficient to keep the campground in good, usable condition for in the near term. Future recreation monitoring at this site would ensure that information would be available to determine if additional improvements are needed at this site in 10 years.

NID proposes and the Forest Service specifies repair of damaged roads at Findley campground. The Forest Service specifies additional road and parking measures at Findley campground, including replacement of retaining walls, additional trailer and vehicle parking, and reconstruction of the circulation road at Findley campground. The existing condition of the Findley campground is generally good, although the circulation road and spur surfaces have areas of cracked, sunken, and eroding asphalt. Repairing the circulation road within 3 years, as specified by the Forest Service and proposed by NID, would address these existing problems. Use levels at Findley campground are low to moderate. Given these use levels, once repairs are made to the existing road, reconstruction of the circulation road and spurs in 10 years would likely not be necessary. However, future recreation monitoring at this site would

ensure that information would be available to determine if additional improvements are needed at this site in 10 years.

At Woodcamp campground, the Forest Service specifies the lengthening/widening of spurs, reconstructing the road, and additional parking within 10 years. The existing condition of the Woodcamp campground is generally fair. Use levels at the Woodcamp campground are moderate. In 2009, 81 percent of recreation users at this site rated the campsite spur size as acceptable, 74 percent of users rated the vehicle parking as acceptable, and 90 percent of users rated the condition of the road as acceptable. Given the use levels and acceptability by recreation users, reconstruction of the road and lengthening/widening of spurs in 10 years would likely not be necessary. However, future recreation monitoring at this site would ensure that information would be available to determine if additional improvements are needed at this site in 10 years.

At Silvertip group campground, the Forest Service recommends the reconstruction of the interior campground roads and parking area, including the creation of 10 additional parking spaces, within 5 years. The existing condition of the Silvertip group campground is generally fair. Use levels at the Silvertip group campground are moderate but there are only 15 informal parking spaces available. The Forest Service notes in its rationale for its condition that there is often insufficient parking to accommodate the users of this group campground. Reconstructing the interior campground roads and parking area and creating additional parking spaces would address this issue and would have little effect on project resources.

The Forest Service specifies improving the parking area for the Woodcamp Interpretive Trail within 5 years. Although the Woodcamp Interpretive Trail is located outside the project boundary, the trailhead, including a gravel parking area for four vehicles and a kiosk, is located within the existing project boundary. Use levels of the parking area are low. Maintaining the parking area would ensure that the parking area remains in a safe and useful condition for users.

At Jackson Meadows vista, the Forest Service specifies gravelling the parking area at Jackson Meadows vista within 5 years. The parking area provides eight informal parking spaces and the condition is generally good. The Forest Service condition to gravel the parking area within 5 years would ensure that the parking area continues to be maintained and would help improve user access to this unique site.

At French Lake currently, there are no developed recreational facilities. Access to French Lake is by foot only, and primary recreation activities are hiking, backpacking, camping, and fishing. The Forest Service specifies minor improvements to the existing informal parking area located outside the locked gate located about 2 miles from the lake, including the installation of rock barriers to limit OHV access to French Lake. Grading and graveling the existing parking area would benefit recreation users by improving access at this site. Installing barriers would limit OHV access and provide further protection to French Lake resources.

The Forest Service specifies reconstruction of the Canyon Creek campground as Development Scale 3 which would include upgrades to campground roads and spurs. NID's proposed approach to this site is to rehabilitate the existing campground, although it does not specify what improvements would be made to roads and spurs. As noted previously, however, use levels at the nearby Faucherie group campground are nearing capacity, and because of that, use is expected to increase at Canyon Creek campground. Improvements to the campground roads and spurs would improve existing facilities at Canyon Creek campground and accommodate higher recreation use.

At the Faucherie Lake day-use and boat ramp, the parking area consists of an undeveloped, informal gravel parking area for about 25 vehicles and a boat launch. NID's proposal to install barriers at the boat launch site would help limit the facility to car-top, carry-in boat launching, which would

minimize shoreline disturbance and help maintain the natural character of the lake. NID's proposal to install a gate at the dam access road would prevent vehicles from accessing the dam and associated structures, and would also prevent OHVs from crossing the dam, making their way across Canyon Creek below the spillway, and traveling into NFS land designated as non-motorized. At Faucherie Lake, the Forest Service also specifies the rehabilitation of the associated parking area and circulation road within 10 years and additional parking within 5 years. As no recreational use estimates were provided by NID or the Forest Service for this site, it is unclear whether the Forest Service specification for rehabilitation of the road and parking area in 10 years is necessary. However, future recreation monitoring at this site would ensure that information would be available to determine if additional improvements are needed at this site in 10 years.

*Campground Host Sites*

Forest Service condition 57 specifies the upgrade of campground host sites with a minimum of septic and water to improve public service and to attract high quality hosts. At Jackson Meadows family campgrounds, the Forest Service specifies a host site at each new family campground. At East Meadow campground, Pass Creek campground, and Woodcamp campground, the Forest Service specifies and NID proposes upgrades to campground host campsites to include septic or holding tank (or leach system) and a hydrant for water hook-up at the site. The Forest Service also specifies the construction of a campground host campsite at Jackson Creek campground that includes water, septic system or holding tank, and preferably power (e.g., solar panels or quiet generator).

Our Analysis

Campground hosts serve a role in helping to manage and patrol the campgrounds. Updating and providing host sites at campgrounds would improve public safety and campground management. However, the Commission cannot ensure that a host is present at every campground, or that public safety would be improved. The responsibility for recreation facility monitoring is that of the licensee. Designating and upgrading one campsite at a campground with special amenities may be useful for attracting hosts, but the Commission has no way of ensuring that the presence of a host would accomplish a project purpose or improve a project effect.

*Trails and Access Measures*

There are numerous trails located within the project area. Some of these trails lie fully within the project boundary and connect two project-related facilities. Other trails may lie outside or partially outside the project boundary and connect a project facility to a non-project facility or connect two or more non-project facilities. In addition, there are several trailheads located within the project boundary. Often these trailheads are associated with project recreation facilities such as parking areas, campgrounds, or day-use areas. In some cases, these trailheads are for trails that quickly leave the project and connect to other non-project trails or facilities. As shown in table 3-227, NID proposes to develop or make improvements to several trails. Forest Service condition 57 and Forest Service 10(a) recommendation 14 contain provisions for several trails or trail-related measures, which are also noted in the table, some of which are similar to those proposed by NID. California Fish and Wildlife has also made recommendations for trails, but in all instances the California Fish and Wildlife's recommendations for trails are identical to the Forest Service condition. Additional trail recommendations specified by the Forest Service in condition 57 and recommended by the Forest Service in recommendation 14 and California Fish and Wildlife in recommendation 16 include: constructing/maintaining pedestrian, native surface trails between Woodcamp Interpretive Trail and Woodcamp, Findley, and Fir Top campgrounds, including the interpretive nature trail through the adjacent Woodcamp campground and the Fir Top campground loop;, and widening the existing trail that connects the parking area to Silvertip group campground.

Table 3-227. Trails proposed by NID or included in Forest Service condition 57 or recommendation 14, California Fish and Wildlife recommendation 16, or BLM condition 1. (Source: staff)[a]

| Trail/Trailhead Location | NID Alternative Recreation Plan Proposal | Forest Service Condition 57 or 10(a) recommendation 14, California Fish and Wildlife Recommendation 16 or BLM Condition 1 Trail Provisions | Trail Description | Inside the Project Boundary |
|---|---|---|---|---|
| East Meadow campground | Construct/maintain a pedestrian trail. | Same provision | Non-motorized trail (~0.1 mile) from the East Meadow campground to the river | Fully within the project boundary |
| Pass Creek boat launch | Construct/maintain an accessible trail. | Same provision | Provides accessible access from the parking area to the boat launch | Fully within the project boundary |
| Aspen picnic area | Construct a non-motorized trail. | Same provision | Connects the group campground to the parking area at Aspen picnic area | Fully within the project boundary |
| Fir Top campground | No trail proposal | Construct/maintain pedestrian native surface trails between Woodcamp Interpretive Trail and Woodcamp, Findley, and Firtop campgrounds within 10 years. | Includes a half-mile interpretive nature trail through the adjacent Woodcamp campground and the Fir Top campground loop. | Fully within the project boundary |

Table 3-227. Trails proposed by NID or included in Forest Service condition 57 or recommendation 14, California Fish and Wildlife recommendation 16, or BLM condition 1. (Source: staff)[a]

| Trail/Trailhead Location | NID Alternative Recreation Plan Proposal | Forest Service Condition 57 or 10(a) recommendation 14, California Fish and Wildlife Recommendation 16 or BLM Condition 1 Trail Provisions | Trail Description | Inside the Project Boundary |
|---|---|---|---|---|
| Silvertip group campground | No trail proposal | Connect the non-motorized pedestrian trail from Woodcamp, Findley, and Firtop to Silvertip (Forest Service 10(a) recommendation 14). | Connects trail from Woodcamp, Findley, and Firtop to Silvertip group campground | Fully within the project boundary |
| Woodcamp Complex Trail System | Construct connector pedestrian trails; install trail and trailhead signage. | Same provision | Trail one connects the project recreation facilities within the Woodcamp Complex (Fir Top, Findley, Woodcamp, and Silvertip group campgrounds; and Woodcamp picnic area) | Fully within the project boundary |

Table 3-227. Trails proposed by NID or included in Forest Service condition 57 or recommendation 14, California Fish and Wildlife recommendation 16, or BLM condition 1. (Source: staff)[a]

| Trail/Trailhead Location | NID Alternative Recreation Plan Proposal | Forest Service Condition 57 or 10(a) recommendation 14, California Fish and Wildlife Recommendation 16 or BLM Condition 1 Trail Provisions | Trail Description | Inside the Project Boundary |
|---|---|---|---|---|
| | | | Trail two would be a pedestrian connector trail within the existing project boundary from the aforementioned Woodcamp Complex Trail System to the trailhead of the non-project Woodcamp Interpretive Trail. | Fully inside the project boundary |
| Jackson Meadows Area – Additional Trail Construction | No trail proposal | Install and maintain trailhead and directional signage on all trails in the Jackson Meadows area within 5 years.<br>Construct and maintain a non-motorized trail from Vista Point and Aspen group campground to a lake overlook within 5 years. (Forest Service and California Fish and Wildlife) | Trail one connects Vista Point and Aspen group campground to a lake overlook. | Location of trail could not be determined[a] |

Table 3-227. Trails proposed by NID or included in Forest Service condition 57 or recommendation 14, California Fish and Wildlife recommendation 16, or BLM condition 1. (Source: staff)[a]

| Trail/Trailhead Location | NID Alternative Recreation Plan Proposal | Forest Service Condition 57 or 10(a) recommendation 14, California Fish and Wildlife Recommendation 16 or BLM Condition 1 Trail Provisions | Trail Description | Inside the Project Boundary |
|---|---|---|---|---|
| | | Construct and maintain a new, non-motorized trail from the Woodcamp Complex to English dam. If not feasible to connect with the Woodcamp Interpretive Trail, provide trailhead facilities within 15 years. (California Fish and Wildlife) | Trail two connects the Woodcamp Complex to English dam. | Partially within the project boundary |
| Bowman Recreation Corridor Trail Development | No trail proposal | • Within 2 years construct/maintain one of the following: (1) pedestrian bridge over Canyon Creek or a walkway across Sawmill spillway at/near Sawmill Lake; or (2) a primitive trail from Faucherie to Sawmill Lakes (Forest Service 10(a) recommendation 14 and California Fish and Wildlife) | Trail would connect Sawmill Lake to Faucherie Lake to provide access to non-project Grouse Ridge Trail | Location of trail one, option a (Canyon Creek) could not be determined[b]<br><br>Location of trail one, option b (Sawmill spillway) is fully within the project boundary<br><br>Location of trail 2 is partially within the project boundary |

Table 3-227. Trails proposed by NID or included in Forest Service condition 57 or recommendation 14, California Fish and Wildlife recommendation 16, or BLM condition 1. (Source: staff)[a]

| Trail/Trailhead Location | NID Alternative Recreation Plan Proposal | Forest Service Condition 57 or 10(a) recommendation 14, California Fish and Wildlife Recommendation 16 or BLM Condition 1 Trail Provisions | Trail Description | Inside the Project Boundary |
|---|---|---|---|---|
| | | If neither of above recommendations are included in the new license, Forest Service specifies trail from the group campground at Sawmill Lake to the Grouse Ridge Trail on the south side of Sawmill Lake. (California Fish and Wildlife also recommends this trail) | Trail would connect Sawmill Lake to non-project Grouse Ridge Trail | Location of trail could not be determined |
| French Lake | No trail proposal | ● Construct and maintain one of the following French Lake trail options:<br>o primitive trail from Faucherie Lake to French Lake; or<br>o primitive trail from Forest Service 843-37 Road to French Lake. | Trail would connect Faucherie Lake to French Lake | Partially within project boundary |

Table 3-227. Trails proposed by NID or included in Forest Service condition 57 or recommendation 14, California Fish and Wildlife recommendation 16, or BLM condition 1. (Source: staff)[a]

| Trail/Trailhead Location | NID Alternative Recreation Plan Proposal | Forest Service Condition 57 or 10(a) recommendation 14, California Fish and Wildlife Recommendation 16 or BLM Condition 1 Trail Provisions | Trail Description | Inside the Project Boundary |
|---|---|---|---|---|
| Bear River Trail | None | Cooperate with trail planners for trail along Bear River; provide perpetual public access of trail and roads across NID lands; support trailhead development, sanitation and signage. | Trail would be a non-project facility along the Bear River partially outside the project boundary. | Partially within the project boundary |

[a] Staff made effort to determine if the trail is located within or outside the project boundary based on NID's Recreation Plan, Forest Service 4(e) conditions and 10(a) recommendations (condition 57 and recommendation 14), and California Fish and Wildlife Response to Notice of Ready for Environmental Analysis, Federal Power Act Section 10(j) and 10(a) Recommendations, Yuba-Bear Hydroelectric Project.

[b] The location is either partially or fully within project boundary but could not be determined

Forest Service 10(a) recommendation 14, California Fish and Wildlife recommendation 16, BLM recommendation 1 and Foothills Water Network all recommend that NID assist with the development of a formal trail along Bear River (Bear River Trail). The Bear River Trail is a 33-mile riverine recreation trail proposed along the Bear River in Placer and Nevada Counties starting at the headwaters of the Bear River in Bear Valley and ending at NID's Combie reservoir. According to BLM, about 15.5 miles of the trail would be on PG&E property, 6 miles on NID property, 4.9 miles on NFS lands, 4.4 miles on BLM lands, 2.7 miles on Placer County lands (Bear River campground), and 3 miles on private lands. The Foothills Water Network provided detailed maps, photographs, and information outlining the proposed segments for the trail in support of the proposed trail.

Our Analysis

The Commission considers trails that connect one or more project recreation facilities to be necessary for project purposes. Some existing project trails connect project recreation facilities to other non-project trails or non-project recreation facilities. To the extent that such trails or trailheads already

exist within the project boundary, they are considered a project facility. However, new trails or trail facilities that do not connect two project recreation facilities are not considered necessary for project purposes. NID's trail proposals appear to be consistent with trails that the Commission would consider necessary for project purposes. However, at some sites, it is not clear whether a proposed trail or trailhead facility is either wholly within the project boundary or is intended to connect two project recreation facilities.

NID's proposals to develop or improve trails or trailheads would benefit recreation users. New trails that are intended to connect two or more project recreation facilities would enhance recreational use at the project by connecting two or more project facilities and consolidating foot traffic to a designated trail. In addition, repair/replacement of portions of existing project trails would help to ensure that the trail or trail facility remains safe and usable for the term of the new license. Additional trails proposed would also help to meet increased recreational demand at the project over the new license term.

The additional trail recommendations specified by the Forest Service, including constructing/maintaining pedestrian, native surface trails within Fir Top campground, the interpretive nature trail through the adjacent Woodcamp campground and the Fir Top campground loop, and connection to the trail from Woodcamp, Findley, and Firtop to Silvertip group campground, are all improvements that serve a project purpose and would benefit recreation users and project resources by consolidating foot traffic to the improved, designated trails.

The Forest Service also specifies a number of trail developments within the Jackson Meadows recreation area and within the Bowman Recreation Corridor. One trail would connect the Vista Point and group campground to a lake overlook. There are numerous trails throughout both these areas, some of which lead to or connect project facilities. However, many of the trails in these areas lie outside the project boundary and do not directly connect two or more project recreation facilities. To the extent that these existing trail systems provide direct access to project facilities, it is appropriate for NID to maintain the portion of the trail that leads directly to the project facilities, and to provide appropriate signage within the project boundary. However, any new trails or trail modifications specified by the Forest Service or recommended by California Fish and Wildlife that do not directly connect two project recreation facilities or are intended to provide access to non-project trails, such as the Grouse Ridge Trail, would be considered unnecessary for project purposes.

The Bear River Trail is a riverine recreation trail proposed along the Bear River in Placer and Nevada Counties starting at the headwaters of the Bear River in Bear Valley and ending at NID's Combie reservoir. Based on the information provided, it appears that there is already an existing informal trail along the Bear River that is used to access the river and for hiking. According to information provided by BLM and Foothills Water Network, a portion of the trail would be on NID property but NID has commented that only 6.4 miles (18 percent) of the proposed trail is within the Yuba-Bear Project boundary. From the information and detailed maps provided by the Foothills Water Network, the proposed location of the proposed trail would cross the project boundary and various canals and diversions. The intended purpose of the proposed trail is to provide a river trail that coincides or intersects in several locations with the project boundary, not to provide trail access to or between project recreation facilities. A portion of the trail is proposed along Rollins reservoir shoreline, located inside the project boundary, and would serve a project purpose and provide additional benefit to recreation users at the project. Although development of the entire Bear River trail would provide benefit to recreation users within the region, based on the information provided, there does not appear to be a clear nexus between most of the proposed segments of this trail and the project. Although the Foothills Water Network and others have provided information regarding impacts of the project on the existing informal trail in this area, those impacts are not affecting recreation at the project or a designated formal trail. Further, the trail may provide access to certain areas of the project that are closed to the public due to concerns over public

safety. It would not be appropriate to require NID to formalize the entire trail or to carry out most of the measures related to this trail, except for the portion proposed along the shoreline of Rollins reservoir that would benefit recreation users at the project.

*Boat Launches and Boat Ramps*

Boating is a popular recreational activity at the project reservoirs. NID provides boat launching facilities on several of the reservoirs, including boat ramps for vehicle launching at Pass Creek boat launch (Jackson Meadows reservoir), Woodcamp boat launch (Jackson Meadows reservoir), Orchard Springs recreation complex (Rollins reservoir), Bowman Lake campground, Faucherie day-use and boat launch, Greenhorn recreation complex (Rollins reservoir), Peninsula recreation complex (Rollins reservoir), and Long Ravine recreation complex (Rollins reservoir). In addition to the boat launches provided at the project, hand launching of non-motorized boats (canoes and kayaks) may also occur elsewhere at the project reservoirs. Currently, some boat launch facilities are in need of improvement to address issues associated with worn or deteriorating facilities, vehicle launching at sites intended for hand launching, as well as use-levels and crowding. Extensions to boat ramps to make the ramps usable under a greater range of reservoir water levels is also an issue that we discuss in the next section.

To address these issues, NID's Alternative Recreation Plan proposes certain modifications, improvements, or upgrades to existing boat launch and boat ramp facilities at Pass Creek boat launch, Woodcamp boat launch, Milton diversion impoundment, Bowman Lake, and Faucherie Lake (see table 3-226 for details). Forest Service condition 57 specifies similar boat launch improvements at the Milton diversion impoundment, Bowman Lake, and Faucherie Lake (see table 3-226 for details). Forest Service condition 57 specifies additional measures related to boat launch and boat ramp improvements, including Pass Creek boat launch (provide asphalt treatment on high water launch within 1 year,), and Woodcamp boat launch (upgrade to a 2-lane ramp with accessible courtesy dock and sidewalk within 5 years). Without exception, California Fish and Wildlife's recommendations regarding boat launches and boat ramps are the same as the Forest Service specifications.

Our Analysis

At the Pass Creek boat launch, NID proposes to provide low-water boat launching (discussed below under boat ramp extensions) and reconstruction of the boat ramp within 15 years. Forest Service condition 57 specifies an additional measure related to the boat launch including providing asphalt treatment on the high water launch and additional parking. Use levels at the Pass Creek boat launch are high during both high and low water periods, with weekend occupancy in 2009 of 83 percent (high water) and 67 percent (low water) and projected weekend rates in 2050 of 138 percent (high water) and 111 percent (low water). Based on these use rates, the Forest Service specification to provide additional parking, including both accessible parking and RV parking, is needed and would help to meet the anticipated increase in use over the term of the license. As noted previously, parking expansion would result in additional clearing of vegetation, but with sound construction and sediment and erosion control practices, construction effects on project resources would be minimal. The existing two-lane, concrete ramp itself is in good condition, and future monitoring of use and condition, as proposed in NID's Alternative Recreation Plan, would determine the potential need for reconstruction in 15 years. We discuss recommended provisions for low-water boat launching later in this section.

NID proposes several upgrades to the Woodcamp boat launch, including replacing the existing launch ramp. The Forest Service specifies replacement of the existing boat ramp with a two-lane ramp and adding an accessible courtesy dock and sidewalk. The existing condition of the Woodcamp boat ramp is fair. The concrete boat ramp is eroding at the edges and is very narrow. NID's proposal to reconstruct the ramp and restroom would address these issues. Use at the Woodcamp boat launch is low, with a seasonal average occupancy of 10 percent and a weekend rate of 8 percent. Projected future use

rates for 2050 are 16 percent seasonally and 13 percent on weekends. However, use rates at the Pass Creek boat launch are very high, and improvements to the Woodcamp boat launch, as specified by the Forest Service would help to meet anticipated increased demand for boat launch facilities at Jackson Meadows reservoir overall.

*Boat Ramp Extensions*

NID's Alternative Recreation Plan includes a provision to provide low-water boat launching access below the constructed Pass Creek ramp until September 30 in critically dry water year types through basic improvements such as clearing, grading, and installing gravel. Prior to implementing any of these basic improvements, the Forest Service and NID would mutually evaluate the condition below the constructed end of the boat ramp and determine if providing access is safe and reasonable.

Forest Service condition 57 specifies and California Fish and Wildlife recommendation 16 recommends NID provide additional boating access to Jackson Meadows reservoir. Specifically, the Forest Service specifies and California Fish and Wildlife recommends that NID provide low-water boat launching access at the Pass Creek boat ramp similar to NID's proposal by grading and installing gravel below the existing constructed ramp to allow for launching until September 30 in critically dry water years. Additionally, the Forest Service specifies and California Fish and Wildlife recommends that NID provide for launching at the Woodcamp boat ramp, to the degree topographically feasible, until September 30 in dry water years.

Our Analysis

NID reports that the Pass Creek boat ramp at Jackson Meadows reservoir is currently functional when the reservoir is at or above elevation 5,996.5 feet msl. Table 3-228 provides the median water surface elevations for the project reservoirs with concrete boat ramps for different water year types based on tables provided by NID in its August 2012 supplemental filing to the amended license application. Under NID's proposed streamflows, the Pass Creek boat ramp would, on average, be unusable for the majority of the recreation season (July 1 through September 30) in critically dry and extreme critically dry water year types, consistent with the no-action alternative. However, in dry water year types, the boat ramp would, on average, be functional for about 15 days less than it currently is in September. NID and PG&E report that critically dry/extreme critically dry water year types only occurred in 4 years (12 percent) out of the 33-year period of record (1976-2008) and dry water year types occurred in 8 years (24 percent) out of the 33-year period of record. Improvements to make the boat ramp functional until September 30 in critically dry years would greatly enhance boating opportunities on Jackson Meadows reservoir. NID's proposal to evaluate the condition below the constructed end of the boat ramp to determine the safety of providing low-water access prior to implementing the proposed and specified improvements is reasonable. If the Forest Service and NID determine that implementing the proposed improvements creates a safety issue for low-water boat launching, extending the boat ramp by approximately 5 vertical feet would help maintain the current number of days the boat ramp is functional and would make the ramp functional in dry water years through September 15. Jackson Meadows reservoir receives high recreational use and ensuring that at least one boat ramp at the reservoir is usable for the entire recreation season would allow users to boat on the reservoir for an extended period of time. Although the majority of Jackson Meadows visitors responding to a survey conducted during the relicensing study indicated that they had no opinion or that water surface elevation was not an issue for launching boats, about 7 percent of the respondents indicated it was a small issue.

NID reports that Woodcamp boat ramp at Jackson Meadows reservoir is currently functional when the reservoir is at or above elevation 6,016 feet msl. Under NID's proposed streamflows, Woodcamp boat ramp would, on average, be unusable from July 1 through September 30 in critically dry and extreme critically dry water year types, which is consistent with the no-action alternative. NID's

proposed streamflows would, on average, reduce the number of days in dry water year types that the Woodcamp boat ramp is functional by about 15 days (the ramp would be unusable for the period July 15 through September 30). In all other water year types, the Woodcamp boat ramp would be functional until September 15 and, in wet water year types, until September 30. Critically dry and extreme critically dry water year types occurred infrequently during the period of record; however, dry water year types occurred in almost one-quarter of the years during the period of record ramp. Reducing the number of days the boat ramp is functional during the peak recreation season would negatively affect recreational boating opportunities.

Although NID does not propose any provisions to extend any of the four boat ramps at Rollins reservoir, NID reports that the Orchard Springs, Greenhorn, Peninsula, and Long Ravine boat ramps at Rollins reservoir are currently functional when the reservoir is at or above elevation 2,133, 2,133, 2,146, and 2,137 feet msl, respectively. Under NID's proposed streamflows, none of the four boat ramps at Rollins reservoir would, on average, be functional from August 15 through September 30 in critically dry and extreme critically dry water year types. NID's proposed streamflows would reduce the number of days that all four boat ramps are functional by about 15 days in critically dry and extreme critically dry water year types (the ramps would all be unusable from August 15 through September 30). In all other water year types, all four boat ramps would, on average, be functional for the entire peak recreation season (until September 30). Although critically dry and extreme critically dry water year types occurred infrequently during the period of record, reducing the number of functional days for all the boat ramps during the peak recreation season would negatively affect recreational boating opportunities. This project reservoir receives the highest total recreational use. The majority of Rollins visitors responding to a survey conducted during the relicensing study indicated that they had no opinion or that water surface elevation was not an issue for launching a boat; however, some respondents indicated that it was a small problem at Orchard Springs (7.4 percent), Greenhorn (6.5 percent), Long Ravine (5.9 percent), and Peninsula (2.6 percent).

Table 3-228. Median water surface elevations for Jackson Meadows and Rollins reservoirs. (Source: NID, 2011a, as modified by staff)

| | No-Action Alternative (Elevation in feet msl) | | | | | | | NID's Amended Minimum Flow Releases (Elevation in feet msl) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Water Year Types** | **Jul 1** | **Jul 15** | **Aug 1** | **Aug 15** | **Sep 1** | **Sep 15** | **Sep 30** | **Jul 1** | **Jul 15** | **Aug 1** | **Aug 15** | **Sep 1** | **Sep 15** | **Sep 30** |
| **Jackson Meadows Reservoir** | | | | | | | | | | | | | | |
| Wet | 6,035.1 | 6,034.9 | 6,031.6 | 6,027.3 | 6,021.8 | 6,017.2 | 6,012.1 | 6,034.1 | 6,033.9 | 6,030.8 | 6,026.5 | 6,021.0 | 6,016.4 | 6,011.7 |
| Above Normal | 6,033.0 | 6,032.9 | 6,029.1 | 6,024.6 | 6,019.1 | 6,014.4 | 6,009.2 | 6,034.4 | 6,032.7 | 6,029.1 | 6,024.8 | 6,019.2 | 6,014.5 | 6,009.3 |
| Below Normal | 6,033.3 | 6,030.8 | 6,027.0 | 6,022.4 | 6,016.7 | 6,011.8 | 6,006.4 | 6,033.2 | 6,030.8 | 6,027.0 | 6,022.4 | 6,016.7 | 6,011.8 | 6,006.4 |
| Dry | 6,020.1 | 6,017.7 | 6,013.5 | 6,008.6 | 6,002.4 | 5,997.1 | *5,992.3* | 6,016.0 | 6,012.9 | 6,008.7 | 6,003.6 | 5,997.2 | *5,991.5* | *5,986.5* |
| Extreme Critically Dry & Critically Dry | *5,992.7* | *5,988.6* | *5,982.7* | *5,975.1* | *5,965.6* | *5,961.4* | *5,956.6* | *5,984.2* | *5,979.7* | *5,973.1* | *5,965.6* | *5,960.2* | *5,955.0* | *5,948.6* |
| **Rollins Reservoir** | | | | | | | | | | | | | | |
| Wet | 2,171.2 | 2.170.1 | 2,170.6 | 2,166.9 | 2,164.7 | 2,160.4 | 2,141.3 | 2,171.1 | 2,171.1 | 2,168.7 | 2,166.9 | 2,164.7 | 2,160.4 | 2,141.2 |
| Above Normal | 2,170.9 | 2,170.0 | 2,171.0 | 2,166.9 | 2,164.7 | 2,160.4 | 2,141.1 | 2,170.9 | 2,170.1 | 2,170.6 | 2,166.9 | 2,164.7 | 2,160.4 | 2,141.1 |
| Below Normal | 2,170.9 | 2,170.0 | 2,168.7 | 2,166.9 | 2,164.7 | 2,160.4 | 2,141.1 | 2,170.9 | 2,170.0 | 2,168.7 | 2,166.9 | 2,164.7 | 2,160.4 | 2,141.1 |
| Dry | 2,170.9 | 2,170.0 | 2,168.7 | 2,166.9 | 2,164.7 | 2,160.4 | 2,141.0 | 2,170.8 | 2,169.3 | 2,167.1 | 2,166.2 | 2,164.7 | 2,160.4 | 2,141.1 |
| Extreme Critically Dry & Critically Dry | 2,158.9 | 2,150.6 | 2,142.5 | 2,137.1 | *2,131.3* | *2,123.7* | *2,091.9* | 2,160.7 | 2,153.2 | 2,141.9 | *2,132.9* | *2,116.6* | *2,097.0* | *2,054.4* |

Notes: Shaded cells indicate periods when the reservoir elevation would be below the bottom usable portion (3 vertical feet above the end of the paved ramp) of one of the existing ramps.

Shaded cells with italicized font indicate periods when the reservoir elevation would be below the bottom usable portion (3 vertical feet above the end of the paved ramp) of all the existing ramps at the reservoir.

*Langs Crossing*

The Forest Service specifies and California Fish and Wildlife recommends that NID work cooperatively with the Forest Service and the licensee for Yuba-Bear Hydroelectric Project[35] to equitably share responsibility amongst the three entities for providing facilities, including a vault toilet, parking area, picnic site, and trash containers, on NFS lands adjacent to Bowman Road at Langs Crossing within 5 years. The Forest Service states in its rationale provided with its preliminary conditions that Langs Crossing is a heavily used dispersed recreation area with no sanitation or other facilities, located on the South Fork of the Yuba River 1 mile below Spaulding dam near the Bowman Road (Forest Service Road 18) crossing of the South Yuba River. The Forest Service did not provide any further rationale related to Langs Crossing with its final conditions. There are popular swimming areas both upstream and downstream of the bridge. According to the Forest Service, there are four land ownerships involved in the recreation use at Langs Crossing: Tahoe National Forest, NID, PG&E, and a private parcel. Camping has been prohibited in this area, but according to the Forest Service, day-use of the area and lack of sanitation facilities has created a human waste issue.

Our Analysis

The Langs Crossing area is located outside the project boundary approximately 1 mile below Spaulding dam near the Bowman Road (Forest Service Road 18) crossing of the South Yuba River. Popular swimming areas are located both upstream and downstream of the bridge that attract visitors. This area does not provide access to project facilities and, therefore, is not necessary for project purposes. Providing facilities at Langs Crossing would provide benefit to recreation users; however, there does not appear to be a nexus between this area and the project. Therefore, it would not be appropriate to require NID to provide or share responsibility for providing facilities related to this area. The Forest Service condition and California Fish and Wildlife recommendation are unclear as to how this shared responsibility for improvements at Langs Crossing would be accomplished.

*Jackson Sanitary Dump Station*

NID's Alternative Recreation Plan propose to implement measures to improve the efficiency of the existing dump facility, located at Jackson Meadows reservoir across from the Pass Creek campground and boat launch. The Forest Service specifies that NID provide a functioning RV dump station with leach field and potable water and notes that the existing dump station meets the need for a dump station, as long as it is properly functioning. According to information provided by NID, the Jackson sanitary dump is lightly used, however, the Forest Service has commented that the use appears light because, prior to 2013, the facility was blocked by a locked gate so it could not easily be accessed by recreation users. NID's Alternative Recreation Plan proposes that if all efforts to improve, modify, or manage the existing dump station fail, NID would construct a dump station with a leach field. California Fish and Wildlife recommends that NID consider alternative uses for the sanitary dump site in the event it is decommissioned.

Our Analysis

According to information provided by NID, the Jackson sanitary dump station has historically received very light use, however, the Forest Service has provided information indicating that prior to

[35] It is assumed that the Forest Service intended to specify that NID would work cooperatively with the Forest Service and the licensee for the Drum-Spaulding Project.

2013, the dump station was behind a locked gate, which resulted in low use numbers. A self-pay station was added in 2013 to allow the facility to remain open 24 hours a day that will likely improve the efficiency and use of the facility. Although the existing dump station does not feature the most up-to-date facilities, measures recently implemented to improve the efficiency of the dump site appear reasonable. Future use monitoring at this site would ensure that information would be available to evaluate the continued need and efficiency for this site during the term of the new license.

*Jackson Meadows Reservoir Administrative Center*

The Jackson Meadows administrative center is a NID-constructed facility located on Forest Service lands. The center, which includes four buildings, is currently maintained by the Forest Service concessionaire and used primarily by Forest Service personnel only. The Forest Service has clarified that it uses the administrative center, except for the vacant barracks, for operating the project recreation sites. The center is not a public use site except for a small general store. NID proposes to remove the center from the project boundary as it is no longer needed or used for project purposes and acknowledges that the Forest Service may require NID to demolish and remove some or all facilities and revegetate the site. The Forest Service specifies that NID provide landlord type maintenance to the existing buildings (except the barracks) and that NID, if NID does not desire to utilize the facility to support operations, demolish and remove some or all facilities and revegetate the site.

Our Analysis

The center is currently maintained by the Forest Service and the facility is used primarily by Forest Service personnel only to operate project recreation sites. The center is not a public recreation site and is not available for public use, except for a small general store run by the Forest Service concessionaire. Given its current use by the Forest Service, FERC has no way of knowing or ensuring that the facility would not be used for other, non-project purposes. This facility does not serve as a recreation facility and does not provide a direct benefit to visitors at the project. The facility does not appear to be necessary for project purposes. We discuss NID's proposal for removing this area from the project boundary in more detail in section 3.3.7, *Land Use And Aesthetic Resources*.

*Chicago Park Forebay*

The Chicago Park forebay is a small reservoir with no developed recreation facilities, a powerhouse, and two access roads with locked gates. BLM condition 33 specifies that NID sign an assistance agreement with BLM within 1 year and develop a rehabilitation plan to block, gate, and rehabilitate roads and trails at this site. By letter dated December 20, 2013, NID confirmed its concurrence with BLM final condition 33, which was not included in NID's proposed Alternative Recreation Plan.

Our Analysis

A rehabilitation plan for the Chicago Park powerhouse would effectively close the area around the Chicago Park powerhouse to recreation. Significant resource damage is occurring from off-road trails and roads, and the recreation use study during relicensing identified public safety concerns due to firearm discharges in this area. The purpose of the closure at the Chicago Park powerhouse is to stop resource damage, occupancy trespass, erosion, and loss of plant and wildlife habitat. This closure would be implemented by BLM working with NID on the blocking, gating, barricading, and rehabilitating unauthorized trail and road access in the area. To stop resource damage, BLM specifies BLM and NID would meet annually to discuss an action plan for the upcoming year that includes rehabilitating, patrolling, and maintaining the area. Although closing the Chicago Park powerhouse area to the public would reduce the undeveloped recreational opportunities at this area, recreational use in this area is

creating public safety concerns and resource damage. Similar opportunities for undeveloped recreational use are provided nearby at Dutch Flat afterbay and Dutch Flat no. 2 forebay.

**Recreation Facility Operation and Maintenance**

NID's proposed Alternative Recreation Plan outlines provisions for O&M of project recreation facilities. NID would be responsible for the annual maintenance of all the project recreational facilities at Jackson Meadows reservoir, Milton diversion impoundment, Bowman Lake, Faucherie Lake, Sawmill Lake, Canyon Creek campground, and Rollins reservoir. NID would solely operate and maintain all the project recreation facilities, but could contract with concessionaires for the administration and O&M of the project's recreation facilities. NID proposes that the maintenance standards at project recreation facilities located on NFS land at Jackson Meadows reservoir, Milton diversion impoundment, Bowman Lake, Faucherie Lake, Sawmill Lake, and Canyon Creek campground would be consistent with the Forest Service cleaning and policing requirements.[36] The proposed Alternative Recreation Plan details the required O&M activities at developed recreation facilities and a schedule for annual maintenance activities.

The Forest Service specifies in condition 57 measures to address O&M of project recreation facilities on NFS lands that are generally consistent with those proposed in NID's Alternative Recreation Plan. The Forest Service also specifies that NID coordinate with the Forest Service to develop a plan to address the management of project-related recreation on NFS lands. The Forest Service also specifies in condition 57 specific provisions for vegetation management at recreation sites that are consistent with those included in NID's proposed March 2013 Integrated Vegetation Management Plan, including provisions for surveying recreation sites to identify hazardous trees and branches, removing vegetation, maintaining vegetation around fire rings, protecting existing vegetation during construction activities, and periodic silvicultural evaluation (see section 3.3.3.2.1 *Vegetation Management, Yuba-Bear Project, Recreation Facilities*).

BLM condition 30 specifies routine maintenance tasks for NID at project recreation facilities on BLM lands that are generally consistent with those proposed by NID and specified by the Forest Service. In addition to those measures, BLM includes several routine maintenance tasks:

- Annually maintain fire ring clearances at designated dispersed sites.
- Within and adjacent to all developed project recreation sites, provide for periodic silvicultural evaluation, stand improvement, view enhancement, and vegetative planting work to identify unseen hazard trees, ensure stand health, provide for screening within and between sites, and enhance views of project lakes and other scenic features.
- Every 2 years, inspect all fire rings and maintain them in good condition or replace. Good condition includes a level grill with a usable grate.

BLM condition 31 specifies that NID manage vegetation at project recreation facilities on BLM land and includes vegetation management provisions that are consistent with those included in Forest Service condition 57 and NID's proposed March 2013 Integrated Vegetation Management Plan.

[36] "Cleaning Recreation Sites," U.S. Department of Agriculture, Forest Service, San Dimas Technology Development Center, August 1995 (SDTC 9523-1206) and the Recreation Sites National Quality Standards, February 5, 2002.

BLM condition 34 specifies that, beginning 90 days after license issuance, NID would enter into a recreation O&M agreement to provide $30,000 annually to BLM for operation, maintenance, law enforcement patrolling, and administration in accordance with the Recreation Plan.

BLM condition 36 specifies that NID would coordinate within 1 year of license issuance with BLM to develop a plan to address the costs of managing project-related recreation on BLM lands.

California Fish and Wildlife includes provisions in its recommendation 16 to address O&M and the costs of managing project-related recreation on NFS and BLM lands that are similar to those included in Forest Service condition 57 and BLM condition 36. California Fish and Wildlife recommends that NID coordinate with the Forest Service and BLM to develop a plan to address the costs of managing project-related recreation on NFS and BLM lands.

By letter dated December 20, 2013, NID confirmed its concurrence with BLM final conditions 30, 31, 34, and 36, discussed above.

Our Analysis

Proper O&M and vegetation management of project recreation facilities helps to ensure that proper upkeep of these facilities and associated public recreational access are provided over the term of the license. NID would be responsible for managing, operating, maintaining, and managing vegetation at all recreation facilities within the project boundary to provide safe and adequate public access to the project. NID would be responsible for existing recreation facilities upon license issuance and new recreation facilities upon construction. Although Forest Service condition 57, BLM conditions 34 and 36, and California Fish and Wildlife recommendation 16 indicate that NID would develop a plan or enter into an agreement to address the management of and costs of managing project-related recreation on NFS and BLM lands, this mechanism would not relieve NID of its responsibility and, therefore, would not be a necessary measure to include in the Recreation Plan. Although addressing the costs of managing project-related recreation would be beneficial to the Forest Service and BLM, NID is ultimately responsible for those facilities within the FERC boundary. Further, the Commission would have no way of determining how the annual payment would specifically be used to operate and maintain recreation facilities at the project.

*Water System Developments*

NID's proposed Alternative Recreation Plan includes a provision for NID to upgrade the existing water systems at each facility unless NID and the Forest Service (for facilities on NFS land) agree that the upgrade is not necessary. The upgrade at each facility would include replacement of existing distribution piping, system connections, and water hydrants, and would maintain the same system design and footprint, as warranted. NID proposes, during the planning for water distribution system, to evaluate if the footprint should be reviewed to determine if there is a design that would better serve recreationists and/or different source designs that would take advantage of new technology. However, from the information provided, it is unclear as to exactly what this proposal entails. The NID Alternative Recreation Plan indicates that, as a general rule, all water systems would be upgraded at least once during a new license term. NID also proposes to replace the existing water storage tanks at Jackson Meadows reservoir at the end of their useful lives and to evaluate expanding the capacity of the storage tanks.

Under condition 57, the Forest Service specifies that NID ensure recreation facilities that provide drinking water, as well as future drinking water systems, be managed as public drinking water systems (i.e., serve at least 15 service connections or 25 persons) under the Safe Drinking Water Act. The Forest Service specifies that NID construct group campground facilities and additional family campsites with potable water at Jackson Meadows reservoir area, provide potable water at the Jackson sanitary dump

station, and provide a minimum of a potable water system at one of the campgrounds in the Bowman Recreation Corridor.

California Fish and Wildlife includes provisions in its recommendation 16 to address water systems that are identical to those included in Forest Service condition 57.

Our Analysis

Relicensing studies indicate the need for additional potable water at the project recreation facilities. Water systems are integral to the recreation sites they serve. Visitors to recreation facilities that are developed in areas with rural and roaded natural Forest Service ROS designations expect the availability of potable water. Providing potable water would help address the needs at project sites by providing more sources of drinking water for visitors at the project. The addition of potable water would also enhance the recreational experience at these sites, and is consistent with facilities and services that recreation users would expect at similar regional recreation sites designated under the Forest Service Recreation Opportunity Spectrum (ROS) as "rural and roaded natural" or "semi-primitive."

NID's proposal to, during the planning for replacement of water distribution systems, evaluate if the footprint should be reviewed to determine if there is a design that would better serve recreationists by helping to address the need for additional potable water at the project. However, from the information provided, it is unclear as to exactly what this proposal entails. NID's proposal to replace the existing water storage tanks at Jackson Meadows reservoir at the end of their useful lives and to evaluate expanding the capacity of the tanks would help address the unreliable water sources in the Jackson Meadows reservoir area.

Although Forest Service policy states that all water systems be managed as public drinking water systems (i.e., serve at least 15 service connections or 25 persons) under the Safe Drinking Water Act, there is no guarantee that NID would be able to manage the public water systems to serve 15 service connections or 25 persons at the project. Furthermore, regulating and enforcing drinking water laws are outside the Commission's authority. In Sierra County, the California Department of Public Health regulates and enforces the drinking water quality laws and regulations. Nevada and Placer Counties regulate and enforce the drinking water laws and regulations through their own health departments.

*Recreation Monitoring*

NID's Alternative Recreation Plan outlines detailed components of its proposed recreation monitoring program for the term of a new license at the project. NID proposes a facility and monitoring approach that uses monitoring indicators and standards, such as occupancy rate and user preferences. The proposed Recreation Plan proposes standards that when exceeded, trigger a review of potential management actions. NID also proposes a recreation questionnaire survey every 12 years in Form 80 monitoring years.

NID's Alternative Recreation Plan outlines several methods to collect information on recreation monitoring indicators and standards, including compiling existing available daily and annual occupancy information; a recreation observation survey that would include surveying during non-holiday periods from Memorial Day through Labor Day; and a recreation questionnaire survey during recreation seasons. NID's proposed Recreation Plan outlines future development triggers.

NID proposes to prepare a Form 80 every 6 years and to also prepare a comprehensive project recreational use report that would summarize the previous 6 years of project recreation fee/occupancy indicator information; summarize recreation observation survey indicator and other data collected during the 6-year period; and proposed changes in project facilities and/or project management. Additionally,

NID proposes that the 6-year comprehensive project recreational use report would also include a summary of identified recurrent dispersed recreation sites. Every 12 years, NID proposes to prepare a recreation questionnaire survey report. NID proposes to provide a draft of the final recreation questionnaire survey report to the Forest Service and other applicable agencies, as appropriate for a 60-day review. NID's also proposes that NID would meet with the Forest Service, BLM, and any other applicable land management agencies during the 60-day review period to discuss potential reasonable resource management measures on the respective land management agency's lands based on the report results. NID proposes to file the final recreation questionnaire survey report, including evidence of consultation, with FERC concurrently with the Form 80 Report filing.

NID's Alternative Recreation Plan includes, as part of ongoing annual O&M activities, an additional component to monitor the presence of trash and human waste at all project recreation facilities that lack trash or restroom facilities. NID's Alternative Recreation Plan includes a reference to the Forest Service preliminary condition (which is consistent with the Forest Service's final condition) for the detailed Trigger Plan that outlines future development triggers.

Forest Service condition 53 provides proposed facility indicators and occupancy standards (triggers) at developed project recreation facilities. The Forest Service specifies that when the occupancy standard for a grouping (groups of similar types of recreation facilities that are relatively close in proximity) is reached or exceeded, a suitability-feasibility analysis would be conducted to determine if site development is feasible and suitable at one of the reservoirs within a facility monitoring grouping. If site development is not suitable or feasible, agreed upon actions and policies would be implemented to manage recreation use levels. The Forest Service specifies that on NFS land, the Forest Service would make the final determination as to whether a proposed development is suitable and feasible. The Forest Service specifies that NID would collect occupancy data at hosted/reservation project campgrounds annually and onsite observations at self-pay/no-host campgrounds, day-use facilities, and primitive campsites every 6$^{th}$ year (concurrent with the Form 80 cycle) as described in tables 1 and 2 of condition 53. Tables 1 and 2 include monitoring indicators, data collection methods, standards (triggers), and management actions for hosted/reservation campgrounds and self-pay/no-host campgrounds, day-use facilities, and primitive campsites.

California Fish and Wildlife's recommendation 12 recommends that NID conduct recreation survey and monitoring as follows:

- NID would conduct recreation monitoring once every 6 years that would include evaluation of resource effects from developed and dispersed use, including evidence of garbage and human waste left onsite. The Forest Service and BLM would be involved in the evaluation of resource effects.

- NID would conduct occupancy surveys of all project facilities 6-year cycle as described in the Drum-Spaulding and Yuba-Bear Recreation Trigger Plan (attached to California Fish and Wildlife's recommendations for the project). This Trigger Plan is a detailed plan that includes monitoring indicators, methods, triggers, and actions for hosted/reservation campgrounds and self-pay/no-host campgrounds, day-use facilities, and primitive campsites (the Trigger Plan is almost identical to the one specified for the Drum-Spaulding Project, except that each Trigger Plan is project-specific and includes a description of new facilities to be constructed when implementation triggers are met).

- NID would conduct a recreation user survey once every 12 years. Survey methods and questions would be reviewed and approved by the Resource Agencies in advance, and survey information would be reviewed by tall interested parties.

- At 6 and 12 years after license issuance, NID would prepare the recreation monitoring and survey report, which would be provided to the Forest Service and BLM for review, comment, and approval prior to filing with the Commission. Both the 6- and 12-year recreation monitoring and survey reports would incorporate data from the information listed above; traffic counters; other resource monitoring results, law enforcement input, emergency services (including fire) input, accident reports, and project patrol reports; and other applicable information. NID would file a recreation resources report in compliance with the regulations at 18 CFR §8.11, or as amended.

California Fish and Wildlife also recommends that within 1 year of submission of the recreation resources report, NID would consult with the resource agencies to review this report and propose appropriate management actions.

BLM condition 29 is generally identical to California Fish and Wildlife recommendation 12, with the addition of the following:

- NID would conduct occupancy surveys of all project facilities on a 6-year cycle for Dutch Flat afterbay and the Chicago Park recreation area near Chicago Park powerhouse.

By letter dated December 20, 2013, NID confirmed its concurrence with Forest Service final condition 53 and BLM final condition 29, discussed above.

Our Analysis

Recreational use at the project is expected to increase by about 23 percent over the next 30 years. The level and type of recreational use and recreation user preferences could change over the term of a new license. Regular monitoring of recreational use, surveying recreation users, and assessing facility capacity and recreation demand would help to determine whether the project's recreation facilities meet demand and visitor needs over the term of the license, and whether recreational use is affecting other resources at the project. The recreation monitoring measures specified by the Forest Service and BLM and recommended by California Fish and Wildlife would all meet the same overall goals.

Conducting recreation monitoring at all project facilities as specified by the Forest Service and BLM and recommended by California Fish and Wildlife would be appropriate to provide project-wide information. Recreation monitoring reports would provide the means to document the survey information and monitor other recreational management provisions, such as litter and human waste monitoring. Reporting the recreation monitoring results every 6 and 12 years concurrent with the Commission's Form 80 Report schedule would ensure that the Commission is updated on recreational use at the project.

*Recreation Development Review*

NID's Alternative Recreation Plan proposes that NID would implement Forest Service preliminary condition 39, *Review of Recreation Developments*, which specified that NID and the Forest Service would meet at least once every 6 years to review all project recreation facilities and to agree on necessary maintenance, rehabilitation, construction, and reconstruction work and its timing. Following the review, NID would develop a 6-year schedule for maintenance, rehabilitation, and reconstruction, which would be approved by Forest Service prior to being filed with the Commission.

Forest Service condition 55 specifies that NID and the Forest Service would meet at least once every 6 years to review project recreation facilities on NFS land and to agree on necessary replacement and major maintenance (i.e., reconstruction) work and its timing. Following the review, NID would

develop a 6-year schedule for replacement and/or reconstruction of project recreation facilities on NFS land, which would be approved by Forest Service and implemented upon Commission approval.

California Fish and Wildlife recommendation 14 is similar to Forest Service condition 55, with the inclusion of BLM in the review process in addition to the Forest Service. California Fish and Wildlife recommends that this review include all project recreation facilities and not just those on NFS land.

BLM condition 28 is identical to California Fish and Wildlife recommendation 14, except that it does not include the Forest Service with BLM for the review process. BLM also specifies that this review include all project recreation facilities.

By letter dated December 20, 2013, NID confirmed its concurrence with Forest Service final condition 55 and BLM final condition 28, discussed above.

Our Analysis

Discussing all project recreation facilities during the recreation development review meeting as specified by the Forest Service and BLM and recommended by California Fish and Wildlife would ensure that reconstruction and replacement activities are scheduled in a coordinated manner. It would also be appropriate for the 6-year schedule that is developed as a result of the recreation review to include all project recreation facilities. There are 208.5 acres of BLM lands within the existing project boundary. The roadside parking for Dutch Flat afterbay and the undeveloped recreational use at Chicago Park forebay occurs on BLM land. Requiring the inclusion of BLM for the review meeting when Dutch Flat afterbay or Chicago Park forebay is discussed would be necessary. However, NID is free to consult with BLM or any other interested stakeholder about its proposed schedule for any recreation facilities. Notifying BLM of the schedule and any proposed work in the vicinity of BLM lands before construction begins would ensure that BLM is kept apprised of any work that could affect BLM lands.

*Project Patrols/Law Enforcement/County Services and Infrastructure*

NID's Alternative Recreation Plan proposes to monitor dispersed recreation within the project boundary and document any dispersed (nondesignated) recreation sites that occur over the course of the open season as part of NID's regular O&M patrols.

The Forest Service specifies in condition 57 that NID coordinate, within 1 year of license issuance, with the Forest Service to develop a plan to address the management of project-related recreation on NFS lands. The plan would address, among other items, (1) patrolling or providing for patrols through fire season by personnel that have the ability to extinguish abandoned and escaped campfires, and perform fire prevention duties; (2) providing for patrols, through the recreation season (including the peak season and the shoulder season); and (3) patrolling dispersed public use areas within one-quarter mile of all project reservoirs and project-affected waterways.

BLM condition 34 specifies that, beginning 90 days after license issuance, NID enter into a recreation O&M agreement to provide $30,000 annually to BLM for operation, maintenance, law enforcement patrolling, and administration in accordance with the Recreation Plan. In addition, BLM condition 36 specifies that NID would coordinate within 1 year of license issuance with BLM to develop a plan to address the costs of managing recreation facilities on BLM lands.

California Fish and Wildlife includes provisions in its recommendation 16 to address project patrols that are identical to those included in the Forest Service condition 57. California Fish and Wildlife also recommends a provision similar to BLM condition 36 for NID to coordinate with the Forest Service

and BLM to develop a plan to address the costs of managing project-related recreation on NFS and BLM lands.

Placer County recommends that NID contribute to the costs of increased county services and infrastructure, including public safety and roads, resulting from the proposed project. Placer County notes that NID and the County are trying to reach an agreement; however, if this agreement is not reached, NID should be required by the new license to compensate Placer County for the costs of any increased county services that have a nexus to the project.

By letter dated December 20, 2013, NID confirmed its concurrence with BLM final conditions 34 and 36, discussed above.

Our Analysis

Project patrol provisions would help encourage visitors, including campground users, OHV users, anglers, and boaters, to comply with regulations and project rules. A projected increase in the number of visitors over the term of the new license would likely increase the need for public services, including law enforcement and fire protection, which are provided by the Sherriff's offices in Nevada, Sierra, and Placer Counties. A project patrol person would help reduce conflicts between recreation users and improve visitor safety by providing an authoritative presence to encourage compliance with regulations and project rules. Additional project patrols at the more remote areas of the project would improve management of environmental resources by increasing visitor contact with enforcement agencies and help to educate visitors about appropriate and restricted uses. While recreation users to the Yuba-Bear Project could result in increased usage of roads in Placer County, only about 11 percent of the project is located in Placer County and the only project recreation facility located in Placer County in the Long Ravine campground at Rollins reservoir.

However, within the project area, public safety and law enforcement duties are the responsibility of the Sherriff's offices in Nevada, Sierra, and Placer Counties, the California Highway Patrol, and federal agencies on federal lands. NID already provides law enforcement funding through public land use fees that it pays for the project. Further, Forest Service law enforcement personnel from the Tahoe National Forest and BLM personnel are responsible for enforcing regulations related to the management of NFS and BLM lands and resources. The Commission has no way of ensuring that the hiring of a patrol person paid for by NID (in this case staffing or funding a seasonal or year-round employee) or providing funding to the Forest Service, BLM, or Placer County would accomplish a project purpose or ameliorate a project effect. However, the Commission can enforce specific measurable actions, such as O&M provisions, including maintenance of project lands and project recreation facilities to address fire safety and vandalism, and other associated potential effects of dispersed recreation use within the project boundary. While improved implementation of Forest Service and Nevada, Sierra, and Placer County standards and guidelines regarding recreational use would be beneficial, enforcement of those regulations would be outside the Commission's jurisdiction.

Although Forest Service condition 57 specifies that NID coordinate with the Forest Service to develop a plan to address the management of project-related recreation on NFS lands, NID would only be responsible for project recreation located inside the project boundary. Recreation that extends to NFS lands outside the project boundary are outside the Commission's authority. Although BLM condition 36 and California Fish and Wildlife's recommendation 16 indicate that NID develop a plan to address the costs of managing recreation facilities on BLM lands for patrols maintaining the project recreation facilities, and providing law enforcement and BLM condition 34 specifies that NID enter into a recreation agreement to provide $30,000 annually to BLM to fund these activities, these mechanisms would not relieve NID of its responsibility and, therefore, would not be a necessary measure to include in the Recreation Plan.

*Public Information, Signage, and Education*

NID proposes to replace all existing entrance signs, directional signs within facilities, directional signs to and from facilities, information/bulletin signs and trailhead signs, as needed. NID would replace a sign with a sign of a similar design and at least to the same construction as currently exist.

At facilities on NFS land, NID would coordinate with the Forest Service on the placement of all signs, including the placement of the Forest Service logo on the signs. Additionally, NID proposes to provide consistent signage at all project information boards at project recreation facilities that would include, at a minimum: a map including area project recreation opportunities, emergency contact information, and applicable water surface regulations. Within 5 years of FERC approval of the Recreation Plan, NID would install consistent signage at all project recreation facilities. At facilities on NFS land, NID would provide this information to the appropriate resource agency for review and comment prior to installation. NID would develop consistent information for the signage within 2 years of FERC approval of the Recreation Plan. In addition, NID proposes to provide signage provided by California Fish and Wildlife and/or the Forest Service at specific project reservoirs where public education information is needed to reduce the spread of amphibian chytrid fungus.

The Forest Service specifies that within 2 years of license issuance, NID would, in coordination with the Forest Service, develop an information strategy that includes maps, signs, brochures, and a website(s) to provide information to enhance project recreation opportunities, and protect and interpret the area's natural and cultural resources. This strategy would include the information displays at each project recreation facility. At recreation sites located on project reservoirs, within 1 year of license issuance, NID would provide signs addressing lake surface regulations. Within 2 years of license issuance, NID would provide information at all information kiosks and boat launches about how the public can help prevent the spread of amphibian chytrid fungus and other waterborne pathogens at the project. An implementation schedule would be part of this strategy, with all actions implemented within 5 years of the license issuance.

California Fish and Wildlife includes provisions in its recommendation 16 to address public information and education that are identical to those included in Forest Service condition 57.

Our Analysis

Visitors routinely use websites and visitor information boards to acquire information about developed recreation facilities and recreation resources to plan their visits. Providing a public website and signs for these venues that depict recreation resource, water resource, and resource protection information as the Forest Service specifies would increase visitor awareness of opportunities available at and near the project. Both NID's Alternative Recreation Plan and the Forest Service provision would meet this need. Because the project has an extensive footprint and spans multiple land jurisdictions it would be appropriate to consult with all affected agencies to develop the brochure specified by the Forest Service. For the brochure to be useful, it would necessarily include non-project information for context and visitor orientation and require significant effort to develop. Signs in combination with a public website would be just as effective and a less expensive method of providing the necessary information to the public. It would be appropriate periodically to review signage, maps, and public website information.

Development and implementation of consistent signage at the project, as proposed by NID and specified by the Forest Service, would provide the means for a coordinated and systematic development of signage and interpretative information associated with the project.

*Whitewater Boating*

NID proposes several streamflow measures that would enhance whitewater boating at the project. As discussed in section 3.3.2.2, *Aquatic Resources*, NID proposes to implement a schedule of flow reductions during spill cessation at Milton diversion dam, Bowman-Spaulding diversion dam, and Dutch Flat afterbay dam to minimize flow fluctuations in the South Yuba River, Canyon Creek, and Bear River (YB-AQR1 Part 7, *Milton Diversion Dam, Bowman-Spaulding Diversion Dam and Dutch Flat afterbay Dam Spill Cessation Schedules and Minimization of Flow Fluctuations*). The first 6 days of the Milton diversion dam spill cessation schedule would also provide flows for whitewater boating as proposed by NID's measure YB-RR4. NID proposes the following specific measures to enhance whitewater boating:

- YB-RR4, *Milton Diversion Dam Supplemental Flows for Whitewater Boating*—In the Middle Yuba River downstream of Milton diversion dam, NID proposes to provide a continuous mean daily target streamflow of 300 cfs for at least 6 continuous days after May 1 in any years in which spill at Milton diversion dam is 300 cfs or greater after May 1.

- YB-RR3, *French Dam Supplemental Flows for Whitewater Boating*—In all water year types in Canyon Creek below French dam, NID proposes to provide a target streamflow of between 120 and 150 cfs over a continuous 24-hour period starting between September 1 and September 30 of each year, until French Lake elevation reaches 6,638 feet msl.

- YB-RR5, *Bowman-Spaulding Diversion Dam Supplemental Flows for Whitewater Boating*—In Canyon Creek downstream of the Bowman-Spaulding diversion dam, NID proposes to provide a continuous mean daily target streamflow of 275 cfs for at least 5 continuous days after April 1 in any years in which flow is 275 cfs or greater.

NID proposes to provide 7-day advance notice to the public of the beginning and ending date of each event described in measures YB-RR3, YB-RR4, and YB-RR-5.

Forest Service condition 31, BLM condition 7, and California Fish and Wildlife's recommendation 2.7 are consistent with NID's proposed measures YB-RR4 and YB-RR5.

The Foothills Water Network supports NID's measures to provide recreational flows. The Foothills Water Network comments that NID's measures to provide whitewater boating flow releases would improve whitewater boating opportunities in Canyon Creek by making flows more predictable and less erratic, would provide substantial improvement in whitewater boating opportunities in the Middle Fork Yuba River below Milton diversion dam, and would provide would provide a late season whitewater boating opportunity in Canyon Creek below French Lake.

Our Analysis

NID's proposed measures to provide recreation-specific flows, in addition to NID's proposed streamflows, would generally maintain or enhance existing whitewater boating opportunities available at the project.

Two whitewater boating runs in the reach below Milton diversion dam were identified during the studies conducted during relicensing. NID's proposed measures would generally maintain or enhance boating opportunities in these whitewater boating runs. In the run from Milton diversion dam to Plumbago, NID's proposed measures would generally maintain boating opportunities for hardshell kayaks as compared to the no-action alternative in all water year types, except for wet water year types when the no-action alternative would result in a few more days. In the run from Plumbago to Our House diversion dam, NID's proposed measures would generally maintain boating opportunities for hardshell

and inflatable kayaks and rafts as compared to the no-action alternative in all water year types. Although NID's proposed measures would result in about 7 fewer days for whitewater boating in wet water year types for rafts, they would substantially increase (about 29 days) boating opportunities for inflatable kayaks in critically dry and extreme critically dry water year types.

NID identified Canyon Creek below French Lake and Faucherie Lake dams as whitewater boating runs during the studies conducted during relicensing. NID's proposed measure would result in a substantial increase in boating opportunities as compared to the no-action alternative in all water year types for hardshell kayaks in Canyon Creek below French Lake dam and below Faucherie Lake dam. Most of these opportunities would occur in September.

*Recreation Flow Information*

NID proposes to provide mean daily streamflow information to the public via the internet (may be accomplished through a third party) from May 1 through November 30 (measure YB-RR2, *Provide Recreation Flow Information*). NID proposes to provide streamflow information for the Middle Yuba River below Milton diversion dam, Canyon Creek below Bowman dam, and Bear River below Rollins dam. NID proposes to provide reservoir storage for Jackson Meadows reservoir, and French, Faucherie, Sawmill, Jackson, Bowman, and Rollins Lakes.

The Foothills Water Network recommends that NID continue current, year-round operations at the existing streamflow gages and provide data in 15-minute intervals. The Foothills Water Network indicates that NID currently provides 15-minute streamflow information for the Middle Yuba River below Jackson Meadows reservoir dam, Middle Yuba River below Milton reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay, and Bear River below Rollins dam.

Annual flow information taken at historic locations is important for scientific purposes and promoting understanding of the watershed, and is also utilized by numerous types of recreationists, including whitewater boaters and anglers. The Foothills Water Network also recommends that a gage be added below the confluence of Canyon Creek on the South Fork Yuba River to allow the public to see the combined effect of flow measures on these reaches.

In its reply to the Foothills Water Network's comments, NID reported that subsequent conversations with American Whitewater confirmed that the Foothills Water Network would be satisfied with the same level of information that is currently provided. NID currently provides information to the public for the stream reaches and reservoirs proposed in measure YB-RR2 and proposes to continue providing this information. NID does not specify where this information is provided.

Forest Service condition 58 specifies that NID, as soon as reasonably feasible, but within 1 year of license issuance, provide real-time streamflow information in cfs for the following reaches: Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton reservoir dam, Canyon Creek below French dam, and Canyon Creek below Bowman reservoir dam. The Forest Service specifies that this streamflow information would be from streamflow gages to document compliance with minimum and spill cessation streamflow requirements in that reach. The Forest Service specifies that the flow information would be available to the public via the internet, which may be accomplished by a third party. The Forest Service notes a preference for the data to be reported in 15-minute intervals; however, data reported in no less than hourly intervals would be acceptable. The Forest Service also specifies that NID coordinate with PG&E to develop a plan to provide real-time streamflow information to the public year-round for streamflows on the South Yuba River immediately below Canyon Creek. Forest Service recommendation 15 recommends that NID, as soon as reasonably feasible, but within 1 year of license

issuance, develop a plan to provide real-time streamflow information in cfs for the Bear River below Dutch Flat afterbay dam and the Bear River below Rollins reservoir dam.

BLM condition 37 is similar to the Forest Service condition and recommendation, except that it does not specify NID provide streamflow information for the following reaches: Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton reservoir dam, Canyon Creek below French dam, and Canyon Creek below Bowman reservoir dam.

Our Analysis

Providing year-round real-time (15-minute as currently provided) streamflow data on the internet for stream reaches, as specified by the Forest Service and BLM, would allow boaters to take advantage of suitable boating flows provided by the project and enable anglers to access recent streamflow conditions. Because the streamflows are affected by special events, reservoir spill, and outages, providing as much advance notice of these occurrences, their duration, and expected travel time for flows would increase whitewater boating opportunities. Developing a plan to provide streamflow information, as specified by BLM and recommended by the Forest Service for certain reaches, would be unnecessary since NID could simply provide the information on the internet.

The location for a new gage recommended by the Foothills Water Network would be 8.5 miles downstream of the project facilities, and flows at this location are influenced by factors beyond the control of NID. The public can determine recreation opportunities in this stretch of the South Fork Yuba River through trends from flow information available from PG&E on the South Yuba River just below Lake Spaulding dam and from information available from NID on Canyon Creek below Bowman dam. Additionally, PG&E and NID filed plans to monitor compliance (as an aquatic resources measure) with minimum flows in the new licenses. Under their proposals, continuous monitoring that is ongoing at existing gages under the existing license would continue uninterrupted and, where the gage capacity needs to be upgraded or a new gage would be required, they propose to design and install appropriate gages and implement monitoring within 1 year of license issuance. The proposed compliance monitoring would record flow data for the tributaries for this reach of the South Yuba River. By adding the flow data for the following proposed compliance monitoring locations, the public can estimate the flow on this reach of the South Yuba River: South Yuba River below Lake Spaulding (at Lang's Crossing), Canyon Creek below Bowman-Spaulding diversion dam, Texas Creek below Texas Creek diversion dam, Clear Creek below Bowman-Spaulding diversion conduit, Fall Creek below Fall Creek diversion dam, Trap Creek below Bowman-Spaulding diversion conduit, and Rucker Creek below Rucker Creek diversion gate. Coordinating with the Drum-Spaulding Project licensee to provide the year-round real-time streamflow data for these compliance gages on a single, public website (could be a third-party website) would provide the public with a single website to obtain flow information for this reach (which has three whitewater boating runs) so that they can take advantage of whitewater opportunities on this reach and also be better informed on safe flows.

Providing year-round mean daily reservoir elevations for Jackson Meadows reservoir, and Faucherie, Bowman, and Rollins Lakes on the internet would allow visitors to know if the formal boat ramps at Jackson Meadows and Rollins are accessible and the conditions at the informal boat ramps at Faucherie and Bowman Lakes before traveling to project reservoirs. There are no formal boat ramps at Sawmill, Jackson, and French Lakes. During the relicensing studies, most visitors at Sawmill and French Lakes indicated that reservoir levels were not an issue or they had no opinion. Providing mean daily reservoir elevation, as NID proposes, combined with informing the public whether the ramps are currently functional, would provide sufficient information to allow visitors to plan their trips.

### 3.3.6 Cultural Resources

#### 3.3.6.1 Affected Environment

**Section 106 of the National Historic Preservation Act**

Section 106 of the NHPA as amended requires the Commission to take into account the effects of licensing a hydropower project on any historic properties and allows the Advisory Council on Historic Preservation (Advisory Council) a reasonable opportunity to comment if any adverse effects to historic properties are identified within a hydropower project area of potential effects (APE).

Historic properties are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. In this document, we also use the term "cultural resources" to include properties that have not been evaluated for eligibility for listing in the National Register. Cultural resources need enough internal contextual integrity to be considered historic properties. For example, dilapidated structures or heavily disturbed archeological sites may not have enough contextual integrity to be considered eligible. Traditional cultural properties (TCPs) are a type of historic property eligible for the National Register because of their association with cultural practices or beliefs of a living community that: (1) are rooted in that community's history; or (2) are important in maintaining the continuing cultural identity of the community (Parker and King, 1998). In most cases, cultural resources less than 50 years old are not considered eligible for the National Register.

Section 106 requires that the Commission seek concurrence with the SHPO on any finding involving effects or no effects on historic properties and allow the Advisory Council an opportunity to comment. If Native American properties have been identified, section 106 also requires that the Commission consult with interested Native American tribes that might attach religious or cultural significance to such properties (i.e., TCPs).

Because existing and potential adverse effects have been identified on historic properties located within the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects APE, PG&E and NID developed HPMPs to seek to avoid, reduce, or mitigate the effects. Potential effects that may be associated with a hydroelectric project include any project-related effects associated with the day-to-day O&M of the project after issuance of a new license. During development of the HPMPs, the applicants consulted with the Commission, Advisory Council, California SHPO, Native American tribes, Forest Service, and BLM. The HPMPs would be implemented by execution of a PA that would be signed by the Commission, Advisory Council (if it chooses to participate), California SHPO, and other consulting parties. PG&E filed the final HPMP with FERC on September 23, 2013. The final HPMP includes provisions for the existing Drum-Spaulding Project. NID filed the final HPMP for the Yuba-Bear Project with FERC on November 15, 2012.

**Tribal Consultation**

In November and December 2007, the Commission sent letters to seven federally recognized Native American tribes who were indigenous to the area in and around the existing Drum-Spaulding and Yuba-Bear Projects. Tribes who received letters from the Commission included the Shingle Springs Rancheria, Greenville Rancheria of Maidu Indians, Washo Tribe of Nevada and California, United Auburn Indian Community of the Auburn Rancheria of California, Enterprise Racheria of Maidu Indians, Mooretown Rancheria, and Berry Creek Rancheria of Maidu Indians. These letters initiated government-to-government consultation regarding the relicensings of these projects, and the Commission asked if the tribes were interested in participating in the licensing process and if they desired to meet with Commission staff to discuss the projects. In response to these letters, Commission staff met directly with the Washo Tribe of Nevada and California, the Enterprise Rancheria, and Greenville Rancheria in April

of 2008. The other tribes declined our invitation for an initial meeting. From October 2007 to June 2008, Commission staff also participated in a number of cultural resources work group and tribal meetings involving the federally recognized tribes, including other non-federally recognized tribal groups including the Tsi Akim Maidu, Colfax-Todd's Valley, Todd's Valley Miwok-Maidu Cultural Foundation, Nissenan Maidu, Nevada City Rancheria, and other Native Americans knowledgeable to the area. Other follow-up cultural resource work group and tribal meetings involving Commission staff took place in 2009. During this time, Commission staff also responded in writing to several tribal members who had specific questions regarding the relicensings of these projects.

**Area of Potential Effects**

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by a proposed new license within a project's APE. The APE is determined in consultation with the California SHPO and is defined as "the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties" (36 CFR 800.16[d]). In this case, the APEs for the existing Drum-Spaulding and Yuba-Bear Projects include all lands within the respective FERC project boundaries, plus lands outside the FERC project boundary where project operations may affect the character or use of historic properties.

For PG&E, the APE for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects encompasses about 6,297.27 acres plus a 100-foot radius surrounding the Signal Peak communication tower.

For NID, the Yuba-Bear APE encompasses about 7,015 acres and a 100-foot radius surrounding the Quartz Hill communication tower.

In addition, the initial project APE boundaries described above were subsequently modified to include the following:

- A 100-foot radius surrounding any other facility related to the O&M of the Yuba-Bear Project (e.g., maintenance buildings directly related to O&M associated with the project boundary);
- 200 feet above the high waterline around all PG&E and NID project lakes and reservoirs, or the project boundaries, whichever is greater;
- For the existing Drum-Spaulding Project, an additional 12.82 linear miles of access roads and 98.54 acres of recreation areas, and an additional 23.41 acres of land; and
- For the Yuba-Bear Project, segments of two newly designated primary project access roads at Chicago Park and French Lake, as well as the removal of 358.2 acres of land and the addition of 263.26 acres of land.

**Cultural History Overview**

Archival research conducted as part of PG&E and NID's relicensing efforts for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects provided background information relevant to understanding past lifeways, cultural sequences, and historic period developments within and adjacent to the project's APE. Based on this gathered background information, a cultural context was formulated and is provided below (as provided in PG&E, 2011d and 2011e; NID, 2011d and 2011e).

Most early archeological work in the northern Sierra Nevada, with the exception of the Lake Tahoe area, was conducted at the lower to middle elevations along the major rivers draining the western Sierran slope including: the North Yuba, Middle Yuba, and South Yuba Rivers; the Bear River; and the North and Middle Forks of the American River. Other rivers and numerous tributaries feed these rivers, depositing water into various bodies on both sides of the Sierran crest (Markley and Henton, 1985).

Evidence from previous archeological investigations in the region suggests that occupation of the northern Sierra Nevada foothills and upper slopes included sporadic seasonal visits by Pre-Archaic people whose major settlements focused on the lush lakeshore and streamside environments found farther east of Lake Tahoe, around the pluvial lakes of the Great Basin, or farther west in the Sacramento and San Joaquin valleys. Work by W.A. Davis and R. Elston (Moratto, 2004) identified cultural components that demonstrated prehistoric human occupation of the region for a period extending about 7,000 years (Elston, 1971).

The earliest human occupation of the region is identified as Clovis culture that is currently identified in North America as occurring between about 13,500 to 13,000 years before present (BP). Clovis culture is distinguished by "fluted" projectile points, percussion blades, and other distinctive artifacts. Very few Clovis sites have been identified in North America; no diagnostic Clovis artifacts have been found in the vicinity of the projects. However, fluted point fragments and complete specimens, typically isolated finds, are known from scattered locations throughout much of the Sierra Nevada region (cf., Rondeau and Dougherty, 2009).

The Pleistocene ended 10,000 years ago when the great continental ice sheets were in serious retreat. However, modern studies using data from Antarctic and Greenland ice cores have shown that the great glacial advances of the Pleistocene were at least quasi-periodic with a cycle length ranging from about 110 to over 150,000 years. There is no certainty at present whether the Pleistocene has really ended or if the Holocene is merely the latest interstadial event with more ice to come in the future. Cultural evidence from this era in the Sierra Nevada region is scant, but comparatively well established. Lindstrom et al. (2007) note the "Pre-Archaic/Tahoe Reach phase," marked by large stemmed points resembling weapons from the Great Basin, occurred in the vicinity of the projects.

By the Early Holocene (about 10,000 to 8,000 BP), evidence from numerous archeological sites throughout California indicates that the region was fully explored by this time and supported a significant population. The regional climate was distinguished by a steady warming-and-drying trend or a period of "relative warming . . ." (cf. Lindstrom et al., 2007). Research has found that during the Early Holocene, the Alder Hill basalt quarry in the Truckee area was actively used. McGuire et al. (2006) recovered Great Basin stemmed points, datable carbon, and obsidian from the quarry; these artifacts indicate that stone tools were being manufactured at that location during the Early Holocene. Lindstrom et al. (2007) also noted that the Great Basin stemmed points recovered from an Eldorado County archeological site were manufactured from a broad range of materials that indicate considerable mobility of at least portions of the human population. In other areas, such as the western Sierra foothills in Calaveras County, there is evidence of extremely stable land use. For example, at the Skyrocket site, evidence shows continued use of the same location over a span of about 2,500 years during the Early Holocene (Fagan, 2003).

The Middle Holocene/Early Archaic (about 8,000 to 5,000 BP) is poorly represented archeologically throughout California. Lindstrom et al. (2007) remark on this issue, speculating that several factors may obscure Middle Holocene contexts. In the Tahoe region, Lindstrom et al. (2007) cite an extensive list of studies, all of which have concluded that the mid-Holocene was the warmest period in recent geological history and, at least in North America, one of the driest periods. Levels in Lake Tahoe may at times have fallen sufficiently low to isolate the lake from the Truckee River. Lindstrom et al. (2007) note evidence of a drought period estimated to have lasted about 1,350 years between 6,300 and

4,850 BP. Effects of these changes farther west are not well documented. Again, at the Skyrocket site in Calaveras County, evidence of occupation diminishes, but is never fully interrupted (Fagan, 2003). Middle Holocene occupation in the vicinity of the projects is represented by the Tahoe Reach and Spooner phases dating between 7,000 and 5,000 BP, which are associated with occupation during the Altithermal climatic period.

The beginning of the Late Holocene/Middle Archaic (5,000 to 1,500 BP) is marked by climatic shifts toward a more temperate regime and the first well-documented archeological cultures (Martis phase) in central and northern California. Numerous Early and Late Martis components indicate that expanding populations used a diverse subsistence base at middle and lower elevations, with a possible emphasis on hunting at higher elevations. Components dating between 5,000 and 3,000 BC are relatively rare, and little is known about prehistoric lifeways during this interval. However, flat slab milling stones, loaf-shaped manos, and large foliate and corner-notched projectiles are the elements that have been associated with these assemblages. In the Sacramento-San Joaquin Delta region, the Windmiller culture emerged with unique traits including an unusual mortuary pattern marked by prone interments with crania oriented in a westerly direction (Moratto, 1984). In the Truckee vicinity and portions of the neighboring western high Sierra, the Martis Complex, marked by typological affiliations with the Great Basin and a preference for locally abundant basalt, was identified by Heizer and Elsasser (1953), Elsasser (1960), and Moratto (1984). To the west and north, the Messilla Complex was defined at three sites in Butte County (Moratto, 1984). Moratto (1984), following arguments of earlier investigators, including studies for the proposed Auburn dam and New Bullards Bar reservoirs, suggests that the Martis Complex may reflect ancestral Maiduan prehistory. By the Middle Archaic, people of the Sierra Nevada show clear influences from both the Great Basin and central California. However, the archeological remains cannot as yet be reliably attributed to modern ethnographic groups.

The lack of discernible relations between archeological complexes and the known material cultures of ethnographic Californian populations ends with the Late Archaic (2,000 to 200 BP). In the high Sierra, the Martis Complex gives way to the Kings Beach Complex, and in the western Sierra, analogous changes occur as the Middle Horizon is replaced by early Augustine Pattern settlements. In the western Sierra, important subsistence changes take place as the acorn clearly emerges as an important staple that is marked by a proliferation of the use of bedrock mortars. The bow appears as the preeminent weapon and is marked archeologically by an abrupt reduction in projectile point size and a significant increase in numbers of points in use. In the high Sierra, the bow also appears in the Kings Beach Complex, and preferred materials for weapon tips change from basalt to microcrystalline silicate materials (Moratto, 1984).

The Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects are within lands claimed ethnographically by the Washoe and Nisenan, or Southern Maidu peoples, of California and Nevada. The high Sierra was exploited by both Nisenan and Washoe (Beals, 1933; Kroeber, 1976), but was usable only during the summer months as attested to by ethnographic accounts. Washoe sources state that parties for trading, gathering, and collecting regularly crossed the Sierra crest and ranged westward, possibly as far as Auburn in the vicinity of the projects (D'Azevedo, 1986).

The majority of the APE for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects falls on lands attributed ethnographically to the Nisenan people, also referred to as the Southern Maidu (Beals, 1933; Kroeber, 1976; Wilson and Towne, 1978). The Nisenan are speakers of a language closely related to Maidu and Konkow and all are members of the Penutian language family. Penutian languages are estimated to have been spoken by half of California's native population at the time of historic contact (Moratto, 1984). Beals (1933) identified four principal linguistic divisions within Nisenan, but observes that ". . . every political unit showed slight dialectic differences." Beals (1933) differentiates between valley, hill, and mountain Nisenan dialects and further identifies divisions running

east-west that approximate the course of major streams, including one in the vicinity of the Bear River. Shipley (1978) identified seven Nisenan dialects, classified as Valley Nisenan, Oregon House, Auburn, Clipper Gap, Nevada City, Colfax, and Placerville.

Nisenan society was organized into small, politically independent tribes or tribelets (Kroeber, 1976; Wilson and Towne, 1978). Each political unit consisted of one or more villages and a number of smaller hamlets with populations ranging from about 20 to 100 people (Kroeber, 1976). Nisenan villages were often occupied by some inhabitants year round. Permanent village occupants typically included the infirm or aged members who were unable to make treks to the higher mountains. Nisenan economy depended extensively on the acorn that was gathered in the fall and stored for later use. However, the Nisenan also hunted and gathered year-round in the diverse biotic communities of the western slope of the Sierra Nevada (Hull, 2007). Hunting was done both individually and communally. Communal hunting was accomplished through a variety of methods, including driving animals and setting fires. Deer, antelope, elk, black bear, wildcats, mountain lions, and other small game were caught and either roasted, baked, or dried. Gathering was a family activity, and group mobility was timed to take advantage of seasonal ripening of specific resources, including roots, wild onion, wild sweet potato, Indian potato, berries, and a variety of nuts, in addition to the acorn. The Nisenan technology was dependent upon naturally occurring materials including stone, bone, shell, wood, plant fiber, and animal products. All tools, clothing, and gear depended upon the acquisition of necessary materials, which were either gathered from natural sources or acquired through trade (such as obsidian, which does not occur in Nisenan territory). Trade and exchange links extended east into the Great Basin and west to the Pacific where sources of marine shell occur (Hull, 2007; Kroeber, 1976; Wilson and Towne, 1978).

Beals (1933) observes that the land above about 3,500 feet msl was rarely entered by any Nisenan except those from mountain communities bordering the high country and was considered open land. He notes that parties visiting the area in the summer would have rarely spent more than four or five days in a single camp. Much of the PG&E and NID project APE falls within this range of "open land" and would have been jointly used by all the people dwelling along its margins.

Neighbors located east of the Nisenan were the Washoe, speakers of the Hokan language. Their core territory centered on montane valleys including the Sierra Valley northeast of PG&E and NID projects, the Lake Tahoe Basin southeast of PG&E and NID projects, and Antelope Valley south of Lake Tahoe (D'Azevedo, 1986). The Washoe also claimed an extended range around these core areas with visits reported as far west as Auburn (D'Azevedo, 1986). The Washoe have been classified as a Californian people by Kroeber (1976). The Washoe language was initially thought to be a unique, isolated language stock; however, linguists now classify it as a member of the widely dispersed Hokan language family. Other Hokan groups are located in northern and southern California and along the California coast (Shipley, 1978).

The Washoe reportedly descended from the northeastern end of the PG&E and NID project APE to collect acorns along the Bear and Yuba Rivers. They may have also wintered on the western slope occasionally, either with Nisenan acquaintances or in small camps (D'Azevedo, 1986; Peters, 1988). Ethnographic accounts indicate a somewhat looser social organization among the Washoe than among the Nisenan, with less emphasis on suprafamilial relationships (D'Azevedo, 1986). Conflict with neighboring groups was infrequent and probable external relations cannot be thoroughly evaluated due to the spare nature of ethnographic information. D'Azevedo (1986) summarizes the relations of the Washoe with their neighbors as generally peaceable. Beals (1933) also notes friendly relationships between Nisenan dwelling in the vicinity of the projects and the Washoe.

Washoe technology and subsistence, like that of the Nisenan, was dependent upon the natural production and use of regionally available materials including wood, bone, stone, and fiber. These

materials occurred throughout their territory or were obtained through exchange or trade, like marine shell. The eastern Sierra supported populations of bighorn sheep, mule deer, antelope, and the ubiquitous black-tailed jackrabbit, while the major streams contained significant populations of trout species, all of economic importance to the Washoe. D'Azevedo (1986) states that the majority of the Washoe tended to remain near their home ranges, wintering together and dispersing into smaller mobile groups in the spring and summer. Some small groups with specific purposes likely penetrated the higher ranges and western slopes of the Sierra for specific plants or animals or perhaps for trade purposes with the mountain Nisenan (Beals, 1933; D'Azevedo, 1986).

While there were definite differences between the Washoe and the Nisenan in concepts of land tenure, these would have had little effect in the use of the Sierran regions above 3,500 feet msl. With observation of proper etiquette, areas to the west would also have been open to Washoe use (D'Azevedo, 1986).

Although contact with Europeans began with the coastal explorations by Spain during the mid-sixteenth century, the effect of European presence did not become evident until arrival of Spanish missionaries in 1769. That year initiated a period—extending into the early nineteenth century—during which missionaries implemented a process to aggregate and colonize the native inhabitants through the institutions of missions, presidios, and pueblos. The missionaries' colonizing efforts greatly affected the demography, social life, and culture of the indigenous people.

Travelers and explorers in the early nineteenth century would have encountered the Maidu, Nisenan (Southern Maidu), and Washoe living within their traditional territories. However, traditional ways of life had been deeply disrupted by disease, wars with military expeditions, enslavement, and relocation that attended Euro-American occupation of the region in the nineteenth century. Nisenan, Maidu, and Washoe communities were displaced from their lands by miners, ranchers, and others seeking to extract resources from the region.

With Mexico's independence from Spain in 1821, the missions were gradually secularized as "ranchos" that were dependent on native inhabitants for farming and ranching labor. The U.S. war with Mexico in the mid-1840s resulted in the cession of California in 1848. That same year, discovery of gold at Sutter's Mill initiated Euro-American migration into the region on an enormous scale. There soon emerged a need for food, shelter, and the infrastructure that accompanies thousands of people in a developing area. Immigrants from Europe, Asia, and elsewhere followed the miners to the gold fields to grow crops, raise cattle, harvest timber, and build towns. Roads were built over the Sierra Nevada, often following trails used by native populations for millennia.

The advent of the Gold Rush in 1849 had catastrophic effects on the Nisenan and the Washoe. While the hill and mountain Nisenan were little affected by the epidemics that raged through the Central Valley in the 1830s, the discovery of gold in their homeland was another matter. Miners descended on the region in a chaotic and frequently violent mix. The Nisenan had to abandon their traditional ways of survival to work as laborers, loggers, and ranch hands (Wilson and Towne, 1978). At the same time that they had to contend with expulsion from their own lands and the loss of their means of survival, the indigenous people of California had to deal with neglect from federal and state governments that were at best apathetic and at worst hostile.

The effects of historic settlement upon the Washoe were different in detail, but socially and culturally just as catastrophic. Washoe social organization, as noted previously, was focused largely on familial level structures and supra-familial organizations—e.g., tribal structures were unfamiliar, yet non-native society expected and demanded "chiefs" who could speak for larger groups, and where the Washoe lacked them, American society forced leaders upon them. As Euro-American settlement in California and

Nevada proceeded, the Washoe were treated as trespassers on their core lands. Traditional fishing practices around Lake Tahoe, for instance, were suppressed, and the Washoe were excluded from the resources of the lake and Truckee River. In the late nineteenth century Washoe leaders petitioned Washington, D.C. about fishery depletion and other matters; however, they received little but promises. As with the Nisenan, the Washoe, for survival's sake, found that they must assume roles in the dominant society by taking jobs in ranching, logging, and other similar pursuits. At the present, both the Nisenan and the Washoe are actively working to preserve and strengthen their societies (D'Azevedo, 1986; Wilson and Towne, 1978).

The Yuba, Bear, and American drainages intersect a number of historic mining districts where elaborate networks of ditches and flumes had been built during the mid-nineteenth century to provide power for miners. As the call for hydraulic power increased, so did the size of the ditches; providing water initially for placer mining and later for the expanding agriculture of the region. Grazing emerged as a major industry in the area and surrounding vicinity, even as the gold rush began to decline. The open ranges of the Sierra Nevada and foothills drew cattlemen, who were soon followed by sheepherders, including a significant number of Basques who had immigrated to the region in the early to mid-1800s. In the 1890s, logging, which had begun in the area in the mid-nineteenth century, became a major extractive activity of the American River Land and Lumber Company and successor companies until the Great Depression in the 1930s.

Beginning in the 1850s, numerous mining ditch companies have been involved with the evolution of water delivery and storage. Then in 1905, plans for the existing Drum-Spaulding Project, PG&E's first major hydroelectric project, were laid out by Frank G. Baum and James H. Wise. Seven years later crews of men, machines, and horses went to work. The project was designed to develop the Yuba and Bear Rivers for water supply and electric power and was instrumental in the development of long-distance transmission and represented a major construction effort.

Today, PG&E's Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects consists of 90 built-environment resources (one of these is the Drum-Spaulding Hydroelectric Historic District), including powerhouses, on-stream dams with reservoirs, off-stream impoundments, diversion dams, associated canal, tunnels, ditches, an overhead transmission line, and other features. The projects, as a whole, reflects the design conceived, surveyed, and engineered by Frank Baum and James Wise. Earlier elements of these projects, such as dams, some dating to the 1850s (pre-PG&E), were either completely rebuilt or remodeled. Throughout the last 50 years, powerhouses, dams, and other water-control and conveyance features have been added, updated, and removed as economic and technological considerations have allowed.

Development of the Yuba-Bear Project stems back to the early 1900s when community leaders sought to acquire new water rights and acquisitioned abandoned mining features (i.e., reservoirs, canals, etc.) from the California Gold Rush to form a public water system (NID, 2007). A group of southeastern Nevada County farmers and orchardists, who formed the Irrigation Club in 1915, filed an application for water rights on Upper Canyon Creek, beyond Bowman Lake (Jackson et al., 1982). On August 5, 1921, voters elected to form a new water district, which was approved by the Nevada County Supervisors. NID was officially established on August 15, 1921, and began supplying local farms with irrigation water shortly thereafter. In 1962, voters supported a $65 million bond issue to construct the Yuba-Bear Hydroelectric Project, which was built between 1963 and 1966. This resulted in new power-generation capabilities and new reservoirs and canal systems, and also created an additional 145,000 acre-feet of water storage for district residents. Two additional powerhouses (Bowman and Rollins) were added to the project in the 1980s.

The abandoned mining features that were used to form the Yuba-Bear water system initially belonged to numerous mining ditch companies that, beginning in the 1850s, were involved in the evolution of the core water-delivery system. However, today's project system, as a whole, reflects a design that was conceived, surveyed, and engineered by NID in the 1910s, constructed in the 1920s, and then completely redesigned in the 1960s (Baker, 2010). Throughout the past 150 years, dams and other water-control and conveyance features have been significantly updated as economic and technological considerations have allowed. The Yuba system of the project uses diversions along tributary creeks and regulatory reservoirs combined with conveyance features, such as tunnels, flumes, and ditches. Perhaps its most noted feature is the National Register-eligible Bowman House that was rebuilt by NID as part of California's State Emergency Relief Administration during the Great Depression of the 1930s. The house was for use by the dam tender and for employees who needed shelter while conducting work in the mountain division of the system.

**Previous Cultural Resource Investigations**

In 2007, the applicants performed records searches at the North Central Information Center (NCIC), Forest Service, Tahoe National Forest, and BLM. The searches identified previous cultural resources surveys and previously recorded archeological and historic-era resources within or directly adjacent to the project's APEs. In addition to identifying previously documented cultural resources, the research also provided background information on the archeology, history, and ethnohistory of the area that could be used to help formulate a cultural context for the cultural resources within the project's APE. The record searches encompassed all lands within the APE boundaries plus an additional 0.25-mile buffer beyond the APE boundaries. Cultural resources records and site location maps, Government Land Office maps, the National Register, California Register of Historical Resources, Office of Historic Preservation Historic Property Directory, 1996 California State Historic Landmarks, 1976 California Inventory of Historic Resources, and Caltrans Bridge Inventory were reviewed during the records searches.

PG&E conducted additional archival research in 2009 at the following locations in California: PG&E archives in San Bruno; PG&E photo archives in San Francisco; Nevada County Historical Society archives in Nevada City; and the California State Library, Government Publications in Sacramento. NID conducted additional archival research in 2008 at the following locations in California: PG&E archives in San Bruno; PG&E photo archives in San Francisco; NID archives in Grass Valley; NID archives in Colfax; and California State Library, Government Publications, in Sacramento. This research was completed to obtain additional information specific to the prehistory and history of the projects, the hydroelectric system as a whole, and the individual features of the systems. The research included contacting PG&E and NID employees, as appropriate, to gather feature-specific information.

In 2009, PG&E conducted a second record search at Tahoe National Forest and the NCIC to gather new material not available in 2007 and to expand the records search for new areas not originally included in the APE. PG&E conducted additional archival research in 2010 to facilitate National Register eligibility evaluations of cultural resources identified within the APE. The following California-based repositories are among those visited to acquire the needed information: PG&E archives in San Bruno, San Francisco, and Auburn at the Alta Service Center; Bancroft Library, University of California, Berkeley; Placer County Archives and Museum, Auburn; Nevada County Historical Society's Searles Library, the Assessment Office, and the Recorder's Office, all in Nevada City; and the California State Library in Sacramento. Research also was performed through oral histories provided by local historians. An additional records search was conducted by PG&E in 2011 prior to conducting archeological and built-environment field survey in areas not inventoried in the 2009-2010 study. The study anticipated that PG&E would conduct archival research at the Sierra County archives in Downieville, California; however, that research was not conducted because the materials available at that location were determined to not be applicable or relevant.

Record searches by PG&E between 2008 and 2011 identified 233 previous cultural resource investigations within the archival research data-gathering area (the existing Drum-Spaulding Project APE plus a 0.25-mile buffer around the APE). Of these, 197 studies are within the APE. About 50 percent of these surveys occurred more than 10 years ago; the reports of investigation associated with these surveys either provided insufficient information to determine the adequacy of the coverage employed, or described a survey coverage methodology that was overly broad and did not fully cover the surveyed areas. The previous archeological survey work conducted within the existing Drum-Spaulding Project APE documented 52 previously recorded cultural resources (archeological sites and built-environment resources) and 96 potential historic sites or features (i.e., potential historic-era resources identified on historic maps).

Of the 52 previously recorded archeological sites and/or built-environment resources in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE, 12 are prehistoric, 36 are historic, and 4 are multicomponent. The prehistoric components include lithic scatters with and without tools, milling stations, midden deposits, and petroglyphs. The historic components include foundations, roads, ditches, refuse scatters, camps, houses, a town site, dams, canals, trestle remains, quarries, a railroad grade, corrals, penstocks with debris, a wall, ranch remains, and tailings. The multicomponent sites contain evidence of both prehistoric and historic occupation.

It was found that the 52 sites previously recorded archeological sites and/or built-environment resources included some portions of the project system, which were previously evaluated as eligible for the National Register (Parks, 1990). A National Register historic district including the system was also proposed at that time (Parks, 1990). However, the evaluation was never submitted to the SHPO for concurrence. Additionally, CA-NEV-694, a lithic scatter in the Upper Drum-Spaulding Project, was previously evaluated as being eligible for listing in the National Register after testing (Macdougall, 1996), though this evaluation was never provided to the SHPO for concurrence. The site was tested again in 2002 by Tahoe National Forest and found eligible (Crawford, 2004); however, again this evaluation was not submitted to the SHPO. The site was reassessed by Tahoe National Forest in 2011 and found ineligible for listing in the National Register due to compromised integrity. The SHPO concurred with this finding in a letter dated September 21, 2011. Also, a small portion of an historic town site known as Summit City/Meadow Lake Townsite in the Upper Drum-Spaulding Project was determined ineligible with SHPO concurrence in 1999 (Macdougall, 1999). Site P-29-2959, a prehistoric quarry in the Upper Drum-Spaulding Project, was recorded and evaluated as ineligible for inclusion in the National Register in 2004 (Compas). It is unknown if the SHPO concurred with this finding. The Levey Ditch Camp, CA-NEV-434-H, that is also located in the Upper Drum-Spaulding Project was tested and evaluated as being ineligible for the National Register in 2009 (Smith); the SHPO concurred with this recommendation on December 8, 2008. The remaining previously recorded historic resources were unevaluated with regard to their National Register eligibility.

In 2011, NID conducted another records search for the Yuba-Bear Project to obtain information on any previous cultural surveys or recorded archeological and historic properties within the additional acreage added to the APE since 2009. This search encompassed the additional 236.26 acres added to the project APE and did not include a 0.25-mile buffer zone beyond these areas, as the original record searches would have mostly covered these areas.

The 2007 and 2011 records searches conducted by NID revealed that 87 cultural resources investigations were conducted within the Yuba-Bear Project study area; 47 of these studies are within the APE. About 73 percent of the previous surveys within the APE occurred more than 10 years ago, were insufficiently intensive, or provided insufficient information in the reports to determine the adequacy of the coverage. Background research further revealed that little was known regarding the development of the Yuba-Bear Project system prior to the current relicensing effort, and that the project had not been

adequately addressed in previous surveys or documents, had not been previously recorded, and were not previously evaluated for listing in the National Register. The record searches for the Yuba-Bear Project study area found that the 47 previous archeological investigations within the APE resulted in recording 16 archeological sites and 38 potential historic sites. Of the 16 archeological sites, 11 are located in the Tahoe National Forest, 3 are on private land, 1 is on PG&E land, and 1 is on NID land. Four of the 16 sites have a prehistoric component, 11 have historic components, and 1 is multicomponent (prehistoric and historic). The prehistoric sites are lithic scatters and bedrock mortars; the historic sites are refuse scatters, ditches, a quartz mine, a yellow metal mine, the Bowman Barracks camp site, a residential site, and an earthen reservoir; the multicomponent site includes a bedrock mortar and a historic refuse scatter. One of the 16 previously recorded archeological sites within the Yuba-Bear APE, the Bowman Barracks camp site, was previously evaluated as ineligible for listing in the National Register, and the SHPO concurred with this finding in a letter dated July 26, 2000. The remaining 15 previously recorded sites had not been evaluated for listing in the National Register.

In addition to the records searches described above, PG&E and NID conducted a study to identify TCPs. The study that was conducted between 2007 and 2011 included contacting the California Native American Heritage Commission (NAHC) for a list of tribes and individuals who might have an interest in the projects and subsequently contacting both recognized and non-recognized tribes and tribal members.

During the relicensing process, PG&E and NID held more than 33 joint meetings with tribes and agencies, and the applicants' ethnographer conducted interviews with about 30 individuals. PG&E and NID also requested that the NAHC review its Sacred Lands File for any potential resources in the vicinity of the projects. The NAHC did not offer whether or not any sacred lands were in the existing Drum-Spaulding and Yuba-Bear Project APE.

The PG&E and NID background review efforts, described above, included identifying previous TCP investigations and previously recorded TCPs within the APE. Additionally, this research focused on identifying any Indian Trust Assets (i.e., legal interests in assets held in trust by the federal government for Indian tribes or individual Indians) within the project APE. No previously documented TCPs were identified during the records search, although this is not unusual since few TCPs have been formally documented in California.

In addition, PG&E and NID conducted archival research for Native American information. In 2009 and 2010, with assistance by tribal members, the following archives were visited or reviewed: California State Library California History Room and Government Publications, the University of California (Berkeley) Bancroft Library, Federal Archives, the Nisenan village research of Sherry Tatsch (2006), and the public library and archives of Nevada, Placer, Plumas, Sierra, and Yuba counties. The primary John Peabody Harrington data used by Tatsch were researched, keeping a focus on families rather than the late-nineteenth- and early-twentieth-century linguistic data. The research further included an examination of the ethnographic records on file at the Yosemite Archives in Yosemite National Park; the University of Nevada, Reno, Special Collections; the Riddell papers at the California State Archives; the Hudson papers from the Field Museum in Chicago; and the Littlejohn and Merriam papers at the University of California Bancroft Library. This additional archival research in 2009 and 2010 found no record of previously documented TCPs.

**Relicensing Fieldwork Methodology**

Archeological and built environment field investigations were completed by PG&E within the existing Upper Drum-Spaulding, Lower Drum, Deer Creek, Projects APE between 2009 and 2011 and by NID within the Yuba-Bear Project APE between 2008 and 2012. The field surveys were a combination of verifying data from the earlier surveys and systematically investigating locations that had been previously but inadequately surveyed and areas that had not been previously surveyed. These surveys did

not include the land above project tunnels because there are no project operations on the surface at these locations.

For PG&E field surveys, Alan Wallace (Colfax Nisenan Maidu/Washoe), a representative of the Washoe Tribe of Nevada and California, joined the field crew in the capacity of an archeological technician. Mr. Wallace's knowledge regarding natural resources, Native American use of specific plants, and ancestral information imparted at specific sites was incorporated into individual site records, where appropriate.

For NID field surveys, members of the Native American community and agencies were invited to accompany the field crews during the surveys. A representative of the Tsi-Akim Maidu Tribe of Taylorsville Rancheria participated in about 50 percent of the archeological field survey for the Yuba-Bear Project.

In general, the field survey strategy used parallel pedestrian transects spaced no greater than 16 to 22 yards (15 to 20 meters) apart. In areas containing intermittent patches of dense vegetation or mixed areas of steep terrain with ledges or flats, where 16- to 22-yard transects were not possible, general coverage was employed. General coverage consisted of transects spaced 22 to 44 yards (20 to 40 meters) apart. Areas within the APE that could not be accessed in a safe manner (e.g., unsafe slopes, certain locations containing dense vegetation) were examined using a general survey strategy that included opportunistic transects. Lands typically inundated by project reservoirs that became accessible as a result of normal reservoir drawdowns were also examined during the survey.

PG&E and NID developed plans for evaluating the National Register eligibility of archeological sites identified within their APE in collaboration with Tribes, SHPO, participating THPOs, the National Forest, and BLM.

For PG&E, the evaluation plan identified archeological sites as being ineligible, unevaluated, or eligible for the National Register. PG&E's plan to address project-related effects, if present, at these sites follows.

- Ineligible sites: no further archeological investigation.
- Unevaluated sites: assessed for project-related effects.
    - If no project-related effects were identified, then they would not be formally evaluated for the National Register, but would be managed as if eligible for the National Register through avoidance by project O&M. If avoidance is not feasible, then PG&E would consult with the Tribes, SHPO, and other consulting parties.
    - If project-related effects were identified, then a determination was made as to whether the affected sites would be evaluated. Some unevaluated sites experiencing project-related effects were on private land and inaccessible to PG&E; for the other unevaluated sites experiencing project-related effects, PG&E proposes to eliminate project effects at those locations thereby resulting in a finding of no adverse effect.
    - Unevaluated sites with project-related effects that required further investigation are planned for National Register assessment within five years of the approval of the HPMP, unless routine monitoring indicates that a modified scheduled is required to promptly address project-related effects. The five-year schedule for evaluation was prioritized according to presumed severity of effects and efficiency of location.

- Eligible sites: assessed for project-related effects.

    - For eligible sites with no project-related effects, PG&E plans to avoid and monitor these sites as outlined the HPMP section 4.3, *Proposed Management Measures*.

    - Eligible sites that are experiencing project-related effects and the one site that requires further work to determine if project-related effects are present, PG&E would resolve the adverse effects following protocols detailed in the Historic Properties Evaluation and Treatment Plan (HPETP) (HPMP appendix H). Resolution measures would begin within 3 years of a determination of adverse effect to a historic property. Pending implementation of the evaluation and treatment plan for these sites or a determination of effect, these sites would be monitored, as outlined in the HPMP section 4.3.5.

For NID, the evaluation plan identified the National Register eligibility of archeological sites as follows: (1) resources that were evaluated based on field data collected during the inventory stage; (2) resources that required additional investigation to determine National Register eligibility; (3) resources that were experiencing no project-related effects and would not be formally evaluated, but would managed as if eligible for the National Register through avoidance by project O&M; and (4) resources that were previously evaluated for listing in the National Register that required no further study.

In 2010, NID also conducted National Register evaluation investigations of two archeological sites located at Greenhorn campground on Rollins reservoir (Risse et al., 2013). The investigations were initiated because of ongoing disturbances resulting from recreational use, operations of the campground, and erosion caused by fluctuating water levels of the reservoir. In addition, the initial archeological investigations at one site suggested that it had the potential to contain human burials. As a result, NID took immediate action outside the relicensing effort to address ongoing effects at these two sites. Investigations followed the National Register evaluation and treatment plan approved by the SHPO on September 21, 2010, and consisted of systematic surface collecting and subsurface shovel testing, feature excavation, backhoe trenching, osteology and faunal analysis, and soil analysis. April Moore, Nisenan/Maidu, served as tribal monitor during the field investigations; and Marcos Guerrero, Cultural Resource Specialist for the UAIC, helped coordinate tribal field technicians.

Also in 2010, PG&E completed its study of the existing Drum-Spaulding Project built environment, which included documentation and National Register evaluation of the project system (e.g., powerhouses, dams, switchyards, and conduits). NID's study of the Yuba-Bear Project's built environment was completed in 2008.

**Identified Resources**

**Archeological and Historic Era Resources**

*Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects*

PG&E identified 218 archeological sites and 125 isolated artifacts or features within the APE of the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. One of these is the Spaulding Dam Construction Discontiguous Archeological District that has nine contributing sites; two of these nine sites are also individually eligible for the National Register. One other archeological site is not eligible individually, but is eligible as a contributing element to the Drum-Spaulding Hydroelectric System and Historic District.

The 125 isolated resources found during the survey include prehistoric or historic-era deposits that are not substantial enough to warrant recordation as archeological sites. Isolates are generally sparse in content, containing fewer than 5 or 10 items and/or occur in secondary (redeposited) context.

Of the 218 archeological sites, 164 are newly identified, 53 are sites that were recorded by other investigations and revisited, and 1 site number is assigned to the Spaulding Dam Construction Discontiguous Archeological District. The 218 archeological resources are comprised of 43 prehistoric sites, 165 historic sites, and 10 multicomponent sites. The majority (71.1% or 155) of the 218 archeological sites is located within the Upper Drum-Spaulding Project; 39 sites are located in the Lower Drum Project and 24 are within the Deer Creek Project.

PG&E has preliminarily examined the National Register eligibility of the 218 sites; 19 were found to be eligible for the National Register individually and/or as contributing elements to a National Register district, 103 were found to be ineligible for the National Register, and the remaining 96 sites could not be assessed based on archival research and field observations. The 96 unevaluated sites are considered potentially eligible pending further research. The National Register eligibility of the 218 archeological sites is summarized in table 3-229.

Table 3-229. Summary of the archeological sites and National Register status in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE. (Source: PG&E, 2013)

| Eligibility Status by Project | Prehistoric Sites | Historic Sites | Multicomponent Sites | Total Number of Sites |
|---|---|---|---|---|
| **Eligible Individually and/or as a Contributing Element to a National Register District** | | | | |
| Upper Drum-Spaulding | 4 | 15 | 0 | 19 |
| Lower Drum | 0 | 0 | 0 | 0 |
| Deer Creek | 0 | 0 | 0 | 0 |
| Total Eligible | 4 | 15 | 0 | 19 |
| **1. Unevaluated and Considered Potentially Eligible for the National Register** | | | | |
| Upper Drum-Spaulding | 18 | 42 | 5 | 65 |
| Lower Drum | 7 | 9 | 1 | 17 |
| Deer Creek | 3 | 8 | 3 | 14 |
| Total Unevaluated | 28 | 59 | 9 | 96 |
| **2. Ineligible Individually or as a Contributing Element to a National Register District** | | | | |
| Upper Drum-Spaulding | 10 | 60 | 1 | 71 |
| Lower Drum | 1 | 21 | 0 | 22 |
| Deer Creek | 0 | 10 | 0 | 10 |
| Total Ineligible | 11 | 91 | 1 | 103 |
| Total Upper Drum-Spaulding | 32 | 117 | 6 | 155 |
| Total Lower Drum | 8 | 30 | 1 | 39 |
| Total Deer Creek | 3 | 18 | 3 | 24 |
| Total Upper Drum-Spaulding, Lower Drum, and Deer Creek | 65 | 347 | 12 | 424 |

The 19 sites that are eligible for the National Register including the National Register Archeological District are located within the Upper Drum-Spaulding Project. Of the 103 sites that have been determined to be ineligible for the National Register, 71 are located in the Upper Drum-Spaulding Project, 22 are in the Lower Drum Project, and 10 are in the Deer Creek Project. The majority (67.7% or 65) of the 96 unevaluated, but potentially eligible sites, is located in the Upper Drum-Spaulding Project; 17 are within the Lower Drum Project and 14 are in the Deer Creek Project. The SHPO concurred with all eligibility determinations in letters dated May 18, 2012, December 21, 2012, and August 1, 2013. PG&E acknowledges that though some resources have been determined ineligible for inclusion in the National Register, they are still important to the Tribes.

Of the 218 archeological sites, 43 are prehistoric, 165 are historic, and 10 are multicomponent sites that contain both historic and prehistoric components. Of the 43 prehistoric sites, the majority (n=32) are located in the Upper Drum-Spaulding Project; 8 in the Lower Drum Project and 3 in the Deer

Creek Project. The majority (70.9% or 117) of the 165 historic sites is located in the Upper Drum-Spaulding Project; the Lower Drum Project has 30 historic sites and the Deer Creek Project has 18 historic sites. Of the 10 multicomponent sites, 6 are in the Upper Drum-Spaulding Project, 1 is in the Lower Drum Project, and 3 are in the Deer Creek Project. A summary of the prehistoric, historic, and multicomponent sites follows.

Prehistoric Site Types

The 43 prehistoric sites are defined by 4 site types: lithic scatters, bedrock milling stations, occupation sites, and rock art sites (table 3-230).

Table 3-230. Summary of prehistoric site types in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE. (Source: PG&E, 2013)

| Prehistoric Site Type by Project | Number of Sites | Percentage of Prehistoric Site Types |
|---|---|---|
| Lithic Scatters | | |
| Upper Drum-Spaulding | 21 | |
| Lower Drum | 2 | |
| Deer Creek | 3 | |
| Total Lithic Scatters | 26 | 60.5 |
| Bedrock Milling Stations | | |
| Upper Drum-Spaulding | 5 | |
| Lower Drum | 4 | |
| Deer Creek | 0 | |
| Total Bedrock Milling Stations | 9 | 20.9 |
| Occupation Sites | | |
| Upper Drum-Spaulding | 2 | |
| Lower Drum | 2 | |
| Deer Creek | 0 | |
| Total Occupation Sites | 4 | 9.3 |
| Rock Art Sites | | |
| Upper Drum-Spaulding | 4 | |
| Lower Drum | 0 | |
| Deer Creek | 0 | |
| Total Rock Art Sites | 4 | 9.3 |
| Total Upper Drum-Spaulding | 32 | 86.05 |
| Total Lower Drum | 8 | 6.975 |
| Total Deer Creek | 3 | 6.975 |
| Total Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects | 51 | 109.3 |

Four of the 43 prehistoric sites have been determined to be eligible for the National Register, 28 have been unassessed and are considered to be potentially eligible for the National Register, and 11 are ineligible. The four National Register-eligible prehistoric sites are rock art sites located in the Upper Drum-Spaulding Project. These rock art sites vary from one to several petroglyph panels with a few elements to a site with many panels and more than 100 elements. The 28 prehistoric sites that are potentially eligible for the National Register include 18 sites (14 lithic scatters, 3 bedrock milling stations,

and 1 occupation site) in the Upper Drum-Spaulding Project, 7 sites (2 lithic scatters, 3 bedrock milling stations, and 2 occupation sites) in the Lower Drum Project; and the 3 prehistoric lithic scatters in the Deer Creek Project. Of the 11 prehistoric sites that are ineligible for the National Register, 10 are located in the Upper Drum-Spaulding Project and 1 is in the Lower Drum Project. The Upper Drum-Spaulding prehistoric sites that are not eligible for the National Register are seven lithic scatters, two milling stations, and one occupation site. The on Lower Drum Project prehistoric site that is not eligible for the National Register is a bedrock milling station.

*Lithic Scatters*—Lithic scatters (n=26) are the most predominate prehistoric site type, representing 60.5 percent of the prehistoric sites. Lithic artifacts are primarily composed of basalt and are identified as debitage, projectile points, and bifaces. Some of the sites, particularly around the Peak lakes and Kelly Lake in the Upper Drum-Spaulding Project, were characterized by a predominance of cryptocrystalline silicate flakes and tools. Obsidian was occasionally noted but rarely in abundance, usually comprising less than 4 percent of the total artifact assemblage.

The majority (n=21) of the lithic scatters are located in the Upper Drum-Spaulding Project; there are 2 in the Lower Drum Project and 3 in the Deep Creek Project.

Of the 26 prehistoric lithic scatters, 7 were ineligible for the National Register; all 7 are located in the Upper Drum-Spaulding Project. Nineteen prehistoric lithics scatters were unevaluated and are considered to be potentially eligible for the National Register, and none were determined to be eligible for the National Register. Of the 19 unevaluated prehistoric lithic scatters that are considered to be potentially eligible for the National Register, 14 are located within the Upper Drum-Spaulding Project, 2 are located in the Lower Drum Project, and 3 are located in the Deer Creek Project.

*Bedrock Milling Stations*—Bedrock milling stations (n=9) represent 20.9 percent of the prehistoric sites. These sites range from a single mortar cup on a bedrock outcrop with no associated material, to a site with 3 mortar cups and 11 grinding slicks. The average milling station contained less than four mortar cups.

Five of the bedrock milling stations are in the Upper Drum-Spaulding Project and four are in the Lower Drum Project and none are in the Deer Creek Project.

Three of the nine milling stations are not eligible for the National Register; one of the three is in the Lower Drum Project and the other two are in the Upper Drum-Spaulding Project. The remaining six bedrock milling stations have not been evaluated for the National Register and are considered to be potentially eligible for the National Register. Of these six, three are in the Upper Drum-Spaulding Project and three are in the Lower Drum Project.

*Occupation Sites*—Occupation sites (n=4) represent 9.3 percent of the prehistoric sites. These sites contained dense quantities of lithic debitage, flaked stone tools, and groundstone implements. All four of the prehistoric occupation sites had associated portable groundstone milling equipment. One occupation sites was defined further by the presence of a midden, house pits features, a dance house depression.

Two of the four occupation sites are located in the Upper Drum-Spaulding Project and two are in the Lower Drum Project; none are in the Deer Creek Project.

Three of the four prehistoric occupation sites were unassessed and are considered to be potentially eligible for the National Register; one of the three is within the Upper Drum-Spaulding Project and two are located within the Lower Drum Project. The fourth occupation site was determined to be ineligible for the National Register; it is located within the Upper Drum-Spaulding Project.

*Rock Art*—The four rock art sites represent 9.3 percent of the prehistoric sites. These sites were found in the high Sierra from elevations of 5,790 to 6,340 feet msl. All of the rock art sites are located in the Upper Drum-Spaulding Project (Kelly Lake, Fordyce reservoir, and Lake Valley reservoir) and have been determined to be eligible for the National Register. The petroglyphs are classified as Style 7, following Payen's (1966) and Foster et al.'s (1998) characterization. Sierran Style 7 sites are relatively rare; at the time of the field investigation, only 137 of these sites had been found confined to a 3-county area.

Historic Site Types

Of the 165 historic sites documented in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects, the majority (n=91 or 55.2 percent) have been determined to be ineligible for the National Register, 59 have not been assessed and are considered to be potentially eligible for the National Register, and 15 are eligible for the National Register. Of the 165 historic sites, the majority (70.9% or 117) is located in the Upper Drum-Spaulding Project; 30 are in the Lower Drum Project and 18 are in the Deer Creek Project.

The 165 historic sites represent 10 activity themes (transportation, mining, water conveyance and storage, hydroelectric-related, ranching, logging, recreation, settlement, unassociated refuse deposits, and other). Table 3-231 summarizes the 165 historic sites by type. A summary of the sites that have been categorized into the ten activity themes follows.

Table 3-231. Summary of historic site types in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE. (Source: PG&E, 2013)

| Historic Site Type by Project | Number of Sites | Percentage of Historic Site Types |
|---|---|---|
| Transportation | | |
| Upper Drum-Spaulding | 10 | |
| Lower Drum | 4 | |
| Deer Creek | 1 | |
| Total Transportation | 15 | 9.1 |
| Mining | | |
| Upper Drum-Spaulding | 13 | |
| Lower Drum | 4 | |
| Deer Creek | 1 | |
| Total Mining | 18 | 10.9 |
| Water Conveyance and Storage | | |
| Upper Drum-Spaulding | 21 | |
| Lower Drum | 8 | |
| Deer Creek | 7 | |
| Total Water Conveyance | 36 | 21.8 |
| Hydroelectric-Related | | |
| Upper Drum-Spaulding | 39 | |
| Lower Drum | 6 | |
| Deer Creek | 5 | |
| Total Hydroelectric-Related | 50 | 30.3 |
| Ranching | | |
| Upper Drum-Spaulding | 3 | |
| Lower Drum | 4 | |
| Deer Creek | 0 | |
| Total Ranching | 7 | 4.3 |
| Logging | | |
| Upper Drum-Spaulding | 4 | |
| Lower Drum | 0 | |
| Deer Creek | 2 | |
| Total Logging | 6 | 3.6 |
| Recreation | | |
| Upper Drum-Spaulding | 1 | |
| Lower Drum | 0 | |
| Deer Creek | 0 | |
| Total Recreation | 1 | 0.6 |
| Settlement | | |
| Upper Drum-Spaulding | 6 | |
| Lower Drum | 1 | |
| Deer Creek | 0 | |
| Total Settlement | 7 | 4.3 |
| Refuse Deposit | | |
| Upper Drum-Spaulding | 17 | |
| Lower Drum | 1 | |
| Deer Creek | 2 | |
| Total Refuse Deposit | 20 | 12.1 |

| | | |
|---|---|---|
| Other | | |
| Upper Drum-Spaulding | 4 | |
| Lower Drum | 1 | |
| Deer Creek | 0 | |
| Total Other | 5 | 3.0 |
| Total Upper Drum-Spaulding | 117 | 70.9 |
| Total Lower Drum | 30 | 18.2 |
| Total Deer Creek | 18 | 10.9 |
| Total Upper Drum-Spaulding, Lower Drum, and Deer Creek | 175 | 103 |

*Transportation*—Fifteen historic sites are reflective of the region's transportation network. The earliest routes are represented by segments of emigrant trail; remnants of mule trails used by miners to move through rugged country, wagon and toll roads built to haul freight into the miners, roads related to hydroelectric development, and twentieth-century highway routes were also identified.

Ten of the 15 transportation-related sites are in the Upper Drum-Spaulding Project; 4 are in the Lower Drum Project, and 1 is in the Deer Creek Project. Of the 15 transportation-related historic archeological sites, 7 have been identified as being unevaluated or potentially eligible for the National Register. One of the seven potentially eligible transportation sites is located in the Deer Creek Project; this site consists of a well-defined 300-ft section of the Truckee-Donner Emigrant Trail. The remaining six are located in the Upper Drum-Spaulding Project and include an abandoned road grade leading to a mining site; an abandoned road segment, possibly the ca. 1860-1920 Mendoza to Meadow Lake Road with rock retaining wall; abandoned road (S-20) segment and bridge; abandoned historic road grade with two stacked rock walls and a concrete platform primarily used ca. 1910-1927, possibly used ca. 1860; abandoned ca. 1860-1930 wagon road to Meadow Lake; and a road grade with rock retaining walls likely related to ca. 1930 National Quartz Mine. Of the eight transportation-related sites that are not eligible for the National Register, four are located in the Upper Drum-Spaulding Project and four are in the Lower Drum Project. These ineligible sites are described as abandoned road segments and bridge abutments, an historic hiking trail known as "Meadow Lake Trail," and the remains of a wooden trestle footing.

*Mining*—Eighteen historic sites were assigned a mining function. Mining sites were defined as sites related to the extraction and processing of minerals. Extraction sites include prospect pits, adits, shafts, sluice mining channels, hydraulic mining waste areas, and stacked rock tailings. Processing sites include one stamp mill that was recorded at Fordyce reservoir in the Upper Drum-Spaulding Project. Related residential areas found in association with extraction sites were also assigned to mining. In general, these sites are clustered within known historic mining districts, such as Meadow Lake and Lowell Ridge in the Upper Drum-Spaulding Project.

Thirteen of the 18 mining sites are located in the Upper Drum-Spaulding Project, 4 are in the Lower Drum Project, and 1 is in the Deer Creek Project. Of the 18 historic mining sites, 11 have not been unevaluated and are considered to be potentially eligible for the National Register. Nine of the 11 unevaluated mining sites are located in the Upper Drum-Spaulding Project; these are the ca. 1930 National Quartz Mine; a ca. 1930 intact mine site with adits, foundations, penstock, crusher, water system, roads, a stamp mill, and prospect pits; a ca. 1863-1870 mine site in the Meadow Lake area with prospect pits, foundations, and trash; ca. 1800 mining site with rock walls, brick scatter, and historic road segment; ca. 1950 hydraulic mining tailings with check dam/ditch; ca. 1870-1901 Elmore Hill Mine; hydraulic mine tailings associated with the ca. 1870-1950 Polar Star Mine; mine tailings related to the ca. 1950 Polar Star Drift Mine; and ca. 1870-1884 sluice air shaft/adit tunnel associated with the Polar Star or Southern Cross mine. The other two unassessed mining sites are located in the Lower Drum Project (a ca.

1850-1890 mine site with pits, tailings, and refuse deposits) and in the Deer Creek Project (a ca. 1930-1950 trash scatter associated with mining activity).

The remaining seven mining-related sites are not eligible for the National Register; four of these are located in the Upper Drum-Spaulding Project and three are in the Lower Drum Project. These sites consist of tailings, adits, pits, and historic refuse that lack integrity and potential to yield significant data.

*Water Conveyance and Storage*—Thirty-six sites represent resources built specifically for the storage and/or conveyance of water. The majority of these are ditches, although a few crib or check dams were also identified. Most of the ditches are assumed to have originated in the nineteenth century for use during mining operations, though their exact age is often unknown. There are several ditches, however, that were built in the first quarter of the twentieth century for hydroelectric development. Ditches range from narrow, shallow, short earthen channels with few distinguishing elements to deep, wide, prominent conveyance features with stacked rock sides, cut-and-fill sections, and other defining characteristics. Related features found with the ditches range from a small concrete weir or check dam to a massive log crib dam. The larger ditches, often depicted on historic maps, are sometimes labeled, i.e., Liberty Hill Ditch in the Deer Creek Project, and have clear mining-related origins; although most were reused for irrigation or hydroelectric development in the twentieth century. One ditch in the Upper Drum-Spaulding Project appears to have been constructed by Chinese laborers, ca. 1860-1870, based on the artifacts recovered from the site. Another water-conveyance site is a portion of the Chalk Bluff Ditch located in the Deer Creek Project that dates to the gold-rush era; a portion of the site within the APE has been filled and improved to create access roads and has subsequently lost its character-defining elements; this part of the site is not eligible for the National Register.

The majority of the 36 water-conveyance and storage sites have been recorded in the Upper Drum-Spaulding Project (n=21); the Lower Drum has 8 water-conveyance and storage sites and Deer Creek Project has 7. Twenty-one of the 36 water-conveyance and storage resources have been identified as being unevaluated or potentially eligible for the National Register. The majority of these sites (61.9% or 13) are located in the Upper Drum-Spaulding Project, 4 are in the Lower Drum Project, and 4 are in the Deer Creek Project.

The 14 Upper Drum-Spaulding water-conveyance sites that are potentially eligible for the National Register are a wood crib and dam; a ca. 1860 riveted penstock and ditch with some rock support; ca. 1874-1920 earthen secondary ditch of Blue Tent Co. with gate foundation remnant; linear rock foundations and berm for pipe; a segment of ca. 1852 Little York ditch; ca. 1855 North Fork ditch/canal, abandoned in 1955; several sections of ditches with intact rock walls; ca. 1913 abandoned Drum canal; a ditch near Dutch Flat tunnel; a ca. 1850-1913 mining ditch with concrete headgate and prospect pit; a ca. 1860-1870 ditch associated with a Lower Drum Project sites are a small earthen nineteenth-century mining ditch; ca. 1850-1910 abandoned riveted penstock; and a small earthen and rock wall ditch, probably associated with mining. The three Lower Drum Project water-conveyance sites that are potentially eligible for the National Register are two small earthen nineteenth-century ditches and an abandoned ca. 1850-1910 riveted penstock. And, the four unevaluated water-conveyance sites in the Deer Creek Project are a segment of the Deer Creek canal, the ca. 1830-1920 Liberty Hill mining ditch, an undated ditch segment, and a nineteenth-century ditch.

The remaining 15 water conveyance/storage sites are not eligible for the National Register; 8 of these are located in the Upper Drum-Spaulding Project, 4 are in the Lower Drum Project, and 3 are in the Deer Creek Project.

*Hydroelectric Related*—Hydroelectric-related historic sites (n=50) represent 30.3 percent of the historic resources in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project APE. These sites were identified as being related to the building and maintenance of the Upper Drum-Spaulding, Lower

Drum, and Deer Creek Projects and include sites related to the construction and maintenance of the system and sites related to residential occupation. Construction sites include cement batch plants, quarries, railroads, crane foundations, and work areas occupied during construction. Maintenance sites are sites that were used for many years solely for the maintenance of canals, powerhouses, dams, and other hydroelectric features. Twelve sites are related to housing employees who worked on the project features. These sites include small, discrete dam and ditch tender's residences that were often occupied on a year-round basis to larger camps multiple dwellings or bunkhouses used seasonally by crews. Many of the larger temporary construction camps were converted to permanent residential use once the building phase was complete, with occupancy continuing through the 1950s. If a site contained obvious activity areas related to the construction effort (blacksmithing areas, stables, cement plant, etc.), it was assigned a construction function, even if a residential component was also identified.

The majority (78 percent) of the hydroelectric-related sites are located in the Upper Drum-Spaulding Project (n=39); of the remaining 11 sites, 6 are in the Lower Drum Project and 5 are in the Deer Creek Project. Twelve of the 50 hydroelectric-related sites are eligible for the National Register; all 12 are located in the Upper Drum-Spaulding Project. These include the Spaulding Dam Construction Discontiguous Archeological District; a ca. 1904-1927 dam tenders house, sections of the historic ca. 1891-1912 Brice & Smart railroad and the ca. 1912-1928 PG&E railroad; ca. 1912-1928 construction foundations and quarry pits; and several sites with ca. 1912-1928 industrial debris. In addition to the 12 eligible hydroelectric-related sites, there are 13 hydroelectric-related sites that have been recommended for further evaluation and are considered to be potentially eligible for the National Register. Nine of the 13 sites that are potentially eligible for the National Register are located at the Upper Drum-Spaulding Project, 3 are located in the Lower Drum Project, and 1 (ca. 1920-1982 ditch tender's house site) is in the Deer Creek Project. The remaining 25 hydroelectric-related sites are determined to be ineligible for the National Register; of these, 18 are located in the Upper Drum-Spaulding Project, 3 are in the Lower Drum Project, and 4 are in the Deer Creek Project.

*Ranching*— Seven sites were attributed to ranching activities, which include corrals, residential areas used as base camps for cattle or sheep herding, and trash scatters affiliated with low-elevation ranch houses. In addition, several abandoned barns were discovered, sometimes affiliated with a collapsed corral. These barns were standing, with roofs and interior features intact, and were recorded as architectural resources.

Of the seven ranching sites, three are located in the Upper Drum-Spaulding Project and four are in the Lower Drum Project. No ranching sites are located in the Deer Creek Project. Two of the seven ranching sites were unassessed for National Register eligibility and are considered to be potentially eligible for the National Register. One of these sites is located in the Lower Drum Project and consists of ca. 1920-1960 trash from a nearby ranch the other site is in the Upper Drum-Spaulding Project and is identified as the ca. 1800-1975 Carpenter Flat Cowboy Camp. The remaining five ranching sites are not eligible for the National Register; of these two are in the Upper Drum-Spaulding Project and three are in the Lower Drum Project.

*Logging*—Cutting timber has a long history in the Sierra, beginning during the California gold-rush era that began in 1849. Six sites were assigned a logging function. Of these six, four are in the Upper Drum-Spaulding Project and two are in the Deer Creek Project. Two of the six logging sites were determined to be eligible for the National Register; both sites are located in the Upper Drum-Spaulding Project. They are a ca. 1891-1912 logging work camp and railroad trestles along the shoreline of Lake Spaulding and a ca. 1920 stream donkey/trash scatter. Another one of the six logging sites (segments of the ca. 1861-1907 Towle Bros. Railroad in the Deer Creek Project) was unassessed and is considered to be potentially eligible for the National Register. Three logging sites were determined to be ineligible for the National Register. These include the ca. 1861-1907 railroad grade on Lowell Hill Road located in the

Deer Creek Project and two locations in the Upper Drum-Spaulding Project that were identified as possible logging camps based on ca. 1940-1950 artifact scatter.

*Recreation*—The Sierra Nevada has long been recognized for its recreational value. As such, many of the lakes within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project APE contain recreational facilities including summer vacation homes; hunting lodges; organized camps for Girl Scouts, Boy Scouts, and religious groups; and established PG&E and Forest Service campgrounds. However, there is only one archeological site that has been identified as having been definitely designed, built, and used exclusively for a recreational purpose. This archeological site is the Sierra Club Ski Hut at White Rock Lake in the Upper Drum-Spaulding Project. The hut was one of six built by the ski club in the 1920s and 1930s and was used seasonally for a number of years. The site was determined to be ineligible for the National Register due to lack of integrity and information potential.

*Settlement*—Settlement sites were divided into two categories: town sites and house sites. Town sites were identified through archival research as locations that once contained a variety of residential and commercial buildings and/or structures. Two town sites were found during the project research: the ca. 1866 Summit City/Meadow Lake Town Site and the ca. 1860-1870 Hudsonville/East Shore Mine Site. Both are located within the Meadow Lake Mining District of the Upper Drum-Spaulding Project. They represent ca. 1860-1875 settlement of the area. Summit City is eligible for the National Register; Hudsonville is not eligible due to a lack of integrity as a result of past logging activity.

In addition to the two town sites, five individual house/cabin sites were found. Four are located in the Upper Drum-Spaulding Project and one is in the Lower Drum Project. These sites typically contain a house pad or rock foundation and associated historic debris related primarily to domestic use. These sites may have been homesteads or may have been used seasonally or for a short period of time. The occupation date range for the house/cabin sites is ca. 1860-1940. Two of the five house/cabin sites are potentially eligible for the National Register. These are the ca. 1865-1870 Mendoza house site and a ca. 1860-1870 house site with structural debris and an artifact scatter. Two additional settlement sites in the Upper Drum-Spaulding Project are a ca. 1900 house site and a ca. 1920-1940 cabin site that are not eligible for the National Register. The Lower Drum Project settlement site is a ca. 1930-1950 concrete foundation slab and artifact scatter that is not eligible for the National Register.

*Refuse Deposits*—Twenty historical sites were classified as refuse deposits with no known association or historical context. It is likely that many of these sites represent casual discard of garbage by campers, hunters, anglers, and others pursuing recreational activities. Without definite contextual affiliations, however, the random metal can dumps and discrete trash scatters are assigned to a general refuse disposal activity and not specifically to recreational use function.

Typically, these sites consist of discrete piles of metal cans, ranging from a dozen or so to hundreds of these containers. A minimal amount of glass (usually from alcohol or condiment bottles) or ceramics was observed at a few sites. The majority of refuse deposits represent late 1940s to early 1960s use of the project.

Seventeen of the 20 refuse deposits are located in the Upper Drum-Spaulding Project, 1 is in the Lower Drum Project, and two that consist of ca. 1920-1950 trash scatters are within the Deer Creek Project. Two of the 20 refuse deposits have been recommended as being potentially eligible for the National Register. Both are located in the Upper Drum-Spaulding Project. One potentially eligible refuse deposit has late-1910 to early-1920 artifacts, penstock fragments that are possibly related to the Drum canal construction, and the potential for intact subsurface deposits. The other is a 1930-1940 trash scatter near "Gilson's Gas Station." The other 18 refuse deposits are not eligible for the National Register. Most of these are in the Upper Drum-Spaulding Project; one is in the Lower Drum Project and two are located in the Deer Creek Project.

*Other*—Five sites have an unknown historical function and were assigned as "Other." These include a concrete foundation and structural debris; a concrete slab and pier footing foundation; an area with logging ditches, cuts, depressions, and trenches; a ca. 1951 concrete slab foundation; and a cable river crossing area with cable anchor pads and a small trash scatter. None of these resources are eligible for the National Register. Two are in the Lower Drum Project; the other three are in the Upper Drum-Spaulding Project. None are located in the Deer Creek Project.

Multicomponent Site Types

Ten multicomponent sites were identified within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE (table 3-232). Of the ten multicomponent sites, the majority (60% or 6) is located in the Upper Drum-Spaulding Project; one is in the Lower Drum Project and three are in the Deer Creek Project.

Table 3-232. Summary of multicomponent site types in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE. (Source: PG&E, 2013)

| Multicomponent Site Type by Project | Number of Sites | Percentage of Multicomponent Site Types |
|---|---|---|
| Primarily prehistoric with historic elements | | |
| Upper Drum-Spaulding | 3 | |
| Lower Drum | 0 | |
| Deer Creek | 2 | |
| Total primarily prehistoric with historic elements | 5 | 50 |
| Primarily historic with prehistoric lithics | | |
| Upper Drum-Spaulding | 3 | |
| Lower Drum | 1 | |
| Deer Creek | 1 | |
| Total primarily historic with prehistoric lithics | 5 | 50 |
| Total Upper Drum-Spaulding | 6 | 60 |
| Total Lower Drum | 1 | 10 |
| Total Deer Creek | 3 | 30 |
| Total Upper Drum-Spaulding, Lower Drum, and Deer Creek | 10 | 150 |

In general, five of the ten multicomponent sites are dominated by lithic debitage and contain chronologically sensitive tools, obsidian flakes, and other artifacts but have a few metal cans and/or glass fragments on the surface; the other five sites are dominated by historic material with a few lithic artifacts. Of the five primarily prehistoric sites, three are located in the Upper Drum-Spaulding Project and two are in the Deer Creek Project. Of the five primarily historic sites, three are located in the Upper Drum-Spaulding Project; two of these sites are mining-related sites (ca. 1865-1870) within the historic Meadow Lake Mining District and contain foundation pads, intact refuse deposits, and other features. The remaining two primarily historic sites are located in the Upper Drum and Deer Creek Project.

Nine of the 10 multicomponent sites have not been evaluated and are therefore considered to be potentially eligible for the National Register. These include seven sites in the Upper Drum-Spaulding Project that are three discrete locations with prehistoric lithic scatters with historic trash scatter; a bedrock milling station with historic debris; an extensive prehistoric occupation/lithic reduction site with historic

trash; a prehistoric lithic scatter with ca. 1980-1870 structural debris and trash; and a ca. 1910-1920 mining prospect pit and historic trash with seven prehistoric flakes. There is one multicomponent site that is potentially eligible for the National Register located in the Lower Drum Project; this site described as a historic ca. 1913-1916 artifact scatter and three prehistoric flakes. The ninth potentially eligible multicomponent site is located in the Deer Creek Project; this site a small prehistoric lithic scatter with two historic cans.

Only one multicomponent site (a sparse lithic scatter with historic bottle fragments) in the Upper Drum-Spaulding Project has been tested and found to be ineligible for the National Register.

*Yuba-Bear Project*

NID identified 147 archeological resources (113 archeological sites and 34 isolated artifacts) in the Yuba-Bear Project APE. The archeological sites are 14 previously recorded resources and 99 newly discovered resources. Two of the 14 previously recorded resources identified during background research were not encountered in the APE. Of the 113 recorded archeological sites in the APE, 9 are prehistoric, 97 are historic, and 7 are multicomponent sites that contain cultural remains associated with both prehistoric and historic occupation and/or use.

NID examined the National Register eligibility of 74 of the 113 archeological sites at the inventory stage based on archival research and field observations and the National Register eligibility of 2 sites in 2010 following an approved testing plan (table 3-233). Of the 76 evaluated sites, all were determined to be ineligible for listing in the National Register; the ineligible recommendations for two sites that were tested in 2010 and are pending SHPO concurrence (Risse et al., 2013).

Table 3-233. Summary of the 76 evaluated archeological sites and National Register status in the Yuba-Bear Project APE. (Source: NID, 2012, Risse et al., 2013)

| National Register Status | Prehistoric Sites | Historic Sites | Multicomponent Sites | Total Number of Sites |
|---|---|---|---|---|
| Eligible | 0 | 0 | 0 | 0 |
| Potentially Eligible | 0 | 0 | 0 | 0 |
| Ineligible | 0 | 72 | 2 | 74 |
| Ineligible, pending SHPO concurrence | 0 | 1 | 1 | 2 |
| Total | 0 | 73 | 3 | 76 |

The other 37 prehistoric, historic, and multicomponent archeological sites were not evaluated for the National Register. The unevaluated sites include 12 that are experiencing project-related effects, 23 that are not experiencing project-related effects, 1 (Bowman Barracks camp) that was previously determined ineligible, and 1 (an historic-era habitation site) that was not relocated. The 34 isolated artifacts do not provide enough data relevant to understanding past events; therefore, these resources were not considered for listing in the National Register. Table 3-234 summarizes the status of the 37 unassessed archeological sites.

Table 3-234. Summary of the 37 unevaluated archeological sites in the Yuba-Bear Project APE. (Source: NID, 2012)

| Effects | Prehistoric Sites | Historic Sites | Multi-component Sites | Number of Sites |
|---|---|---|---|---|
| Unevaluated Sites Experiencing Project-Related Effects | 4 | 5 | 3 | 12 |
| Unevaluated Sites Experiencing No Project-Related Effects | 5 | 17 | 1 | 23 |
| Previously Recorded Site – Ineligible for the National Register | 0 | 1 | 0 | 1 |
| Previously Recorded Site – Unable to Relocate | 0 | 1 | 0 | 1 |
| Total | 9 | 24 | 4 | 37 |

Prehistoric Site Types

Of the 37 unevaluated archeological sites recorded in the APE, 9 are exclusive to prehistoric use (table 3-235). Occupation sites were the most common prehistoric site type encountered and contained a variety of flaked and groundstone tools. The two other prehistoric site types are lithic scatters (n=2) and bedrock milling stations (n=3). The nine unevaluated prehistoric sites are being treated as if they are eligible for listing in the National Register. One of the two lithic scatters and three of the four occupation sites are experiencing project-related effects and are scheduled to be evaluated for National Register eligibility within five years following license issuance. Two unassessed prehistoric sites (one lithic scatter and one occupation site) are not experiencing project-related effects and are not planned for further evaluation, at this time.

Table 3-235. Summary of unevaluated prehistoric site types in the Yuba-Bear Project APE. (Source: NID, 2012)

| Prehistoric Site Type | Number of Sites | Percentage of Prehistoric Site Types |
|---|---|---|
| Lithic Scatters | 2 | 22.2 |
| Bedrock Milling Stations | 3 | 33.3 |
| Occupation Sites | 4 | 44.4 |
| Total | 9 | 99.9 |

Historic Site Types

There are 97 historic sites documented in the Yuba-Bear Project APE. These resources reflect land-use themes centering on transportation, mining, water conveyance and storage, hydroelectric related, settlement, refuse deposits, and other. The historic resources are summarized in table 3-236 and are described below.

Table 3-236. Summary of historic site types in the Yuba-Bear Project APE. (Source: NID, 2012)

| Historic Site Type | Number of Sites | Percentage of Historic Site Types |
|---|---|---|
| Transportation | 5 | 5.15 |
| Mining | 31 | 31.96 |
| Water Conveyance and Storage | 14 | 14.43 |
| Hydroelectric Related | 9 | 9.28 |
| Settlement | 13 | 13.40 |
| Refuse Deposits | 18 | 18.56 |
| Other | 7 | 7.22 |
| Total | 100100 | 7.227.22 |

*Transportation*—Five sites were identified under the transportation theme; these represent 5.15 percent of the historic sites and include the following: segments of the "Dutch Flat to Henness Pass Road," the Nevada Narrow Gauge Railroad bridge remains with four concrete piers and a stone culvert, a concrete culvert/bridge on Chicago Park Forebay Road, a segment of old Highway 40 that includes a concrete culvert date stamped "1924," and the possible remains of the old bridge where "You Bet Road" crosses Greenhorn Creek. All five sites are ineligible for the National Register.

*Mining*— Thirty-one of the historic sites were identified as being related to mining activities. This site type represents 31.96 percent of the historic sites identified in the Yuba-Bear Project APE. Mining sites were defined as sites related to the extraction and processing of minerals. Mining sites include prospect pits, adits, shafts, sluice mining channels, hydraulic mining waste areas, and stacked rock tailings. Of the 31 historic sites identified as being associated with mining activity, 26 are not eligible for the National Register and the other 5 are unevaluated for the National Register, but are not experiencing project-related effects.

*Water Conveyance and Storage*—Fourteen historic sites were identified as being related to water conveyance and storage and represent 14.43 percent of the historic sites. These include flumes, ditches, and check dams (concrete, aggregate, and earthen construction). Ten of these sites are not eligible for the National Register; three water conveyance and storage sites are unevaluated for the National Register, but are not experiencing project-related effects; and one unevaluated site is experiencing project related effects. This site is a road/ditch with a remnant of a rock retaining wall and a rock-and-earth check dam at Rollins reservoir. This site is planned for evaluation 3 years after license issuance and approval of the HPMP.

*Hydroelectric Related*—Nine sites were identified as hydroelectric related. They represent 9.28 percent of the historic sites and include a conduit diversion gate, diversion dam and penstock gate, a cobble-and-boulder berm, and a possible spillway or abandoned gate with associated debris. One site was identified by an earthen-filled pad bounded by concrete-and-stone retaining walls and is possibly associated with the Fuller Lake to Spaulding no. 3 powerhouse built in 1928.

Six of the nine hydroelectric-related sites are ineligible for the National Register; one is unevaluated, but is not experiencing project-related effects. One other unassessed hydroelectric-related site is experiencing project-related effects; this site is an extensive historic (ca. 1920-1960) artifact scatter

in the Bowman-Spaulding transmission line on National Forest land. It would be evaluated within five years following license issuance and approval of the HPMP.

*Settlement*—Thirteen settlement sites were identified through archival research as locations that once contained a variety of residential and commercial buildings and/or structures. These sites represent 13.40 percent of the historic site types and are defined by the presence of foundations or footings or by extant structural remains. One site, Munson Church Camp, is a complex that includes two houses, four associated structures, rock walls, a wagon, and a dock.

Nine of the 13 settlement sites have been determined to be ineligible for the National Register. The other four settlement sites have not been evaluated for the National Register; of these, three are not experiencing project-related effects. The one settlement site that is unassessed and is experiencing project-related effects consists of a foundation, shed, ditch, and associated refuse scatter; this site would be evaluated within five years following license issuance and approval of the HPMP.

*Refuse Deposits*—Eighteen historic sites were classified as refuse deposits with no known association or historical context. These sites represent 18.56 percent of the historic sites and typically consist of discrete piles of metal cans, ranging from a dozen or so to hundreds of these containers. A minimal amount of glass (usually from alcohol or condiment bottles) or ceramics was observed in association with a few of the sites. The majority of refuse deposits represent late-1940s to early-1960s use of the project.

Twelve of these sites are ineligible for the National Register; this includes one site that was assessed for the National Register in 2010 and recommended as being ineligible, pending SHPO concurrence (Risse et al., 2013). Two other refuse deposit sites are unassessed for the National Register and are experiencing project-related effects. These two sites would be evaluated within five years following license issuance and approval of the HPMP. Four refuse deposit sites have not been evaluated for the National Register, but are not experiencing project-related effects. These four sites would be treated as if eligible, avoided by O&M activities, and routinely monitored.

*Other*—Seven sites have an unknown historical function and were assigned as "Other" and represent 7.22 percent of the historic sites in the Yuba-Bear Project APE. These sites include transmission line remains (poles, wire lines, insulators); three concrete piers and associated historic debris; a stone retaining wall; a partially submerged earthen boat ramp, six concrete slabs, and two concrete footings; the remnants of a possible footbridge and roadside refuse scatter; and four concrete footings that appear to be associated with an old utility line. Six of these sites are not eligible for the National Register; and one has not been unevaluated for the National Register, but is not experiencing project-related effects.

Multicomponent Site Types

Seven sites documented within the APE contain both prehistoric and historic cultural materials and are classified as multicomponent sites (table 3-237). Five of the sites are dominated by prehistoric elements but have a few historic elements on the surface and two sites are primarily historic with only a minimal number of prehistoric lithic artifacts (flakes) encountered.

Table 3-237. Summary of multicomponent site types in the Yuba-Bear Project APE. (Source: NID, 2012)

| Multicomponent Site Type | Number of Sites | Percentage of Multicomponent Site Types |
|---|---|---|
| Primarily prehistoric with historic elements | 5 | 71.4 |
| Primarily historic with prehistoric lithics | 2 | 28.6 |
| Total | 7 | 100.0 |

Two of the sites that are primarily prehistoric have bedrock milling stations and evidence of historic mining activity; these two sites are not eligible for the National Register. One multicomponent site comprised of a lithic scatter and midden with an historic refuse scatter and concrete foundation was tested for National Register eligibility in 2010 and found to be ineligible, pending SHPO concurrence (Risse et al., 2013). Another multicomponent site consisting of two bedrock milling stations and a concrete-and-stone foundation has not been evaluated for the National Register, but is not experiencing project-related effects.

Three other multicomponent sites that are experiencing project-related effects associated with recreational use are planned for National Register assessment within five years following license issuance and approval of the HPMP. These three sites are described as a lithic scatter and historic refuse scatter; a prehistoric occupation site with four petroglyphs, a bedrock milling outcrop, two prehistoric house pits, ground and flaked stone tools, and a minimal amount of historic refuse; and a prehistoric occupation site with a bedrock milling outcrop and historic refuse scatter.

**Historic Buildings and Structures**

*Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects*

PG&E identified 118 built-environment resources, including the Drum-Spaulding Hydroelectric System and Historic District, during field investigations conducted between September 2009 and August 2011. These are summarized in table 3-238.

Table 3-238. Summary of National Register eligibility for the built-environment resources in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE. (Source: PG&E, 2013)

| National Register Status | Hydroelectric Related | High-Elevation Rock Face Dams | Non-Hydroelectric Related | Total |
|---|---|---|---|---|
| Eligible Individually | 17 | 0 | 5 | 22 |
| Eligible Drum-Spaulding Hydroelectric System and Historic District | 1 | 0 | 0 | 1 |
| Ineligible Individually but Eligible as a Contributing Element to the Historic District | 19 | 0 | 0 | 19 |

Table 3-238. Summary of National Register eligibility for the built-environment resources in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE. (Source: PG&E, 2013)

| National Register Status | Hydroelectric Related | High-Elevation Rock Face Dams | Non-Hydroelectric Related | Total |
|---|---|---|---|---|
| Ineligible Individually or as a Contributing Element to the Historic District, but Eligible under California Register Criteria | 0 | 0 | 1 | 1 |
| Ineligible Individually or as a Contributing Element to the Historic District | 24 | 17 | 20 | 61 |
| Modern: Not Formally Recorded | 10 | 0 | 0 | 10 |
| Unevaluated | 2 | 0 | 2 | 4 |
| Total | 73 | 17 | 28 | 118 |

Of the 117 built-environment resources and the 1 National Register-eligible district, 23 resources are eligible for the National Register individually; 19 are not eligible individually, but are eligible as contributing elements to the Drum-Spaulding Hydroelectric System and Historic District, 1 (Porter's Grave) is eligible under the California Register Criteria, but does not qualify for inclusion in the National Register; 61 are not eligible individually or as a contributing element to the historic district; 10 are modern and were not formally recorded; and 4 were unevaluated for the National Register. No built-environment resources are being affected by project O&M; subsequently, no built-environment specific management measures are recommended to address project-related effects. SHPO has concurred with the findings in letters dated February 13, 2012, and August 1, 2013.

Though none of the individual built-environment resources are being affected by the project, the Drum-Spaulding Hydroelectric System and Historic District includes one archeological site (the ca. 1904-1927 house site associated with Ed Roening, PG&E dam tender) that is eligible as a contributing element to the historic district and is currently being affected by project O&M. Project-related effects to this resource are a result of wave action.

The majority (n=90) of the built-environment resources are associated with the generation of electricity and include 73 resources identified as hydroelectric related and 17 resources as high-elevation dams. The hydroelectric resources include dams, powerhouses, canals, switchyards, work and residential camps, tramways, and other features related to historic development. The remaining 28 built-environment resources are non-hydroelectric resources that are related to recreation (cabins, organizational camps, clubs, and lodges), transportation (trails, roads, bridges), ranching (corrals, barns, sheds), non-project water conveyance systems (canals), and other (an historic grave plot).

Hydroelectric-Related Resources

The three PG&E projects (Upper Drum-Spaulding, Lower Drum, and Deer Creek) are divided into four hydroelectric systems that reflect different construction efforts and time periods. These include the Alta, Dutch Flat No. 1, and Drum-Spaulding Powerhouse Systems located in the Upper Drum-

Spaulding Project and the Deer Creek Powerhouse System in the Deer Creek Project. A description of these systems and their hydroelectric-related resources (table 3.239) follows.

*Upper Drum-Spaulding Project Hydroelectric-Related Resources* – The Upper Drum-Spaulding Project includes the Alta Powerhouse System with 5 resources, the Dutch Flat Powerhouse System with 5 resources, and part of the Drum-Spaulding Hydroelectric System and Historic District with 35 resources. The Drum-Spaulding Hydroelectric System and Historic District also extends into the Deer Creek Project (Deer Creek-Drum 60kV transmission line) and into the Lower Drum Project (20 resources).

The Alta and Dutch Flat Hydroelectric Systems in the Upper Drum-Spaulding Project are not eligible for the National Register; however, there are some elements within these systems that are individually eligible for inclusion in the National Register. A description of the National Register-eligible components within these two hydroelectric systems follows.

The Alta Powerhouse System, as a whole, has greatly diminished integrity and does not appear to qualify for inclusion in the National Register. However, the Alta powerhouse retains eligibility status at the local level under criterion A for its representation of pioneering hydroelectric development in the Sierra Nevada region of California, as initially determined by the California SHPO in 2007. Its eligibility under criterion C was mitigated in 2007 with HAER documentation.

The Dutch Flat Powerhouse System has three ca. 1943 components (penstocks, tunnel, and powerhouse) that do not reflect an outstanding engineering design and do not appear to meet National Register criteria. Two components (Drum afterbay and Dutch Flat No. 1 intake) were reconstructed in 1967 and are considered modern. These resources were not formally recorded or evaluated. The proposed evaluation date for these two resources is 2017.

The Drum-Spaulding Powerhouse System, designed by Frank Baum and James Wise with architect Ivan Frickstad, was instrumental in the development of long-distance transmission. The system represents a major construction effort and is an intact example of a high-head, impulse-wheel, high-voltage electric generation system and an example of cutting-edge construction technology in the hydroelectric field during its period of significance. Thus, it is eligible for the National Register under criteria A and C at the state level, with a period of significance dating from 1912 to 1931.

The Drum-Spaulding Hydroelectric System and Historic District consists of 35 built-environment features that include 8 National Register-eligible resources, 14 resources that are eligible only as contributing elements to the district, 9 resources that are not eligible for the National Register, and 4 modern resources within the district that have not been formally recorded. Three of the modern resources (Drum No. 3 penstock, Drum No. 2 powerhouse, and Jordan Creek diversion) are planned for evaluation in 2015; and the fourth (Drum access road) is planned for 2047.

In addition, the Upper Drum-Spaulding Project includes 17 small high-elevation reservoirs used to store water for release into Fordyce and Spaulding Lakes (table 3-240). In general, these lakes are contained behind small, rock-faced dams that have their origins in the gold-rush era quest for water necessary for mining. These dams have been raised, rebuilt, and modified many times through the years, particularly during conversion to hydroelectric use and do not retain integrity reflective of gold-rush roots. They are modest dams that have no outstanding characteristics that make them unique. While they store water for the overall system, they are not outstanding engineering components and no longer retain their early historical importance to the California gold-rush era. As such, these dams do not meet any of the National Register criteria and are evaluated as not eligible for inclusion in the National Register.

Table 3-239. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects built-environment resources (hydroelectric related) and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|
| | | Upper Drum-Spaulding Project | | |
| Alta Powerhouse System (APS) | P-31-1289/ P-31-5391 | Towle intake and canal, ca. 1866; modified 1921, 1959 | Yes | Ineligible |
| APS | P-31-5390 | Towle diversion dam, ca. 1866; modified 1921 | Yes | Ineligible |
| APS | P-31-5392 | Alta forebay dam, ca. 1864; modified 1902 | Yes | Ineligible |
| APS | P-31-5393 | Alta penstock, ca. 1902; modified 1955 | Yes | Ineligible |
| APS | P-31-4403 | Alta powerhouse, ca. 1902 | Yes | Eligible |
| Dutch Flat Powerhouse System (DFPS) | None | Drum afterbay, ca. 1928; reconstructed 1967 | No | Modern: not formally recorded |
| DFPS | None | Dutch Flat No. 1 intake, ca. 1943; reconstructed 1967 | No | Modern: not formally recorded |
| DFPS | P-31-5387 | Dutch Flat No. 1 penstocks, ca. 1943 | Yes | Ineligible |
| DFPS | P-31-5389 | Dutch Flat No. 1 tunnel, ca. 1943 | Yes | Ineligible |
| DFPS | P-31-5388 | Dutch Flat No. 1 powerhouse, ca. 1943 | Yes | Ineligible |
| Drum-Spaulding Hydroelectric System and Historic District (DSHHD) | P-29-4023 | Drum-Spaulding Hydroelectric System and Historic District, ca. 1912-1931; modified many times | Yes | Eligible |

Table 3-239. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects built-environment resources (hydroelectric related) and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|
| DSHHD | P-29-4046 | Fordyce dam tender's house, ca. 1955 | Yes | Ineligible |
| DSHHD | P-29-4257 | Fordyce dam, ca. 1874 and 1881; modified 1913, 1924, 1936 | Yes | Contributing Element |
| DSHHD | P-29-4258 | Fordyce dam access road, ca. 1860; modified 1911 | Yes | Contributing Element |
| DSHHD | P-29-4259 | Spaulding No. 1 dam, ca. 1912; modified 1913, 1916, 1919, 1939, 1977 | Yes | Eligible |
| DSHHD | P-29-4260 | Spaulding No. 3 dam , ca. 1913; modified 1916, 1919 | Yes | Contributing Element |
| DSHHD | P-29-4261 | Spaulding No. 2 dam, ca. 1916; modified 1919, 1939, 1974 | Yes | Contributing Element |
| DSHHD | P-29-4262 | Spaulding No. 1 powerhouse, ca. 1917; modified 1928 | Yes | Contributing Element |
| DSHHD | P-29-4263 | Spaulding No. 2 powerhouse, ca. 1920; modified 1928, 1933 | Yes | Contributing Element |
| DSHHD | P-29-4264 | Spaulding No. 2 penstock and intakes, ca. 1920; modified 1928 | Yes | Contributing Element |
| DSHHD | P-29-4265 | Spaulding No. 3 powerhouse, ca. 1928 | Yes | Contributing Element |
| DSHHD | P-29-4266 | Spaulding No. 3 penstock, ca. 1928 | Yes | Contributing Element |
| DSHHD | P-29-4267 | Spaulding incline railway/tram and stairs, ca. 1917; modified 1924, 1955 | Yes | Eligible |
| DSHHD | P-29-4268 | Spaulding dam access road, ca. 1913 | Yes | Contributing Element |
| DSHHD | P-29-4269 | Spaulding dam maintenance camp, ca. 1913-1928 | Yes | Eligible |

Table 3-239. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects built-environment resources (hydroelectric related) and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|
| DSHHD | P-29-4270 | Camp Spaulding (residential), ca. 1913-1928; modified 1970s | Yes | Eligible |
| DSHHD | P-29-4271 | Spaulding dam tender's house, ca. 1915; modified 1953 | Yes | Ineligible |
| DSHHD | P-29-4272 | Drum canal, ca. 1912; modified 1917, 1928, 1965 | Yes | Ineligible |
| DSHHD | P-29-4300 | Nevada diversion spillway, ca. 1912; modified 1917, 1928, 1965 | Yes | Ineligible |
| DSHHD | P-31-4387 | Drum No. 1 powerhouse compound, ca. 1913 | Yes | Eligible |
| DSHHD | P-31-5394 | Lake Valley dam/Lake Valley auxiliary dam, ca. 1889, 1911; modified 1928 | Yes | Contributing Element |
| DSHHD | P-31-5395 | Kelly Lake dam, ca. 1887; modified 1928 | Yes | Contributing Element |
| DSHHD | P-31-5396 | Lake Valley canal diversion dam, ca. 1928 | Yes | Contributing Element |
| DSHHD | P-31-5396 | Lake Valley (Crossover) canal, ca. 1928; modified 1937, 1941, 1946, 1979 | Yes | Eligible |
| DSHHD | P-31-5403 | Drum residential camp, ca. 1913; modified 1959 | Yes | Ineligible |
| DSHHD | P-31-5403 | Drum water tower, ca. 1913 | Yes | Contributing Element |
| DSHHD | P-31-5405 | Drum forebay dam, ca. 1913; modified 1965 | Yes | Ineligible |
| DSHHD | P-31-5406 | Drum No. 1 and No. 2 penstock and valve/wheel houses, ca. 1913 (#1) and 1922 (#2) | Yes | Eligible |
| DSHHD | P-31-5462 | Auburn Ravine improvements, ca. 1913; modified many times | Yes | Unevaluated |
| DSHHD | None | Drum No. 3 penstock, ca. 1965 | No | Modern: not formally recorded |

Table 3-239. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects built-environment resources (hydroelectric related) and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|
| DSHHD | None | Drum No. 2 powerhouse, ca. 1965 | No | Modern: not formally recorded |
| DSHHD | None | Drum access road, ca. 1925 | No | Modern: not formally recorded |
| DSHHD | None | Switchyards, ca. 1913-1928; modified many times | No | Ineligible |
| DSHHD | None | Weirs, gauges, gauge houses, spill gates, ca. 1913-1928; modified many times | No | Ineligible |
| DSHHD | None | Microwave transmitters, ca. 1950-2000 | No | Ineligible |
| DSHHD | None | Jordan Creek diversion, ca. 1960s | No | Modern: not formally recorded |
| | | Lower Drum Project | | |
| Drum-Spaulding Hydroelectric System and Historic District (DSHHD) | P-31-1109 | Upper Wise canal, ca. 1913; modified 1931 | Yes | Contributing Element |
| DSHHD | P-31-1109 | Lower Wise canal, ca. 1913; modified 1931 | Yes | Contributing Element |
| DSHHD | P-31-1745 | Bear River canal, ca. 1852; modified 1925, 1931 | Yes | Contributing Element |
| DSHHD | P-31-1745 | Bear River diversion dam, ca. 1909; modified 1926, 1931 | Yes | Contributing Element |
| DSHHD | P-31-1816 | Rock Creek multi-arch dam, ca. 1916; modified 1998 | Yes | Eligible |

Table 3-239. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects built-environment resources (hydroelectric related) and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|
| DSHHD | P-31-3050 | South canal, ca. 1917; modified 1920, 1931 | Yes | Eligible |
| DSHHD | P-31-3050 | Appleton concrete flume, ca. 1931 | Yes | Eligible |
| DSHHD | P-31-3050 | Halborn concrete flume, ca. 1931 | Yes | Eligible |
| DSHHD | P-31-4502 | Wise No. 1 powerhouse compound, ca. 1917 | Yes | Eligible |
| DSHHD | P-31-4955 | Halsey powerhouse compound, ca. 1913-1916 | Yes | Eligible |
| DSHHD | P-31-5397 | Halsey penstock, ca. 1913-1916 | Yes | Eligible |
| DSHHD | P-31-5398 | Halsey afterbay dam, ca. 1916 | Yes | Eligible |
| DSHHD | P-31-5399 | Wise forebay dam, ca. 1916 | Yes | Contributing Element |
| DSHHD | P-31-5400 | Wise penstocks, ca. 1916; modified 1933, 1978, 1986 | Yes | Ineligible |
| DSHHD | P-31-5401 | Halsey forebay No. 1 and No. 2 dams, ca. 1916; modified 1923, 1955 | Yes | Contributing Element |
| DSHHD | None | Rock Creek intake, ca. 1916; modified 1960s | No | Modern: not formally recorded |
| DSHHD | None | Wise No. 2 powerhouse, ca. 1986 | No | Modern: not formally recorded |
| DSHHD | None | Newcastle powerhouse intake/penstock, ca. 1986 | No | Modern: not formally recorded |
| DSHHD | None | Newcastle powerhouse, ca. 1986 | No | Modern: not formally recorded |

Table 3-239. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects built-environment resources (hydroelectric related) and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|
| | | Deer Creek Project | | |
| Drum-Spaulding Hydroelectric System and Historic District (DSHHD) | P-29-4305 | Deer Creek-Drum 60kV transmission line, ca. 1916; modified many times | Yes | Ineligible |
| Deer Creek Powerhouse System (DCPS) | P-29-0879 | Main South Yuba canal, ca. 1858; modified 1878, 1926-1999 | No | Ineligible |
| DCPS | P-29-4251 | Bear Valley work camp, ca. 1913 | Yes | Ineligible |
| DCPS | P-29-4252 | Deer Creek penstock/intake, ca. 1908 | Yes | Ineligible |
| DCPS | P-29-4253 | Chalk Bluff canal, ca. 1858; modified 1878, 1993 | Yes | Ineligible |
| DCPS | P-29-4254 | Deer Creek forebay/dam, ca. 1907 | Yes | Ineligible |
| DCPS | P-29-4255 | Deer Creek No. 1 powerhouse, ca. 1908 | Yes | Eligible |
| DCPS | P-29-4304 | Big tunnel, ca. 1893; modified 1908 | Yes | Ineligible |

Table 3-240. High-elevation dams identified within the Upper Drum-Spaulding Project APE and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Land Owner[a] | Site Type | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|---|---|
| Spaulding No. 3 | P-29-4061 | PG&E | Dam | Middle Lindsey Lake dam, ca. 1920; modified 1931 | Yes | Ineligible |
| Spaulding No. 1 and No. 2 | P-29-4110 | PG&E | Dam | Meadow Lake dam, ca. 1864; modified 1921, 1931, 1963, 1966, 1986 | Yes | Ineligible |
| Spaulding No. 1 and No. 2 | P-29-4111 | PG&E | Dam | White Rock dam, ca. 1855; modified 1922, 1931 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4112 | PG&E | Dam | Blue Lake dam, ca. 1856; modified 1931, 1990 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4113 | PG&E | Dam | Rucker Lake dam, ca. 1856; modified 1922, 1931, 1972 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4114 | PG&E | Dam | Fuller Lake dam, ca. 1856; modified 1922, 1930, 1964, 1966, 1976, 1987 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4115 | PG&E | Dam | Upper Lindsey Lake dam, ca. 1870; modified 1931 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4116 | PG&E | Dam | Carr Lake dam, ca. 1870; modified 1921, 1931, 1972 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4117 | PG&E | Dam | Feeley Lake dam, ca. 1870; modified 1921, 1931, 1972 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4118 | PG&E | Dam | Lower Lindsey Lake dam, ca. 1921; modified 1932, 1972 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4119 | PG&E | Dam | Culbertson Lake dam, ca. 1852; modified 1921, 1931 | Yes | Ineligible |

Table 3-240. High-elevation dams identified within the Upper Drum-Spaulding Project APE and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Land Owner[a] | Site Type | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|---|---|
| Spaulding No. 3 | P-29-4120 | PG&E | Dam | Lower Rock Lake dam, ca. 1921; modified 1931 | Yes | Ineligible |
| Spaulding No. 3 | P-29-4121 | PG&E | Dam | Upper Rock Lake dam, ca. 1855; modified 1931 | Yes | Ineligible |
| Spaulding No. 1 and No. 2 | P-29-4122 | PG&E | Dam | Sterling Lake dam, ca. 1858; modified 1922, 1929, 1979 | Yes | Ineligible |
| Spaulding No. 1 and No. 2 | P-31-4348 | PG&E | Dam | Kidd Lake dam, ca. 1855; modified 1922, 1931, 1945, 1962, 1972 | Yes | Ineligible |
| Spaulding No. 1 and No. 2 | P-31-4349 | PG&E | Dam | Upper Peak Lake dam, ca. 1850; modified 1931, 1954, 1964 | Yes | Ineligible |
| Spaulding No. 1 and No. 2 | P-31-4350 | PG&E | Dam | Lower Peak Lake dam, ca. 1860; modified 1923, 1932 | Yes | Ineligible |

a - PG&E = Pacific Gas and Electric Company: Ownership designations are based on 2009 county assessment data.

*Lower Drum Project Hydroelectric-Related Resources* —The Lower Drum Project has 19 hydroelectric-related built-environment resources; all 19 are within the Drum-Spaulding Hydroelectric System and Historic District. These include 8 resources that are both individually eligible for the National Register, 6 resources that are eligible only as contributing elements to the historic district, 1 resource that is not eligible for the National Register and 4 modern resources that have not been formally recorded.

One of the eligible resources, Rock Creek multi-arch dam, was determined individually eligible for inclusion in the National Register under criterion A and C in 1999 with SHPO concurrence; criterion C was mitigated through HAER documentation. This resource is also a contributing element to the Drum-Spaulding Hydroelectric System and Historic District. The other seven National Register-eligible built-environment resources are the ca. 1913-1916 Halsey powerhouse compound, penstock, and afterbay dam; the ca. 1917 Wise No. 1 powerhouse; the ca. 1931 Appleton and Halborn concrete flumes; and the ca. 1917 South canal. The six built-environment resources located in the Lower Drum Project that are contributing elements to the Drum-Spaulding Hydroelectric System and Historic District are the ca. 1913 Lower Wise canal, the ca. 1852 Bear River canal, the ca. 1909 Bear River diversion dam, and the ca. 1916 Wise forebay and Halsey forebay No. 1 and No. 2 dams.

Three of the modern resources (Wise No. 2 powerhouse, Newcastle powerhouse, and Newcastle powerhouse intake/penstock) are planned for evaluation in 2036; and one (Rock Creek intake) is planned for 2015.

*Deer Creek Project Hydroelectric-Related Resources* —The Deer Creek Project includes seven hydroelectric-related resources in the Deer Creek Powerhouse System and one in the Drum-Spaulding Hydroelectric System and Historic District. The seven built-environment resources recorded in the Deer Creek Powerhouse System include the ca. 1858 Main South Yuba and Chalk Bluff canals; ca. 1913 Bear Valley work camp; the ca. 1907-1908 Deer Creek No. 1 powerhouse, forebay/dam, and penstock/intake; and the ca. 1893 Big tunnel. Two of these seven hydroelectric-related resources are located within the Upper Drum-Spaulding Project APE; these are the ca. 1858 Main South Yuba Canal and the ca. 1813 Bear Valley work camp. In addition, the one built-environment resource in the Deer Creek Project that falls within the Drum-Spaulding Hydroelectric System and Historic District is the Deer Creek-Drum 60kV transmission line.

Modifications to the two major features (South Yuba and Chalk Bluff canals) have compromised the integrity of the district; therefore, this system does not qualify for inclusion in the National Register. Individually, the South Yuba canal was previously determined ineligible for inclusion in the National Register (Baker et al., 2004) with SHPO concurrence. However, the Deer Creek powerhouse, while not of outstanding architectural or engineering design, appears to meet criterion A as an example of early PG&E hydroelectric development efforts, and it is individually eligible at a state level with a period of significance of 1908, its date of construction.

Non-Hydroelectric-Related Resources

Of the 118 built-environment resources (table 3-241), 28 are not associated with hydroelectric development. Fourteen of these resources have been recorded in the Upper Drum-Spaulding Project, 13 are in the Lower Drum Project, and 1 is in the Deer Creek Project. These resources are identified as being related to transportation (8), recreation (7), ranching (4), settlement (4), non-project canals (4), and other (1). Most (n=21 or 75 percent) of the 28 non-hydroelectric-related resources have no historical or architectural/engineering importance or have been significantly altered; these resources do not meet National Register eligibility criteria due to their compromised integrity.

Table 3-241. Non-hydroelectric historic buildings and structures identified within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Land Owner[a] | Site Type | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|---|---|
| Upper Drum-Spaulding Project | | | | | | |
| Transportation | | | | | | |
| Sterling Lake | P-29-4047 | PG&E TNF | Trail | Sterling Lake trail, ca. 1950s | Yes | Ineligible |
| Spaulding Lake | P-29-4079 | PG&E | Trail | Spaulding trail, ca. 1891 | Yes | Ineligible |
| Fuller Lake | P-29-4087 | PG&E TNF PVT | Road | Bowman Road (abandoned), ca. 1856 | Yes | Ineligible |
| Recreation | | | | | | |
| Sterling Lake | P-29-262 | PG&E TNF | Organizational camp | Robert L. Cole Boy Scout Camp, ca. 1954 | Yes | Ineligible |
| Peak Lakes | P-31-4285 | PG&E PVT | Organizational camp | Camp Winthers, ca. 1957 | Yes | Ineligible |
| Culbertson Lake | P-29-4060 | PG&E PVT | Vacation home | Culbertson Lake Vacation Home Complex, ca. 1920s, 2009 | Yes | Ineligible |
| Fuller Lake | P-29-4085 | PG&E PVT | Recreational club | Grass Valley Rifle, Rod and Gun Club, ca. 1942-1955 | Yes | Ineligible |
| Fuller Lake | P-29-4086 | PVT | Recreational club | Dear Fly Lodge, ca. 1930s | Yes | Ineligible |
| Upper Rock Lake | P-29-4058 | PG&E | Trail | Rock Lake trail, ca. 1860s | Yes | Unevaluated |

Table 3-241. Non-hydroelectric historic buildings and structures identified within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Land Owner[a] | Site Type | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|---|---|
| Settlement | | | | | | |
| Dutch Flat Powerhouse Road | P-31-5348 | PVT | Coal house | Dutch Flat coal house, ca. 1930 | Yes | Eligible |
| Dutch Flat Powerhouse Road | P-31-5349 | PVT | Monument | Dutch Flat Historic Monument, ca. 1950 | Yes | Eligible |
| Dutch Flat Powerhouse Road | P-31-5350 | PVT | Post Office | Dutch Flat Post Office, ca. 1890-1898 | Yes | Eligible |
| Dutch Flat Powerhouse Road | P-31-5351 | PVT | House | Diggins Hill Road residence (Hegge House), ca. 1930 | Yes | Ineligible |
| Other | | | | | | |
| South Yuba Canal | P-29-4100 | PG &E | 2 grave plots | Porter's grave, ca. 1880-1906 | Yes | Ineligible National Register Eligible California Environmental Quality Act |
| Lower Drum Project | | | | | | |
| Transportation | | | | | | |
| Bear River Canal | P-31-4321 | PVT | Road | Dog Bar Road, ca. 1920s | Yes | Ineligible |
| Bear River Canal | P-29-3061/ P-31-3367 | PVT | Concrete arch bridge | Old Bear River bridge, ca. 1924 | Yes | Eligible |
| Bear River Canal | P-31-4315 | PVT | Concrete bridge | Campground Road bridge, ca. 1930 | Yes | Ineligible |
| Drum Canal | P-29-4096 | PG& | Roll-up | Bear River roll-up bridge, | Yes | Ineligible |

Table 3-241. Non-hydroelectric historic buildings and structures identified within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Land Owner[a] | Site Type | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|---|---|
| Access Roads | | E | metal bridge | ca. 1950s | | |
| Wise Development | P-31-5423 | PVT | Concrete bridge | Haines Road bridge, ca. 1930s | Yes | Ineligible |
| Ranching | | | | | | |
| Bear River Canal | P-31-4317 | PVT | Barn | Bear Valley barn (Meadow Vista barn), ca. 1900 | Yes | Unevaluated |
| South Yuba Canal | P-29-2249 | PG &E | Corral | Bear Valley corral, ca. 1905-1990s | Yes | Ineligible |
| Bear River Canal | P-31-4337 | PVT | Shed | Shed, ca. 1940-1950s | Yes | Ineligible |
| Newcastle Powerhouse | P-31-4309 | PVT | Ranch | Newcastle Ranch property, ca. 1940s | Yes | Ineligible |
| Non-project Canals | | | | | | |
| Bear River Canal | P-31-796 | PVT | Non-project canal | Lower Boardman canal, ca. 1880, 1924 | Yes | Ineligible |
| Bear River Canal | P-31-5347 | PVT | Non-project canal | Bowman feeder canal, ca. 1910s | Yes | Ineligible |
| Wise Development | P-31-1110 | PG &E PVT | Non-project canal | Fiddler's Green canal, ca. 1860, 1920, 1970 | Yes | Ineligible |
| Halsey Development | P-31-4340 | PG &E PVT | Non-project canal | Bowman canal, ca. 1916 | Yes | Ineligible |

Table 3-241. Non-hydroelectric historic buildings and structures identified within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE and National Register eligibility. (Source: PG&E, 2013)

| Project Location | Primary Number | Land Owner[a] | Site Type | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|---|---|---|
| Deer Creek Project | | | | | | |
| Recreation | | | | | | |
| Deer Lake | P-31-4300 | PVT | Organizational Camp | Deer Lake girl scout camp historic core | Yes | Eligible |

a - PG&E = Pacific Gas and Electric Company; PVT = Private or Other; TNF = Tahoe National Forest. Note: Ownership designations are based on 2009 county assessment data.

*Transportation*—The eight transportation resources are two trails, two roads, and four bridges located in the Upper Drum-Spaulding and Lower Drum Projects. There are no transportation-related resources located in the Deer Creek Project.

The Upper Drum-Spaulding Project has two trails (ca. 1950 Sterling Lake Trail and ca. 1891 Spaulding Trail) and one road (abandoned ca. 1856 Bowman Road) that are not eligible for the National Register. The Lower Drum Project non-hydroelectric-related transportation resources are four bridges: one ca. 1950 roll-up metal bridge (Bear River roll-up bridge), one ca. 1924 concrete arch bridge (Old Bear River bridge), and two ca. 1930 concrete bridges (Campground Road bridge and Haines Road bridge). Of these four, only one, the ca. 1924 concrete arch bridge (Old Bear River bridge) is eligible for the National Register. It is eligible for its engineering design under criterion C and is listed as a Place of Historical Interest, Nevada County (#036). There are no project-related effects on the site.

*Recreation*—The seven recreation resources in the Upper Drum-Spaulding Project APE are three organizational camps, two recreational clubs, a vacation home, and a trail in the Upper Drum-Spaulding and Deer Lake Projects. None are located in the Lower Drum Project.

Six of the seven recreational resources are located in the Upper Drum-Spaulding Project. These include two organizational camps (ca. 1954 Robert L. Cole Boy Scout Camp at Sterling Lake and ca. 1957 Camp Withers at Peak Lakes), two recreational clubs at Fuller Lake (ca. 1942-1955 Grass Valley Rifle, Rod and Gun Club and ca. 1930 Deer Fly Club), a vacation home (ca. 1920 Culbertson Lake Vacation Home), and a trail (ca. 1860 Rock Lake Trail). Five of the Upper Drum-Spaulding Project recreation-related resources are not eligible for the National Register; one (Rock Lake Trail) is unevaluated and is considered to be potentially eligible for the National Register. This resource is not experiencing project-related effects; therefore, no management measures are planned unless project-related effects are identified or planned in the future.

One recreation resource, an organizational camp, is located in the Deer Creek Project. This resource is the historic core of the ca. 1920-1930 Deer Lake Girl Scout Camp; it is eligible for the National Register under criterion C for architecture. No project-related effects have been identified at this resource within the Deer Creek Project APE.

*Ranching*—The four ranching resources are a barn, corral, shed, and ranch that are all located in the Lower Drum Project. Three (ca. 1905-1990 Bear Valley corral, ca, 1940-1950 shed, and ca. 1940 Newcastle Ranch) are not eligible for the National Register. The fourth ranching resource (ca. 1900 Bear Valley/Meadow Vista Barn) is described as being "dilapidated, but still standing" and as being located just outside the Lower Drum Project APE. This resource is unevaluated and is considered to be potentially eligible for the National Register. This resource is not experiencing project-related effects; therefore, no management measures are planned unless project-related effects are identified or planned in the future.

*Settlement*—The four settlement resources are a commercial building, an historic monument, a house, and a post office. All four are located along Dutch Flat Powerhouse Road in the Upper Drum-Spaulding Project. Three of these resources are eligible for the National Register. These are the ca. 1930 Dutch Flat coal house, the ca. 1950 Dutch Flat historic monument, and the ca. 1890-1898 Dutch Flat post office. The coal house is a unique example of a commercial building constructed specifically for the storage and sale of coal to the community. It retains integrity and meets criterion C eligibility. The historic monument is unique; it is the only one erected in the area by the Centennial Commission. The post office is an excellent example of a late-nineteenth-century commercial gold-country building and meets eligibility

under criterion C. No project-related effects have been identified for these resources. The fourth resource (ca. 1930 Diggins Hill Road residence known as the Hegge House) is not eligible for the National Register. It has been significantly modified and does not retain integrity.

*Non-project Canals*—The four non-project canals are located in the Lower Drum Project. Two (ca. 1880 Lower Boardman canal and ca. 1910 Bowman feeder canal) are associated with the Bear River canal; one (ca. 1860 Fiddler's Green canal) is in the Wise Development, and the fourth (ca. 1916 Bowman canal) is in the Halsey Development. All four non-project canals are ineligible for the National Register.

*Other*—The one non-hydroelectric-related resource in the "Other" category is the ca. 1880-1900 two-grave plot known as the "Porter Family Grave Plot." This site is located in the Upper Drum-Spaulding Project. It is a well-known grave site marked with a plaque and enclosed with a picket fence. It is not eligible for the National Register, but is eligible under the California Register of Historic Resources (CRHR) criterion 1.

*Yuba-Bear Hydroelectric Project*

NID completed its study of the project's hydroelectric system built-environment in 2008 that included documentation and National Register evaluation of the project system. Twenty-four primary project features and numerous system sub-features were documented (table 3-242). These include 4 powerhouses, 24 dams, 2 conduits, 1 transmission line, and 2 buildings. The evaluation identified the system as ineligible for listing in the National Register as a historic district because the features of the system, as a whole, do not convey a unified sense of time and place, nor do they convey architectural interconnectedness.

Table 3-242. Summary of National Register eligibility for the built-environment resources in the Yuba-Bear Project APE. (Source: NID, 2012)

| **Eligibility Status** | **Total** |
|---|---|
| Eligible | 2 |
| Insufficient Integrity, Not Eligible | 9 |
| Modern, Not Eligible | 13 |
| Total | 24 |

Nine system features were evaluated individually as ineligible for listing in the National Register, and 13 system features are modern. Table 3-243 lists the 24 system features and construction history. These are located in the Bowman, Dutch Flat, Chicago Park, and Rollins Developments. Only those features and facilities identified during archival research and field studies as being 50 years old or older were recorded in the field. When modern components of the project system that were not yet 50 years of age at the time of the relicensing studies reach 50 years of age, NID would evaluate those components for potential inclusion in the National Register.

Table 3-243. Yuba-Bear Project built-environment resources and National Register eligibility. (Source: NID, 2012)

| Facility Type | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|
| | Bowman Development | | |
| Dam | Jackson Meadows dam (ca. 1965) | No | Modern |
| Dam | Milton dams (1926, 1964, 1992) | Yes | Ineligible |
| Dam | French Lake dam (1858, 1929, 1933, 1945, 1948) | Yes | Ineligible |
| Dam | Sawmill dam (1910, enlarged 1930, 1938) | Yes | Ineligible |
| Dam | Faucherie dam (1966) | No | Modern |
| Dam | Jackson Lake dam (1926, 1942, 1945, 1948) | Yes | Ineligible |
| Dam | Bowman dams (1926, modified 1960s, 1980s) | Yes | Ineligible |
| Dam | Bowman Road (1925) | Yes | Ineligible |
| Powerhouse | Bowman powerhouse (1980s) | No | Modern |
| Water conveyance | Milton-Bowman diversion tunnel/ conduit (1926, enlarged 1964) | Yes | Ineligible |
| Tertiary Element | Bowman house (1935) | Yes | Eligible |
| Tertiary Element | French Lake control house (1858) | Yes | Eligible |
| Transmission Line | Bowman-Spaulding transmission line (1980s) | No | Modern |
| | Dutch Flat Development | | |
| Dam | Texas Creek diversion dam (1960s) | No | Modern |
| Dam | Fall Creek diversion dam (1920s, 1960s) | Yes | Ineligible |
| Dam | Dutch Flat forebay dam (1966) | No | Modern |
| Powerhouse | Dutch Flat No. 2 powerhouse (1966) | No | Modern |
| Water Conveyance | Bowman-Spaulding conduit (1926, rebuilt 1964) | Yes | Ineligible |
| | Chicago Park Development | | |
| Dam | Dutch Flat afterbay dam (1966) | No | Modern |
| Dam | Dutch Flat afterbay dam (1966) | No | Modern |
| Dam | Chicago Park forebay dam (1960s) | No | Modern |

Table 3-243. Yuba-Bear Project built-environment resources and National Register eligibility. (Source: NID, 2012)

| Facility Type | Description | National Register Evaluation | National Register Eligibility Assessment |
|---|---|---|---|
| Powerhouse | Chicago Park powerhouse (1966) | No | Modern |
| Water Conveyance | Chicago Park conduit (1966) | No | Modern |
| | Rollins Development | | |
| Dam | Rollins dam (1966) | No | Modern |
| Powerhouse | Rollins powerhouse and transmission lines (1980) | No | Modern |

All of the 24 built-environment resources are identified as hydroelectric related. These are 15 dams, 4 powerhouses, 3 water-conveyance features, 1 transmission line, and 2 tertiary elements (ca. 1935 Bowman dam tender's house and ca. 1858 French Lake control house). Eight of the 15 dams are modern and not evaluated and 7 are ineligible for the National Register; all 4 powerhouses and the transmission line are modern and not evaluated; and 1 of the 3 water-conveyance features is modern and the other 2 are ineligible for the National Register.

However, two buildings within the project, the Bowman House and the French Lake control house, were evaluated as individually eligible for listing in the National Register. The Bowman House appears eligible for listing in the National Register under criterion C on a local level, with a period of significance of 1935 as a distinctive Depression-era dam tender's house associated with the early development of the Yuba-Bear Project. The French Lake control house was evaluated as significant under criterion A for its association with the development of Nevada County's hydraulic mining industry, as well as under criterion C as a representative example of 1850s high-mountain architecture on a local level, with a period of significance from 1858, the date of original construction (NID, 2012). These buildings are actively used by NID as part of project operations. The current use is not affecting those qualities and characteristics that qualify them for listing in the National Register. NID would avoid impacting or altering those characteristics of the building that qualify them for listing in the National Register.

Additionally, the project includes several NID-managed recreation areas that are presumed to have been constructed after the project reservoirs were built in the 1960s. As such, NID would inventory, document, and evaluate these recreation areas for the National Register within five years following license issuance. This schedule was determined in accordance with the Recreation Management Plan for scheduled improvements to recreation facilities.

**Traditional Cultural Properties Study**

*Upper Drum-Spaulding, Deer Creek, Lower Drum Projects*

In late 2010, one National Register-eligible TCP was identified in the Lower Drum Project APE. There were no TCP resources identified in the Upper Drum-Spaulding and Deer Creek Projects.

The Lower Drum Project TCP has been used as a ceremonial and social event center, as well as a place for dances, since at least the late 1800s and probably well before. It has been a center of religious, social, and community life for people with Southern Maidu heritage; the area has been continuously used for the same or similar purposes for more than 100 years.

The importance of this TCP is based on the ongoing and annual community ceremonies; the continued gathering of plants for food, medicines, and implements; the teaching of youth about the place; the use of native language to describe and lay down prayers for the place; and the community's security and well-being in knowing that the place is protected. These are all associated with significant Maidu cultural history and perpetuation.

This TCP was evaluated as eligible for the National Register under criterion A at the local level of significance for its association with important events in the history and ongoing culture of the Southern Maidu. Under criterion A, this is a place of ongoing long-term cultural activity for the period of significance that began in the late-nineteenth-century ethnographic period and continues to the present. It was also evaluated as eligible for the National Register under criterion B at the regional level of significance for its association with an important teacher whose contributions to the ethnographic knowledge of California are extraordinary. Under criterion B, the period of significance is ca. 1878-1968. SHPO has concurred with the eligibility recommendations in a letter dated October 30, 2012.

PG&E states in the HPMP that it is working with the tribes to protect this site and avoid adverse effects. Should unavoidable adverse effects occur to the identified TCP, or to any not-yet-identified TCP, treatment would be negotiated and agreed upon between the SHPO, PG&E, and the relevant tribes or group on a case-by-case basis.

*Yuba-Bear Project*

The TCP study for the Yuba-Bear Project APE found that there was no specific information about ongoing traditional uses of places that might qualify them as National Register-eligible TCPs. Native American participants knew that some people from their family or tribe lived in or near the APE, but could not identify where the places were specifically. Several people interviewed were aware of the medicinal, fungal, and food plants at the reservoirs, along the canals, and along the creeks; but none of the plants has community value nor were any being adversely affected by the project.

#### 3.3.6.2 Environmental Effects

**Project-Related Effects on Cultural Resources**

Project-related adverse effects on cultural resources considered eligible for the National Register (i.e., historic properties) would require PG&E and NID to resolve such effects, in consultation with the SHPO and other parties, depending on the nature and location of the affected historic property. Project-related effects are brought about by activities that may alter the characteristics of a historic property that contribute to its National Register eligibility; for example, road maintenance that affects a previously undisturbed archeological site or a facility improvement that removes windows or doors of an historic powerhouse. In addition, some project-related activities may not have a direct effect on historic properties, but may create conditions by which damage occurs. For example, building or maintaining a project road may not directly affect historic properties, but may enable public access to areas that contain these resources.

Project-related effects on cultural resources within a hydroelectric project APE are likely to occur from routine O&M of buildings and structures; reservoir inundation and fluctuation; vegetation management; road maintenance, construction, and use; recreational activities; and emergency repairs. The following sections describe in more detail some of the activities within the PG&E and NID project APE that may affect historic properties.

**Routine Operation and Maintenance of Buildings and Structures**

Hydroelectric operating systems include dams, powerhouses, penstocks, valve houses, canals, and associated features. As these facilities age, they require maintenance to continue operational efficiency. However, maintenance can affect the character-defining features that contribute to the significance of a building or structure. Maintenance might include structural, mechanical, or electrical upgrades of facilities; repair of buildings and other structures; replacement of windows, doors, roofing, or other building components; expansion or improvement of parking and storage areas; and other similar activities. In addition, ground-disturbing activities during construction of new proposed facilities could have the potential to directly or indirectly affect archeological sites.

**Reservoir Inundation and Fluctuation**

Historic properties, in particular archeological sites, within a reservoir basin may be consistently inundated by water or periodically subjected to wet-and-dry cycles and wave action associated with annual fluctuations in reservoir water level. The effects of these actions on archeological sites may include erosion, deflation, hydrologic sorting, or displacement of artifacts. The severity of these effects is primarily dependent on where within the reservoir basin a site is located. Inundated sites may be affected less than sites within the annual fluctuation zone. Further, sites located on a reservoir shoreline can be subject to vandalism when they are exposed during the drawdown or low-elevation periods.

**Vegetation Management**

Routine management of vegetation is necessary at PG&E's and NID's facilities to maintain safe distance between conductors and poles and the adjacent vegetation. Hazard trees may need to be trimmed or cut down to comply with the California Public Resources Code 4293; however, felling timber, skidding downed trees, and using harvesting equipment have the potential to affect historic properties, particularly archeological sites.

**Road Maintenance, Construction, and Use**

Road maintenance and construction activities also have the potential to affect historic properties. Grading roads, excavating ditches for drainage, and replacing ineffective culverts pose potential threats to historic properties that are in the immediate vicinity of these activities. Vehicular traffic on dirt roadways can also damage historic properties.

**Recreational Activities**

Recreational activities common to hydroelectric projects include boating, fishing, hiking, horse riding, off-roading (use of off-highway vehicles (OHVs) outside of designated roads and trails), and camping. These activities can expose historic properties and can lead to disturbance of intact cultural deposits, increased erosion or deterioration of sites, unauthorized artifact collecting, or more severe site vandalism and looting. Ongoing maintenance at recreational facilities, formal and informal improvements, and infrastructure development can also affect

significant cultural values. The addition of new recreational facilities would increase and exacerbate potential effects related to inadvertent destruction of archeological sites, unauthorized collection of artifacts, and vandalism.

#### Emergency Repairs

Emergency repairs to project facilities may be necessary in response to serious threats to life, property, or the safe operation of hydroelectric facilities. Such actions, however, have the potential to affect historic properties. For example, an historic dam may require repair not in keeping with its original materials, or the creation of a fire break could affect an archeological site. In addition, emergency situations associated with non-project facilities could affect cultural resources. For example, crews responding to downed non-project power lines may not be aware of the potential for affecting cultural resources.

In addition to the six above-mentioned project effects for PG&E and NID's projects, NID's HPMP identifies site vandalism and looting as a potential threat to historic properties.

#### Artifact Collection/Vandalism

Looting is described as casual collection of surface artifacts as well as deliberate unauthorized digging and theft of cultural resources. NID points out that the more accessible historic properties are to public traffic, the more likely they are to be affected by vandalism. Furthermore, archeological sites that have been impacted by looting in the past are prone to additional looting.

### Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects

#### Archeological Resources

PG&E documented 218 archeological sites in the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects APE. The majority (71.1 percent or 155) is located within the Upper Drum-Spaulding Project; 39 are in the Lower Drum Project and 24 are in the Deer Creek Project. Of the 218 archeological sites, 103 are not eligible for the National Register, 96 have not been evaluated for National Register eligibility, and 19 are eligible for the National Register. Table 3-244 presents a summary of the National Register evaluation and a determination of project effects for these sites.

Table 3-244. Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects archeological site evaluation summary. (Source: PG&E, 2013)

| National Register-Eligibility Status of Sites by Project | Number of Sites | Project Effect | Number of Sites |
|---|---|---|---|
| Upper Drum-Spaulding Project | | | |
| Ineligible | 71 | NA | 71 |
| Unevaluated | 65 | No effects | 33 |
| | | Effects − Will be evaluated | 25 |
| | | Effects − Will not be evaluated | 7 |
| Eligible | 19 | Effects | 8 |
| | | To be determined | 1 |
| | | No effects | 10 |
| Total Upper Drum-Spaulding | 155 | | 155 |
| Lower Drum Project | | | |
| Ineligible | 22 | NA | 22 |
| Unevaluated | 17 | No effects | 12 |
| | | Effects − Will be evaluated | 3 |
| | | Effects − Will not be evaluated | 2 |
| Eligible | 0 | | 0 |
| Total Lower Drum | 39 | | 39 |
| Deer Creek Project | | | |
| Ineligible | 10 | NA | 10 |
| Unevaluated | 14 | No effects | 8 |
| | | Effects − Will be evaluated | 5 |
| | | Effects − Will not be evaluated | 1 |
| Eligible | 0 | | 0 |
| Total Deer Creek | 24 | | 24 |
| Total Upper Drum-Spaulding, Lower Drum, and Deer Creek | 218 | | 218 |

*Ineligible Sites*

PG&E identified 103 archeological sites as being ineligible for the National Register. The majority (68.93 percent or 71) is located in the Upper Drum-Spaulding Project; 22 are in the

Lower Drum Project and 10 are in the Deer Creek Project. The SHPO concurred with all eligibility determinations in letters dated July 29, 2011; May 18, 2012; December 21, 2012; and August 1, 2013. No further cultural resources management consideration is required for these sites. However, the HPMP states that "[t]hough these sites have been determined ineligible, PG&E would undertake minor test excavations to ensure that there are no remaining subsurface archeological deposits that would prompt the reconsideration of the previous determination."

*Unevaluated Sites*

Of the 96 sites that have not been evaluated for National Register eligibility, 65 are in the Upper Drum-Spaulding Project, 17 are in the Lower Drum Project, and 14 are in the Deer Creek Project. PG&E determined that 53 of the 96 unevaluated sites are not being affected by any project-related activities. The 53 unevaluated sites that are not being affected are primarily in the Upper Drum-Spaulding Project (n=33); 12 are in the Lower Drum Project and 8 are in the Deer Creek Project. PG&E's HPMP states that these 53 sites would be treated as if eligible for the National Register, avoided by O&M activities, and routinely monitored.

The remaining 43 unevaluated sites are experiencing project-related effects that include recreational activities, access road maintenance and use, PG&E construction staging areas, artifact collecting and metal detecting, dam outlet runoff, flooding, transmission line maintenance and vegetation clearing, fluctuating water levels, wave action, soil deflation, and slope erosion. PG&E proposes to conduct formal National Register evaluations at 33 of the 43 unevaluated sites that are experiencing project-related effects. The 33 sites that would be formally evaluated for National Register eligibility are located in the Upper Drum-Spaulding (n=25), Lower Drum (n=3), and Deer Creek Projects (n=5).

For the remaining 10 unevaluated sites within the APE that are experiencing project-related effects, PG&E proposes to eliminate all project-related effects in the locations, if possible. Seven of these sites are located in the Upper Drum-Spaulding Project; two are in the Lower Drum Project and one is in the Deer Creek Project. Eight of these sites are located on PG&E land and two are on private property. PG&E proposes to eliminate all project-related effects for the eight unevaluated sites on PG&E land. Because the other two unevaluated sites are located on private property; PG&E is not able to assess effects at those sites. However, PG&E plans to evaluate these sites, if or when landowner access is granted.

*Eligible Sites*

Nineteen archeological sites (including the Spaulding Dam Construction Discontiguous Archeological District) are eligible for the National Register. All 19 are located within the Upper Drum-Spaulding Project.

PG&E determined that 8 of the 19 National Register-eligible sites are experiencing project-related effects that include recreational activities; road construction, maintenance, and use; PG&E construction staging areas; modern trash disposal; pot-hunting; wave action; and deflation. As stipulated in section 4.3.4 of the HPMP, PG&E proposes to resolve adverse effects at these eight sites within 3 years of a determination of adverse effect to a historic property. Pending implementation of the resolution measures for these sites or a determination of effect, PG&E would monitor these sites, as outlined in section 4.3.5 of the HPMP.

Also, PG&E identified one National Register-eligible site that requires further work to determine if project-related effects are present. The rock art component of this site is eligible for the National Register, but the lithic scatter associated with the site is unassessed. PG&E proposes

to monitor this site to identify potential project-related effects per section 4.3.5 in the HPMP. If project-related effects are identified, PG&E would follow the HPMP procedures and formally evaluate the site for its National Register eligibility and mitigate adverse effects, if necessary.

PG&E proposes to avoid and monitor the remaining 10 National Register-eligible sites, as outlined in section 4.3.5 of the HPMP. These sites are not experiencing project-related effects.

*Summary of Proposed Management Measures for Affected Archeological Sites*

The 41 archeological sites (8 National Register-eligible sites in the Upper Drum-Spaulding Project and 33 sites that are pending National Register evaluation: 25 in the Upper Drum-Spaulding Project, 3 in the Lower Drum Project, and 5 in the Deer Creek Project) that are experiencing project-related effects and the 1 National Register-eligible site in the Upper Drum-Spaulding Project that has unassessed project-related effects are listed in table 3-245. The table identifies the potential project effects and PG&E's proposed management of effects.

Table 3-245. PG&E's proposed management of National Register-eligible and potentially eligible archeological and historic-era resources experiencing project-related effects. (Source: PG&E, 2013)

| Resource Number[a] | Location | Potential Project Effects | Proposed Management |
|---|---|---|---|
| **Upper Drum-Spaulding Project Sites Eligible for Listing on the National Register with Project-Related Effects** | | | |
| P-29-0853-H<br>CA-NEV-693-H<br>FS 05-17-56-003<br>Summit City/Meadow Lake Townsite | Meadow Lake | Recreation, artifact collecting and vandalism, road construction, PG&E-managed campground | Monthly monitoring and data recovery to resolve adverse effects. |
| P-29-4023-H<br>CA-NEV-2036-H<br>FDY-MRM-1 | Fordyce Lake | Wave action | Annual monitoring and data recovery to resolve adverse effects. |
| P-29-4069-H<br>CA-NEV-2069-H<br>SPL-MRM-17 | Spaulding Lake | PG&E staging area, modern trash disposal, access road | Same as above. |
| P-29-4071-H<br>CA-NEV-2071-H<br>SPL-MRM-20 | Spaulding Lake | Wave action, deflation | Same as above. |
| P-29-4090-H<br>CA-NEV-2081-H<br>SPL-MRM-3 | Spaulding Lake | Wave action | Same as above. |
| P-29-4108-H<br>CA-NEV-2091-H<br>SPL-MRM-12 | Spaulding Lake | Minimal access road maintenance | Same as above. |

Table 3-245. PG&E's proposed management of National Register-eligible and potentially eligible archeological and historic-era resources experiencing project-related effects. (Source: PG&E, 2013)

| Resource Number[a] | Location | Potential Project Effects | Proposed Management |
|---|---|---|---|
| P-29-4138<br>CA-NEV-2127-H<br>Spaulding Dam Construction Discontiguous Archeological District | Spaulding Lake | PG&E staging area, trash disposal, access road, deflation, wave action | No monitoring. |
| P-31-1829<br>CA-PLA-1418<br>FS 05-17-55-534 | Kelly Lake | Camping | Monthly monitoring. PG&E plans to limit access to the site. |
| **3. Upper Drum-Spaulding Project Site Eligible for Listing on the National Register with Undetermined Project-related Effects** | | | |
| P-29-4030<br>CA-NEV-2041<br>FDY-MRM-26 | Fordyce Lake | To be determined | Annual monitoring and subsurface testing to determine the extent of the lithic scatter. |
| **4. Upper Drum-Spaulding Project Sites Proposed for National Register Evaluation 1 to 3 Years Following License Issuance** | | | |
| P-29-0695-H<br>CA-NEV-613H | Fordyce Lake | Camping; site at high-water line, artifact collecting | Monthly monitoring<br>HPMP appendix H<br>HPETP section 3.3, *Historic Archeological Sites* |
| P-29-2248-H | South Yuba Canal Access Roads | Used as an access road | Same as above. |
| P-29-4029<br>CA-NEV-2040<br>FDY-MRM-25 | Fordyce Lake | Erosion, partial inundation, wave action, fishing, soil deflation | Annual monitoring<br>HPMP appendix H<br>HPETP section 3.2.6.2.1, *Lithic Scatters* |
| P-29-4031-H<br>CA-NEV-2042-H<br>FDY-MRM-4<br>FS 05-17-53-931 | Fordyce Lake | Wave action, fluctuating water levels, deflation, camping | Same as above. |
| P-29-4034-H<br>CA-NEV-2043-H<br>FDY-MRM-10 | Fordyce Lake | Fluctuating water levels, wave action, slope erosion | Same as above. |

Table 3-245. PG&E's proposed management of National Register-eligible and potentially eligible archeological and historic-era resources experiencing project-related effects. (Source: PG&E, 2013)

| Resource Number[a] | Location | Potential Project Effects | Proposed Management |
|---|---|---|---|
| P-29-4037/H<br>CA-NEV-2046/H<br>FDY-MRM-20 | Fordyce Lake | Wave action, fishing | Annual monitoring<br>HPMP appendix H<br>HPETP sections 3.3, *Historic Archeological Sites*, and 3.2.6.2.1, L*ithic Scatters* |
| P-29-4038<br>CA-NEV-2047<br>FDY-MRM-27 | Fordyce Lake | Wave action, erosion, deflation | Same as above. |
| P-29-4039-H<br>CA-NEV-2048-H<br>FDY-MRM-29 | Fordyce Lake | Wave action | Annual monitoring<br>HPMP appendix H<br>HPETP section 3.3, *Historic Archeological Sites* |
| P-29-4045-H<br>CA-NEV-2052-H<br>FDY-MLM-1 | Fordyce Lake | Soil deflation, OHV | Same as above. |
| P-29-4052-H<br>CA-NEV-2058-H<br>MDW-MRM-3<br>FS 05-17-56-591 | Meadow Lake | Camping, access road, PG&E staging area | Same as above. |
| P-29-4131<br>CA-NEV-2096<br>STR-MLN-1 | Sterling Lake | Annual inundation, wave action, deflation | Same as above. |
| P-31-4377-H<br>CA-PLA-2407-H<br>DMCR-MLN-4 | Drum Canal Access Roads | Vegetation clearing for transmission line maintenance | Same as above. |
| P-31-4381-H<br>CA-PLA-2411-H<br>DMCR-MLN-8 | Drum Canal Access Roads | No project-related effects; ongoing artifact collecting and site vandalism | Same as above. |
| **5. Upper Drum-Spaulding Project Sites Proposed for National Register Evaluation 2 to 4 Years Following License Issuance** | | | |
| P-29-4042-H<br>CA-NEV-2051-H<br>FDY-TK-2<br>FS 05-17-53-937 | Fordyce Lake | Wave action; road extends below high-water mark | Annual monitoring<br>HPMP appendix H<br>HPETP section 3.3, *Historic Archeological Sites* |

Table 3-245. PG&E's proposed management of National Register-eligible and potentially eligible archeological and historic-era resources experiencing project-related effects. (Source: PG&E, 2013)

| Resource Number[a] | Location | Potential Project Effects | Proposed Management |
|---|---|---|---|
| P-29-4055-H<br>CA-NEV-2060-H<br>MDW-MLM-2<br>FS 05-17-56-592 | Meadow Lake | Dam outlet runoff | Same as above. |
| P-29-4056-H<br>FS 05-17-56-527 | Meadow Lake | Dam outlet runoff | Same as above. |
| P-29-4063<br>CA-NEV-2065<br>FEE-MRM-1<br>FS 05-17-53-944 | Feeley Lake | Wave action, deflation | Annual monitoring<br>HPMP appendix H<br>HPETP section 3.2.6.2.1, *Lithic Scatters* |
| P-31-4280<br>CA-PLA-2368<br>PKU-MRM-1<br>FS 05-17-57-897 | Peak Lakes | Wave action, deflation | Same as above. |
| P-31-4281<br>CA-PLA-2369<br>PKU-MRM-2<br>FS 07-17-57-898 | Peak Lakes | Wave action, deflation | Same as above. |
| P-31-4282<br>CA-PLA-2370<br>PKL-MRM-3<br>FS 05-17-57-903 | Peak Lakes | Wave action | Same as above. |
| P-31-4283<br>CA-PLA-2371<br>PKL-MRM-4<br>FS 05-17-57-899 | Peak Lakes | Deflation | Same as above. |
| P-31-4294<br>CA-PLA-2377<br>LVY-MRM-1 | Lake Valley reservoir | Wave action, deflation | Same as above. |
| P-31-4299<br>CA-PLA-2381<br>LVY-MRM-6 | Lake Valley reservoir | Wave action, fluctuating water levels, deflation | Same as above. |
| P-31-4303<br>CA-PLA-2383<br>LVY-MRM-9 | Lake Valley reservoir | Wave action | Same as above. |

Table 3-245. PG&E's proposed management of National Register-eligible and potentially eligible archeological and historic-era resources experiencing project-related effects. (Source: PG&E, 2013)

| Resource Number[a] | Location | Potential Project Effects | Proposed Management |
|---|---|---|---|
| **6. Upper Drum-Spaulding Project Sites Proposed for National Register Evaluation 3 to 5 Years Following License Issuance** | | | |
| P-29-4089<br>CA-NEV-2080-H<br>SPL-MRM-2 | Lake Spaulding | Wave action, deflation | Annual monitoring HPMP appendix H HPETP section 3.3, *Historic Archeological Sites* |
| **7. Lower Drum Project Site Proposed for National Register Evaluation 1 to 3 Years Following License Issuance** | | | |
| P-31-4327<br>CA-PLA-2392<br>HSP-MRM-08 | Halsey Development-powerhouse and afterbay | Graveled staging area | Monitoring every 3 years. HPMP appendix H HPETP section 3.2.6.2.1, *Lithic Scatters* |
| **8. Lower Drum Project Site Proposed for National Register Evaluation 3 to 5 Years Following License Issuance** | | | |
| P-31-4308-H<br>CA-PLA-2416-H<br>NCP-MRM-02 | Newcastle powerhouse | Access road maintenance | Annual monitoring HPMP appendix H HPETP section 3.3, *Historic Archeological Sites* |
| P-31-5361<br>CA-PLA-2424<br>BRCS-MRM-17 | Bear River canal spillway channels | Erosion | Annual monitoring HPMP appendix H HPETP section 3.2.6.2.2, *Milling Stations* |
| **9. Deer Creek Project Sites Proposed for National Register Evaluation 3 to 5 Years Following License Issuance** | | | |
| P-29-1585<br>Segment (a)<br>FS 05-17-53-982 | Deer Creek canal forebay | Canal forebay head gate floods the ditch regularly | Annual monitoring HPMP appendix H HPETP section 3.3, *Historic Archeological Sites* |
| P-29-1653-H<br>FS 05-17-55-367<br>(a) – (c) | Deer Creek transmission line | Vegetation clearing for transmission line maintenance | Same as above. |
| P-29-4004<br>CA-NEV-2035/H<br>FS 05-17-53-983<br>DCT-MRM-5 | Deer Creek transmission line | Vegetation clearing for transmission line maintenance | Same as above. |

Table 3-245. PG&E's proposed management of National Register-eligible and potentially eligible archeological and historic-era resources experiencing project-related effects. (Source: PG&E, 2013)

| Resource Number[a] | Location | Potential Project Effects | Proposed Management |
|---|---|---|---|
| P-29-4107/H<br>CA-NEV-2090/H<br>DCT-MRM-4<br>FS 05-17-53-955 | Deer Creek transmission line | Vegetation clearing for transmission line maintenance | Same as above. |
| P-29-4229-H<br>DCT-MRM-8 | Deer Creek transmission line | Vegetation clearing for transmission line maintenance | Same as above. |

a Primary, Trinomial (-H = historic; /H = prehistoric and historic; no H or /H = prehistoric), Forest Service (FS), Temporary

The eight National Register-eligible sites that are experiencing project-related effects and one National Register-eligible site that has undetermined project-related effects are located in the Upper Drum-Spaulding Project. In addition, there are 25 unassessed sites that are located in the Upper Drum-Spaulding Project with project-related effects and are scheduled for National Register evaluation following license issuance. Of the remaining eight sites pending National Register evaluation, three are in the Lower Drum Project, and five are located in the Deer Creek Project.

PG&E-proposed management for archeological sites with project-related effects includes blocking vehicular access to these sites, posting restrictive signage, closing user-created roads, and conducting annual monitoring of erosion. In addition, PG&E proposes notifying transmission managers and educating employees about sites that may be affected by vegetation management or new transmission line construction. PG&E currently implements an employee environmental and sensitivity training program and proposes to continue this program. For the protection of historic resources, PG&E also proposes educating the public about the cultural significance of the area through interpretive signage, brochures, or other similarly appropriate media. Representatives from the tribes and resource agencies would be asked to participate in the creation of interpretive materials.

In addition, within 2 years of license issuance PG&E plans to develop and implement a seasonal project patrol on project and project-affected Forest Service and BLM lands. The seasonal project patrol tasks would include monitoring and reporting vandalism of facilities, including cultural sites, and other resource damage. At the annual coordination meeting, PG&E would coordinate with the resource agencies and interested parties to review the seasonal patrol reports from the prior recreation season and plan any adjustments for the next season.

**Historic Buildings and Structures**

PG&E identified 118 historic built-environment resources. Of these, 90 (including the Drum-Spaulding Hydroelectric System and Historic District) are associated with generating electricity and include dams, powerhouses, canals, switchyards, work and residential camps, and tramways. The majority of the 90 hydroelectric-related built-environment resources that include 17 high-elevation dams are located in the Upper Drum-Spaulding Project (n=63); 19 are located in the Lower Drum Project and 8 are located in the Deer Creek Project.

The remaining 28 built-environment resources include 4 non-project water conveyance systems (canals) located in the Lower Drum Project and 24 resources that are not related to water conveyance or generation of hydroelectric power. Thematically, the 24 non-hydroelectric resources are related to transportation (trails, roads, bridges), ranching (corrals, barns, sheds), recreation (cabins, organizational camps, clubs, and lodges), settlement (commercial buildings, historic monument, residence, and a post office), and other (historic grave site). Of the 24 non-hydroelectric resources, 14 are located in the Upper Drum-Spaulding Project, 13 are in the Lower Drum Project, and 1 is in the Deer Creek Project.

Of the 118 built-environment resources, 23 are eligible for the National Register, 20 are eligible as contributing elements to the Drum-Spaulding Hydroelectric System and Historic District, and 62 are not eligible for the National Register. The remaining 13 resources include 10 that were determined to be modern and were not formerly recorded or documented and 3 that are not being affected by the project and were unevaluated for the National Register. PG&E proposes to document the 10 modern resources when they become 50 years of age and to monitor the 3 resources that were unevaluated for National Register eligibility. If project-related effects are identified, PG&E would follow HPMP procedures and formally evaluate the affected site(s) for National Register eligibility and would follow procedures to mitigate adverse effects, if necessary.

PG&E determined that none of the 118 historic built-environment resources in the APE are presently being affected by project O&M. Consequently, no built-environment specific management measures are currently recommended to address project-related effects.

Additionally, there are 33 PG&E-managed recreation areas that are presumed to have been constructed after the project reservoirs were built in the 1960s. These recreation areas have primitive campsites, campgrounds, boat launches, day-use picnic areas, group campgrounds, trailheads, and shoreline access with no developed facilities. Some of these areas are jointly owned and managed with the Forest Service or private property owners. PG&E would begin to inventory, document, and evaluate these recreation areas for the National Register, as necessary and when appropriate (i.e., if they are determined to be 50 years of age or older), within 5 years following license issuance. The majority (n=30) of the 33 PG&E-managed recreation areas are located in the Upper Drum-Spaulding Project and 3 are located in the Lower Drum Project.

Should other built-environment resources within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project APE turn 50 years of age during the new license, PG&E proposes to record these resources and evaluate them for eligibility for inclusion in the National Register when and if project O&M activities are planned that could potentially affect them. Though no architectural or engineered historic properties are currently being affected, future potential effects related to normal upkeep and maintenance of these types of resources (i.e., window replacement, painting, new plumbing, etc.) are possible. As a result, in addition to the screened undertakings,[37]

[37] Screened undertakings are those undertakings that have the potential to affect historic properties, but following appropriate screening, may be determined exempt from further review or consultation under the HPMP. The cultural resources specialist is responsible for screening those individual undertakings that are listed in appendix J of the HPMP to determine whether further consideration is required, or if they may be determined exempt from further review and consultation under the terms of the HPMP.

when practical, PG&E proposes to operate and maintain the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects according to the guidelines found in the Secretary of the Interior's standards to take into account the management of any potential future effects of undertakings on historic properties or potential historic properties that are of architectural or engineering importance.

Furthermore, if PG&E proposes to rehabilitate, restore, relocate, reconstruct, or otherwise modify any built-environment resource that is an historic property, or build new construction within the viewshed of a National Register-eligible or listed historic district, PG&E would submit construction plans for buildings and structures to the SHPO for review and comment. These activities do not apply to the screened undertakings.

**Traditional Cultural Properties**

PG&E reported that, during the TCP consultation, the tribal community pointed out that while there are ongoing or previous effects to the one TCP that was identified during the TCP study, those effects for the most part are not altering the way the people celebrate, dance, and continue to meet and interact at the site (Davis-King, 2011). As discussed in the confidential TCP evaluation, the property that is located in the Lower Drum Project was recommended as being eligible for the National Register under criterion A for its association with ongoing ceremonial and educational activities. The SHPO concurred with this recommendation on October 30, 2012. According to the TCP report, "the association of the place with these community events and even the spirit of the place have not been altered, according to the community, so that while there appear to be effects to the place, those effects are not adverse. That is, the effects do not diminish the value the place holds for the native community." PG&E determined that project operations had no adverse effect on the TCP.

PG&E states in the HPMP that it is working with the tribes to protect this site and avoid adverse effects. Should unavoidable adverse effects occur to the identified TCP, or to any not-yet-identified TCP, treatment would be negotiated and agreed upon between the SHPO, PG&E, and the relevant tribes or groups on a case-by-case basis.

In addition, the TCP report describes specific botanical resources that are used by the Southern Maidu in ceremonies and medicine. These include several flowering plants that are gathered for use in dances and ceremonies; coffee berry seeds and Sierra plum pits that are used to make beads; and various berries and plants that are used for purification. The TCP report indicates that these plants continue to be important in dance ceremonies.

The TCP report also stated that "there is a very strong interest in the condition of the salmonid fishery near and in the project APE." Salmon fishery was very important to the Southern Maidu, and an effort is ongoing by the tribes to identify places that might be associated with traditional salmon-fishing activities. Although no salmon-fishing areas were identified, places in the lower reaches of the American and Bear Rivers (outside the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project APE) are known. Identifying salmon-fishing areas and processing sites continues to be an important topic.

**Our Analysis**

*Archeological Resources and National Register Eligibility*

PG&E has identified 218 archeological sites. Of these, 122 were evaluated for National Register eligibility during the survey phase and 96 were identified as requiring additional

fieldwork prior to National Register evaluation. PG&E identified project-related effects for all archeological sites that have been determined to be eligible for the National Register or are pending National Register evaluation and has identified appropriate protection and mitigation measures such as, restricting land access to areas with significant archeological sites, conducting monitoring for erosion, providing employees and contractors with information about environmental sensitivity on PG&E lands, providing public education materials, and implementing a seasonal project patrol to monitor and report on vandalism to cultural sites.

*Historic Buildings and Structures*

In accordance with the FERC-approved study plan, PG&E evaluated 118 historic built-environment resources for potential listing in the National Register. On February 13, 2012, the SHPO found that 23 of the 118 built-environment resources were eligible for the National Register this includes the Drum-Spaulding Hydroelectric System and Historic District that has 20 resources that are only eligible for the National Register as contributing elements to the district. Also, 62 of the 118 built-environment resources were determined to be ineligible to the National Register and 2 resources that were unevaluated for the National Register. None of the 118 historic built-environment resources are presently being affected by the project. Therefore, no management measures are proposed by PG&E for the historic buildings and structures. However, if and when potential project-related adverse effects would occur on these historic built-environmental resources, PG&E would apply appropriate measures to resolve such effects in accordance with acceptable historic preservation standards in consultation with the SHPO.

PG&E also identified 10 modern resources and several post-1960 recreation areas that would be inventoried, documented, and evaluated when they are determined to be 50 years of age or older. Waiting for the modern built-environment resources and post-1960 recreational facilities to reach 50 years of age would allow for appropriate evaluation under NHPA and any project effects could be determined based on eligibility for the National Register.

*Traditional Cultural Properties*

Upon review of the TCP report, we conclude there is enough information to determine that the one resource (ceremonial and social event center) within the Lower Drum Project APE can be considered as a National Register-eligible TCP. Through the HPMP, PG&E would continue to work with the tribes to alleviate any potential project-related adverse effects to this TCP. If any future TCPs are discovered within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project APE, PG&E would also engage and consult with the tribes to evaluate and consider measures to protect these resources. We agree with this approach.

The TCP report identified plants and salmon fishing that are culturally important to the Southern Maidu. Even though significant plant-collecting areas may not qualify as National Register-eligible TCPs, they still need to be protected by other statutes, such as NEPA. To adequately protect TCP plants and wildlife, it would be appropriate for PG&E to consult with the tribes to identify culturally significant plant species within 60 days of license issuance and to include the protection of culturally significant plants in its Integrated Vegetation Management Plan. As a result, we address current and planned protection measures for culturally sensitive plants in section 3.3.3.2, *Terrestrial Resources, Environmental Effects*. Similarly, salmon fishing is not a section 106 resource; however, we address current and planned protection measures for salmon in section 3.3.2.2, *Aquatic Resources, Environmental Effects*.

**Historic Properties Management Plan**

Continued project operation and enhancements and new construction could affect cultural resources listed in or eligible for inclusion in the National Register. The purpose of PG&E's HPMP is to resolve (i.e., reduce, avoid, or mitigate) existing or potential project-related adverse effects to historic properties within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project APE for the term of the new license.

PG&E provided a first draft of the HPMP to the Forest Service, BLM, and tribes for a 30-day review and comment period on August 31, 2010. PG&E met with tribes and agencies on October 6, 2010, to discuss any questions regarding the draft HPMP. PG&E included the HPMP in its license application and provided it to the SHPO for review and comment following a request from FERC in a letter dated January 31, 2011. On May 18, 2012, PG&E issued HPMP binders, including the newly drafted Historic Properties Treatment (HPTP), for a 30-day review. PG&E held a cultural work group meeting with tribal/agency relicensing participants to review and discuss comments on the HPMP and the HPTP on May 31, 2012. PG&E filed a revised HPMP (dated August 2012) with the Commission on September 25, 2012, and a revised final HPMP (dated September 2013) with the Commission on September 23, 2013. The revised final HPMP includes provisions for cultural resource protection at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects.

PG&E's HPMP is designed to prescribe specific actions and processes to manage historic properties. It is intended to serve as a guide for operating personnel when performing necessary O&M activities and to prescribe site treatments designed to address ongoing and future effects on historic properties. The HPMP also describes a process of consultation with appropriate state and federal agencies and tribes regarding the management of historic properties. PG&E's requirements detailed in the HPMP include: appointment of an HPMP Coordinator; training for all O&M staff; routine monitoring of known cultural resources; and periodic review and revision of the HPMP as necessary.

Implementation of the HPMP would ensure that project-related effects on cultural resources would be taken into account and the appropriate management measures would be in place prior to imposing any O&M activities on cultural resources. PG&E anticipates that FERC would execute a PA with the SHPO (if the Advisory Council declines to participate) to implement the final HPMP upon license issuance. PG&E, the tribes, the Forest Service, and BLM would be invited to participate in the PA as consulting parties.

PG&E's cultural resource management goals emphasize responsible stewardship of historic properties, with avoidance and preservation-in-place as the principal objectives. Many of the sites that would be managed through the HPMP have not been evaluated for eligibility to the National Register; unevaluated sites would be treated as eligible and managed accordingly, until their status is determined otherwise. PG&E would use qualified tribal cultural monitors during archeological investigations, non-emergency construction and maintenance activities requiring ground disturbance that would create a reasonable effect to historic properties, and long-term historic properties monitoring.

PG&E proposes other protocols and procedures in the HPMP involving educating the public and PG&E staff on protecting cultural resources, emergency situations, treatment of human remains, curation of recovered cultural materials, activities that do not require SHPO involvement, future project studies, seasonal patrolling, monitoring of cultural resources, and general consultation.

*Our Analysis*

The Commission reviewed the May 2010 draft HPMP and had eight comments that were adequately addressed by PG&E in the revised (April 2011) HPMP that was filed with the final license application. The Commission provided two additional comments on the revised April 2011 HPMP. Both comments resulted in modification to the HPMP that included: (1) a narrative section in the National Register Evaluation Plan in appendix F; and (2) incorporating the results of the remaining studies into the final HPMP and update the National Register Evaluation Plans based on correspondence from the SHPO and other consulting parties. As a result, PG&E filed a revised HPMP with the Commission in September 2013.

The UAIC, Washoe, and Nisenan Maidu provided comments on the 2010 and 2012 HPMP regarding site identification and protecting site location information, survey coverage, site monitoring schedule and quality control, HPMP revisions, the preferred artifact recovery methodology, artifact curation, concerns about salmon and other flora/fauna, tribal participation, treatment of human remains, TCPs, creative mitigation, and project-related effects. PG&E's responses to comments provided by the UAIC, Washoe, and Nisenan Maidu are appropriate and are addressed in the HPMP. PG&E's final HPMP (filed in September 2013) adequately addressed concerns expressed by the UAIC, Washoe, and Nisenan Maidu

Preliminary 4(e) condition b.11 filed by Reclamation and 10(a) measure 19 filed by California Fish and Wildlife specify that the HPMP should include requirements for protecting paleontological discoveries that could be identified on federally managed land during project activities and that PG&E solicit written approval from the federal land manager to proceed following a discovery.

The final HPMP filed with the Commission by PG&E in September 2013 contains a number of measures to manage and protect historic properties in a timely manner and adequately addresses the Reclamation 4(e) condition b.11 and California Fish and Wildlife 10(a) recommendation 19 that are applicable to section 106 resources. However, section 106 does not include provisions for protecting paleontological resources; the paleontological law enacted by Congress in March 2009 requires all federal land managers to manage and protect paleontological resources discovered on their lands.[38] Consequently, the Commission in issuing a new license for PG&E's proposed Drum-Spaulding, Lower Drum, and Deer Creek Projects would not have jurisdiction over PG&E to require them to provide measures in the HPMP to protect paleontological resources upon their discovery..

Federal Power Act final 4(e) conditions were filed by the Forest Service on November 20, 2013, and the BLM on November 21, 2013. Forest Service condition 56 and BLM condition 21 state that "Upon Commission approval, Licensee shall implement the Historic Properties Management Plan, filed separately with the Commission."

[38] See Omnibus Public Land Management Act of 2009, Public Law 111 011, Title VI, Subtitle D on Paleontological Resources Preservation (123 Stat. 1172; 16 U.S.C. 470aaa). This statute requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal land using scientific principles and expertise. Subtitle D includes specific provisions addressing management of these resources by BLM, National Park Service, Reclamation, FWS, and Forest Service.

PG&E's final HPMP would adequately resolve project-related adverse effects to historic properties for the term of a new license. The avoidance strategies, public and employee training proposals, signage plans, transportation plans, monitoring, and consultation proposals are all measures that would ensure that archeological sites and historic properties within the Upper Drum-Spaulding, Lower Drum, and Deer Creek Project's APE are protected and maintained throughout the term of any license issued for the projects.

Commission staff would attach the final HPMP to a PA and execute it with the SHPO (given that the Advisory Council declined to comment). In the license order, Commission staff would use a standard license article to implement the PA upon license issuance.

**Yuba-Bear Project**

**Archeological Resources**

NID identified 147 cultural resources (113 sites and 34 isolated artifacts) during the 2008 to 2012 relicensing field investigations within the project APE. This work included recordation of 14 previously documented sites and 96 newly discovered sites. NID identified the 113 archeological sites as being either ineligible (n=76) or unevaluated (n=37) for the National Register; no archeological sites were eligible for inclusion in the National Register. The SHPO concurred with NID's recommendation for these sites on August 18, 2011.

In 2010, NID conducted National Register evaluation studies at two of the unevaluated sites (P-29-3947 and P-29-3953) located along the Rollins reservoir shoreline (Risse et al., 2013). The additional work was initiated due to ongoing disturbances to these sites as a result of recreational use, operations of the campground, and erosion caused by fluctuating water levels of the reservoir. In addition, initial archeological investigations at one site suggested that it had the potential to contain human burials. As a result, NID took immediate action outside the relicensing effort to address ongoing effects at these two sites. Investigations consisted of systematic surface collecting and subsurface shovel testing, feature excavation, backhoe trenching, osteology and faunal analysis, and soil analysis. The investigations followed the National Register evaluation and treatment plan approved by the SHPO on September 21, 2010. The investigations at both sites generated data to support prehistoric and historic use; however, the integrity of the deposits, in particular aspects of location, setting, feeling, design, workmanship, and association have been severely compromised by the construction and continued use of the campground and its facilities, which included demolition of structures that once stood on each site during the late 1960s, as well as fluctuations in the reservoir water line at P-29-3593. NID submitted the report of investigations for this work to the Commission on October 18, 2013, with the recommendation that these two sites were ineligible for the National Register. SHPO concurrence with this recommendation is pending.

Since 2009, the FERC boundary for the NID project has changed, which resulted having nine resources that were inventoried in 2008 and 2009 removed from FERC jurisdiction. Six of the nine sites removed from FERC boundary were previously evaluated as being ineligible for the National Register; pending SHPO concurrence these six sites require no further cultural resource management consideration. Two of the remaining three sites are unevaluated for National Register eligibility; however, they are located on Forest Service land. Since these sites are not removed from federal jurisdiction; removing them from the FERC boundary has had no effect on these sites. The remaining site that is unevaluated for the National Register and has been removed from the FERC boundary is located on private land. The FERC boundary was reduced to correspond with NID's easement at this location. NID and FERC never had land rights to the

site location; therefore, it was never subject to federal oversight. Therefore, the FERC relicensing of the project will not adversely affect this unevaluated site located on private property. Following the FERC boundary changes, none of the nine sites being removed from the FERC boundary would require further cultural resources management consideration with regards to project O&M activities.

Table 3-246 presents a summary of the National Register evaluation and a determination of project effects for the 113 sites, which includes the 9 sites that were removed from the FERC boundary.

Table 3-246. Yuba-Bear Project archeological site evaluation summary. (Source: NID, 2012)

| National Register Eligibility | Number of Sites | Project Effect | Number of Sites |
|---|---|---|---|
| Ineligible | 78 | NA | 76 |
| | | Previously Recorded Site (Bowman Barracks Compound) Determined Ineligible in 2000 | 1 |
| | | Previously Recorded Site (Historic Habitation) Not Relocated | 1 |
| Unevaluated | 35 | Effects − Will be evaluated | 12 |
| | | No Effects | 23 |
| Eligible | 0 | NA | 0 |
| Total | 113 | | 113 |

*Ineligible Sites*

With the recent investigations at P-29-3947 and P-29-3593, described above, the number of ineligible sites in the Yuba-Bear Project is 78. This includes one previously recorded site, the Bowman Barracks camp, which was determined by the SHPO as being ineligible for listing in the National Register in 2000 and a previously recorded historic habitation that was not relocated. All 34 isolated artifacts that were identified within the APE were ineligible for the National Register

*Unevaluated Sites*

NID identified 35 archeological sites that were not evaluated for the National Register. Of these, 12 were found to have project-related effects and 23 had no project-related effects.

Of the 12 unevaluated archeological sites that were determined to have project-related effects, 4 are prehistoric sites (lithic scatters/bedrock milling outcrops and rock art); 5 are historic sites (refuse scatters, foundations, rock walls, ditches, and a shed); and 3 are multicomponent sites (dominated by prehistoric elements including lithic scatters, a midden, bedrock milling outcrop and some historic refuse scatters and evidence of historic settlement). Project-related effects at these 12 sites include recreational activities; campground construction and maintenance; transmission line construction; spillway construction; road maintenance and use; and erosion, deflation, and deflation from fluctuating waters levels.

NID proposes to evaluate formally the 12 unevaluated sites for listing in the National Register following additional archival research and/or field investigations. The evaluations for potential listing in the National Register would be conducted within five years of license issuance and approval of the HPMP, unless routine monitoring indicates that a modified schedule is required to address project-related effects more quickly. NID proposes evaluating one to four sites per year and to begin resolution measures for addressing effects within 3 years of a determination of adverse effect. The proposed plan for further investigations is in appendix I of the HPTP that was prepared in consultation with the tribes, FERC, the National Forest, and BLM; it was submitted to the SHPO for review and concurrence. Based on the outcome of the formal National Register evaluations, these sites would be managed following general management measures in section 4.3 of the HPMP. These measures include avoiding sites, stabilizing and protecting sites, conducting additional survey work when reservoir water levels occur 20 vertical feet lower than they were during the relicensing field surveys; conducting site testing and data recovery excavations if avoidance, stabilization, and protection are not possible; conducting site monitoring to provide feedback about the condition of sites and confirming that sites have been avoided as planned; and initiating the inadvertent discovery process, when necessary.

Project-related effects for the 12 archeological sites that are pending National Register evaluation are listed in table 3-247. The majority of these sites are located at recreational areas along the shoreline of Rollins reservoir (Long Ravine campground, Peninsula campground, and Greenhorn campground); at the Faucherie Lake day-use recreation area, and at the Jackson Meadows reservoir boat ramp. Three sites are associated with historic occupation and water conveyance at Rollins reservoir, at the Bowman-Spaulding conduit, and at the Bowman-Spaulding transmission line. These sites are being affected by a combination of dispersed recreational use, erosion, road and canal maintenance and use, and transmission line construction.

Table 3-247. NID's proposed management of unevaluated archeological sites experiencing project-related effects. (Source: NID, 2012)

| Resource Number[a] | Location | Potential Project Effects | NID Proposed Management |
|---|---|---|---|
| **Sites Proposed for National Register Evaluation 1 Year Following License Issuance** | | | |
| P-31-3839<br>CA-PLA-2339<br>AE-YB-2 | Rollins reservoir, Long Ravine campground | Recreation | Campground use and maintenance are disturbing the site. Monthly monitoring. |
| P-31-3840<br>CA-PLA-2340/H<br>AE-YB-3/H | Rollins reservoir, Long Ravine campground | Recreation | Campground use and maintenance are disturbing the site. Monthly monitoring. |
| P-29-3945<br>CA-NEV-2014<br>AE-YB-31 | Rollins reservoir, Peninsula campground | Recreation; shoreline erosion | Observed cultural remains indicate the site likely retains some level of integrity and data potential, but it sits below the high waterline where the cultural matrix has been eroded by fluctuating water levels and/or wave action. Annual monitoring. |
| P-29-3969<br>CA-NEV-2029<br>AE-YB-23 | Rollins reservoir, Peninsula campground | Recreation; shoreline erosion | Fluctuating water levels and/or wave action is eroding site sediments, and the site has been disturbed by construction of |

Table 3-247. NID's proposed management of unevaluated archeological sites experiencing project-related effects. (Source: NID, 2012)

| Resource Number[a] | Location | Potential Project Effects | NID Proposed Management |
|---|---|---|---|
| | | | the campsites. Monthly monitoring. |
| **10. Sites Proposed for National Register Evaluation 2 Years Following License Issuance** | | | |
| P-29-3910<br>CA-NEV-1995H<br>AE-YB-54H | Faucherie Lake, day-use recreational area | Recreation; shoreline erosion | The site is experiencing ongoing day-use recreational activity and camping. Monthly monitoring. |
| P-29-3918<br>CA-NEV-2002<br>FS 05-17-56-584<br>AE-YB-41 | Jackson Meadows, reservoir boat ramp | Recreation; shoreline erosion | Site sediments are being eroded due to wave action and/or fluctuating water levels. Monitoring every 3 years. |
| P-29-3919<br>CA-NEV-2003H<br>FS 05-17-53-923<br>AE-YB-34H | Faucherie Lake, day-use recreational area | Recreation | The site is experiencing ongoing effects from day-use recreational activity and camping. Monthly monitoring. |
| P-29-3970<br>CA-NEV-2030<br>AE-YB-29 | Rollins reservoir, Peninsula campground | Recreation; shoreline erosion | Observed cultural remains indicate the site likely retains some level of integrity and data potential, but the cultural matrix has been eroded below the reservoir's high waterline by fluctuations in the water level and/or wave action. Monthly monitoring. |
| **11. Sites Proposed for National Register Evaluation 3 Years Following License Issuance** | | | |
| P-29-2044<br>PAR-S-BSC-1H | Bowman Spaulding conduit (Bowman Lake to Rucker tunnel) | Canal and road maintenance, day-use | Road and canal maintenance has created push piles of debris though the site, which has been razed. Not enough information is currently available to determine eligibility, and the resource's archeological data potential is unknown. Monitoring every 3 years. |
| P-29-3971<br>CA-NEV-2031/H<br>AE-YB-4-/H | Rollins reservoir, Greenhorn campground | Recreation; shoreline erosion; and transmission line construction | The site has been disturbed by construction of the transmission line and campground, and fluctuating water levels have eroded and deflated site sediments. Annual monitoring. |
| P-29-4315<br>CA-NEV-2125H<br>HDR-YB2-4 | Rollins reservoir | Shoreline erosion | Fluctuating water levels of the reservoir are eroding the site away. Annual monitoring. |
| **12. Sites Proposed for National Register Evaluation 4 Years Following License Issuance** | | | |
| P-29-3895<br>CA-NEV-1991H<br>FS 05-17-53-919 | Bowman-Spaulding transmission line | Erosion | The site was disturbed by the construction of a transmission line and is experiencing erosion. Monthly monitoring. |

Table 3-247. NID's proposed management of unevaluated archeological sites experiencing project-related effects. (Source: NID, 2012)

| Resource Number[a] | Location | Potential Project Effects | NID Proposed Management |
|---|---|---|---|
| AE-YB-60H | | | |

[a] Primary, Trinomial (-H = historic; /H = prehistoric and historic; no H or /H = prehistoric), Forest Service (CA-NEV, CA-PLA), Temporary (AE-, HDR-, PAR-).

Following the formal National Register evaluations at these 12 archeological sites, NID proposes to manage the sites following the general management measures discussed in section 4.3 of the HPMP.

NID's proposed management at the 12 unevaluated archeological sites experiencing project-related effects includes avoidance by project O&M activities. If these resources cannot be avoided, then NID would follow the procedures outlined in section 4.3.4 of the HPMP. Avoidance means that no activities associated with undertakings may affect historic properties or unevaluated resources, and that activities associated with undertakings may not occur within the resource boundaries, including any defined buffer zones. Portions of undertakings may need to be modified, redesigned, or eliminated to avoid historic properties and unevaluated resources. Buffer zones may be established to ensure added protection where necessary. The use of buffer zones in avoidance measures is particularly applicable where setting contributes to the property's eligibility under 36 CFR 60.4, or where setting may be an important attribute of some types of historic properties (e.g., historic buildings or structures associated with historic landscapes or TCPs).

In addition to protecting these sites by avoidance during O&M activities, NID proposes to conduct monitoring of these sites by a qualified, professional archeologist. Not all of the historic properties in the APE, however, have the same potential to be affected by the project, so there may be variability in how often a site is monitored. Frequency of monitoring would be based on considerations of accessibility, site type, and proximity to project features and recreational use areas, and would be the product of consultation with tribes, participating THPOs, and agencies, as appropriate. NID provides a monitoring schedule in appendix J of the HPMP.

No project-related effects were observed at 23 of the 35 unevaluated sites. These include 5 prehistoric sites (1 lithic scatter, 1 occupation site, and 3 bedrock milling stations); 17 historic sites (5 mining sites; 4 refuse deposits; 3 water conveyance features such as ditches, flumes, dams; 1 hydroelectric-related site with a concrete diversion control gate and spillway; 3 settlement sites with extant structures, and 1 other site with road segments and trails that is possibly related to logging or mining); and 1 multicomponent site (prehistoric bedrock milling features and a historic concrete-and-stone foundation).

As a result of having no project-related effects, these sites would not be formally evaluated, but would be managed by NID as if they are eligible for the National Register through avoidance and routine monitoring. Monitoring would follow the prescribed protocols described under general management measures in section 4.3 of the HPMP, which includes conducting no ground-disturbing activities within site boundaries; ground-disturbing activities within 30 feet of site boundaries may be monitored by an archeologist. These 23 unevaluated sites would be formally evaluated for listing in the National Register if at any time unavoidable effects from project O&M activities are planned.

*Eligible Sites*

At present, there are no National Register eligible archeological sites located within the Yuba-Bear Project APE.

**Historic Buildings and Structures**

Recordation of the historic built-environment within the Yuba-Bear Project APE resulted in the identification of 24 system features. Evaluation, completed as part of the relicensing Historic Properties Study Plan, determined the system to be ineligible for listing in the National Register as a historic district because the features of the system, as a whole, do not convey a unified sense of time and place, nor do they convey architectural interconnectedness. However, two buildings, the ca. 1935 Bowman House and the French Lake control house, were evaluated as individually eligible for listing in the National Register. Both the Bowman House and the French Lake control house are actively used by NID as part of project operations. The current use is not affecting those qualities and characteristics that qualify the buildings for listing in the National Register. As a result, each building would continue to be used by NID. However, project O&M would avoid affecting or altering those characteristics of the buildings that qualify them for listing in the National Register. The remaining 22 system features were evaluated individually as ineligible for listing in the National Register; 13 of these are modern and would need to be documented and reevaluated when they reach 50 years of age. NID submitted the National Register evaluation of the project system and individual features, including the Bowman House and the French Lake control house, to SHPO for review and comment in a transmittal dated August 19, 2010. The SHPO concurred with these findings in a letter dated November 16, 2010.

**Traditional Cultural Properties**

NID's TCP study did not identify any TCPs within the Yuba-Bear Project APE (Davis-King, 2011). The Yuba-Bear Project HPMP provides management measures if future TCPs are identified within the APE; NID would consider the new TCP information in consultation with the SHPO, affected tribes (including any participating THPOs), and land-managing agencies as appropriate, following the procedures and guidelines outlined in the HPMP.

Although the TCP report did not identify any TCPs in the Yuba-Bear Project APE, it describes specific botanical resources that are used by the Southern Maidu in ceremonies and medicine. These include several flowering plants that are gathered for use in dances and ceremonies; coffee berry seeds and Sierra plum pits that are used to make beads; and various berries and plants that are used for purification. The TCP report indicates that these plants continue to be important in dance ceremonies.

In addition, the TCP report stated that "there is a very strong interest in the condition of the salmonid fishery near and in the project APE" (Davis-King, 2011). Historically, salmon fishery was very important to the Southern Maidu, and the TCP report confirms that there is an ongoing effort by the tribes to identify places that might be associated with traditional salmon-fishing activities. Although no areas within the APE were identified, places in the lower reaches of the American and Bear Rivers (outside the APE) are known. Identifying salmon-fishing areas and processing sites continues to be an important topic.

**Our Analysis**

*Archeological Resources*

NID identified 113 archeological sites, of which 78 are ineligible for the National Register and 35 were not evaluated for the National Register. Of the 35 unevaluated sites, 12 were found to have project-related effects and 23 had no project-related effects. In accordance with the FERC-approved study plan, NID proposes to evaluate the 12 unevaluated sites that are experiencing project-related effects within 5 years of license issuance. These National Register-eligibility determinations remain outstanding, but are necessary for compliance with section 106. Requiring NID to make these determinations for the 12 archeological sites that are being affected by the project, in consultation with the SHPO, would ensure that these sites are protected.

*Historic Buildings and Structures*

In accordance with the FERC-approved study plan, NID evaluated 24 historic built-environment resources for potential listing in the National Register; only 2 are eligible for the National Register. None of the 24 historic built-environment resources in the Yuba-Bear Project APE are being affected by the project.

NID also identified 13 modern resources that would be inventoried, documented, and evaluated when they are determined to be 50 years of age or older. Waiting for the modern built-environment resources to reach 50 years of age would allow for appropriate evaluation under the NHPA, and any project effects could be determined based on eligibility for the National Register.

In addition, NID identified several post-1960 recreation areas that would be inventoried, documented, and evaluated for National Register eligibility within five years following license issuance. This schedule was determined in accordance with the Recreation Management Plan for scheduled improvements to recreation facilities.

*Traditional Cultural Properties*

NID submitted a TCP report for the Yuba-Bear Project and found that there were no TCPs present in the APE. In our analysis, we conclude that NID conducted adequate investigations for TCPs; and at this time there appear to be no TCPs present in the APE. NID provided management measures in the HPMP for the protection of TCPs, should any be identified in the future. We agree with this approach.

The TCP report identified certain plants and salmon fishing as being culturally important to the Southern Maidu. Even though significant plant-collecting areas may not qualify as National Register-eligible TCPs, they still need to be protected by other statutes, such as NEPA. To adequately protect TCP plants and wildlife, it would be appropriate for NID to consult with the tribes to identify culturally significant plant species and to include the protection of culturally significant plants in the Integrated Vegetation Management Plan. As a result, current and planned protection measures for culturally sensitive plants are discussed in section 3.3.3.2, *Terrestrial Resources, Environmental Effects*. Similarly, salmon fishing is not a section 106 resource; however, current and planned protection measures for salmon are discussed in section 3.3.2.2, *Aquatic Resources, Environmental Effects*.

**Historic Properties Management Plan**

Continued project operation and enhancements and new construction could affect cultural resources listed in or eligible for inclusion in the National Register. The purpose of the HPMP is to avoid, reduce, or mitigate (i.e., resolve) existing or potential project-related adverse effects to historic properties within the project's APE for the term of a new license. The Yuba-Bear HPMP prescribes specific actions and processes to manage historic properties within the project APE. It is intended to serve as a guide for NID's operating personnel when performing necessary O&M activities and to prescribe site treatments designed to address ongoing and future effects on historic properties. The HPMP also describes a process of consultation with appropriate state and federal agencies, as well as with tribes that may have interests in historic properties within the APE. License requirements detailed in the HPMP include: management measures; training for all O&M staff; routine monitoring of known cultural resources; and periodic review and revision of the HPMP.

Implementation of the HPMP would ensure that the effects of NID's Yuba-Bear Project on cultural resources would be taken into account and that the appropriate management measures are in place prior to imposing any O&M activities on cultural resources. NID anticipates that the Commission would execute a PA with the SHPO (if the Advisory Council declines to participate) to implement the final Yuba-Bear Project HPMP upon license issuance. NID, the tribes, the Forest Service, and BLM would be invited to participate in the PA as consulting parties.

*Our Analysis*

NID provided a draft of the HPMP to the Forest Service, BLM, and tribes for a 30-day review and comment period on September 8, 2010, and met with tribes and agencies on October 6, 2010, to discuss any questions regarding the HPMP. Written comments were received from BLM, the Forest Service, and April Moore, a Nisenan/Maidu tribal member on October 27, 2010, and from UAIC between October 1 and 12, 2010. NID addressed the written comments in the revised draft HPMP, which was again provided to tribes and agencies with the DLA that was filed with the Commission on November 3, 2010, for a 90-day review. Comments on the revised HPMP were received from the Washoe Tribe of Nevada and California (December 29, 2010), FERC (January 31, 2011), and the resource agencies (January 28, 2011). On February 11, 2011, NID met with participating tribes and agencies to discuss comments to the HPMP and review the status of the relicensing process, including the future schedule. All comments were addressed by NID and the HPMP was updated, as necessary. On April 15, 2011, NID distributed copies of the final license application and HPMP to participating tribes, agencies, and the SHPO. On November 1, 2011, NID responded to FERC's request for clarification and additional information on the project's final license application and modifications to the draft HPMP. NID responded that the modifications would be addressed in a final HPMP.

Preliminary 10(a) recommendation 19 filed by California Fish and Wildlife specifies that the HPMP should include requirements for paleontological discoveries that could be identified on federally managed land during project activities and that NID solicit written approval from the federal land manager to proceed following a discovery.

NID's final HPMP adequately addressed the California Fish and Wildlife 10(a) recommendation 19 applicable to section 106 resources. However, California Fish and Wildlife's recommendation includes protection measures for paleontological resources. Paleontological resources are not cultural resources and thus are not eligible for listing in the National Register, and therefore, do not qualify as historic properties. NID has not included management measures

for paleontological resources in the HPMP. The paleontological law enacted by Congress in March 2009 requires all federal land managers to manage and protect paleontological resources discovered on their lands.[39] Consequently, the Commission in issuing a new license for the Yuba-Bear Project would not have jurisdiction over NID to require them to provide measures in the HPMP to protect paleontological resources upon their discovery.

On November 28, 2011, NID notified participants of an upcoming survey around Rollins reservoir due to exceptionally low water levels that were lower than they were during relicensing study efforts. On November 15, 2012, NID filed a revised HPMP that included the results of the additional survey work at Rollins reservoir. This version of the HPMP received comments from FERC, the Forest Service, BLM, and UAIC. NID addressed these comments and submitted a final HPMP (dated October 2012) to the Commission on November 15, 2012.

Under the FPA, final 4(e) conditions were filed by the Forest Service on November 20, 2013, and the BLM on November 21, 2013. Forest Service condition 60 and BLM condition 38 state that "Upon Commission approval, Licensee shall implement the Historic Properties Management Plan, filed separately with the Commission."

NID's final HPMP filed on November 15, 2012, with the Commission (NID, 2012) contains a number of measures to manage and protect cultural resources in a timely manner and addressed concerns expressed by the Commission, SHPO, UAIC, Washoe, and Nisenan Maidu and the Forest Service and BLM. NID's final HPMP that was filed on November 15, 2012, would adequately resolve project-related adverse effects to historic properties for the term of a new license. The avoidance strategies, public and employee training proposals, signage plans, transportation plans, monitoring, and consultation proposals are all measures that would ensure that archeological sites and historic properties within the Yuba-Bear Project APE are protected and maintained throughout the term of any license issued for the project.

Commission staff would attach the final HPMP to a PA and execute it with the California SHPO (given that the Advisory Council declined to participate), prior to issuance of a license. In the license order, Commission staff would use a standard license article to implement the PA upon license issuance.

[39] See Omnibus Public Land Management Act of 2009, Public Law 111 011, Title VI, Subtitle D on Paleontological Resources Preservation (123 Stat. 1172; 16 U.S.C. 470aaa). This statute requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal land using scientific principles and expertise. Subtitle D includes specific provisions addressing management of these resources by BLM, National Park Service, Reclamation, FWS, and Forest Service.

### 3.3.7 Land Use and Aesthetic Resources

#### 3.3.7.1 Affected Environment

**Land Use Resources**

The Upper Drum-Spaulding, Lower Drum, Deer Creek Projects are located in Nevada and Placer Counties, California. The projects include 10 developments—Spaulding No. 3, Spaulding No. 1 and No. 2, Deer Creek, Alta, Drum No. 1 and No. 2, Dutch Flat No. 1, Halsey, Wise, Wise No. 2, and Newcastle. As described in section 2.2.1.1, *Existing Project Facilities, Drum-Spaulding*, the existing project includes 24 on-stream reservoirs, 5 off-stream impoundments, 3 diversion dams, 12 powerhouses, various water conduits, generation interconnection transmission lines, and appurtenant facilities and structures. The Upper Drum-Spaulding, Lower Drum, Deer Creek Projects boundaries encompass the project facilities and features described above, as well as primary access roads and other lands necessary for recreation, shoreline management, and the protection of environmental resources.

The Upper Drum-Spaulding, Lower Drum, Deer Creek Projects boundaries encompass 5,520.2 acres of land. A portion of the land within the project boundaries is owned by the U.S. and managed by the Forest Service (18 percent or 978.3 acres), the BLM (<1 percent or 10.6 acres), and Reclamation (<1 percent or 5.1 acres). Land ownership within the project boundary is summarized in table 3-248.

Table 3-248. Summary of land ownership within the Upper Drum-Spaulding, Lower Drum, and Deer Creek, Projects boundary. (Source: PG&E, 2011a)

| Owner | Acres | % of Total |
|---|---|---|
| Forest Service | 978.3 | 18 |
| Bureau of Land Management | 10.6 | <1 |
| Bureau of Reclamation | 5.1 | <1 |
| PG&E | 3,443.9 | 62 |
| State | 20.4 | <1 |
| Other patented non-federal | 1,061.9 | 19 |
| **Total federal lands** | **994.0** | **18** |
| **Total non-federal lands** | **4,526.2** | **82** |

The Yuba-Bear Project is located in Sierra, Nevada, and Placer Counties, California. The existing project includes four developments – Bowman, Dutch Flat, Chicago Park, and Rollins. As discussed in section 2.2.1.2, *Existing Project Facilities, Yuba-Bear*, the Bowman Development includes seven reservoirs, one conduit, one transmission line, and one powerhouse. The Dutch Flat Development includes one diversion impoundment, one reservoir, two conduits, and one powerhouse. The Chicago Park Development includes one reservoir, one conduit, and one powerhouse. The Rollins Development includes one reservoir and one powerhouse. The Yuba-Bear Project boundary encompasses the project facilities and features described above, as

well as primary access roads and other lands necessary for recreation, shoreline management, and the protection of environmental resources.[40]

The existing Yuba-Bear Project boundary encompasses 6,252.6 acres of land. A portion of the land within the project boundary is owned by the U.S. and managed by the Forest Service as part of the Tahoe National Forest (25 percent or 1,540.8 acres) and by BLM as the Sierra Resource Management Area (3 percent or 208.5 acres). Land ownership within the project boundary is summarized in table 3-249.

Table 3-249. Summary of land ownership within the existing Yuba-Bear Project boundary. (Source: NID, 2011a)

| Owner | Acres | % of Total |
|---|---|---|
| Forest Service | 1,540.8 | 25 |
| Bureau of Land Management | 208.5 | 3 |
| Nevada Irrigation District | 4,056.3 | 64 |
| Other private | 447.0 | 7 |
| **Total federal lands** | **1,749.3** | **28** |
| **Total non-federal lands** | **4,503.3** | **72** |

Land uses in the vicinity of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects include general agriculture, residential agriculture, forest, residential forest, forest recreation, public, open space, recreation, resort, and timberland production zones. The following plans and county ordinances direct land use and management in the vicinity of the projects.

**Tahoe National Forest Land and Resource Management Plan**

The Tahoe National Forest encompasses about 800,000 acres within Sierra, Nevada, and Placer Counties, portions of which are located within the boundaries of the Upper Drum-Spaulding, Deer Creek, and Yuba-Bear Projects. The Tahoe National Forest is managed by the Forest Service in accordance with the Tahoe National Forest Land and Resource Management Plan (LRMP), as amended, for old forest ecosystems, aquatic, riparian, and meadow ecosystems, hardwood ecosystems, fire and fuels management, and noxious weed management. The LRMP establishes forest-specific management areas, each of which has standards and guidelines relating to the Forest Service's Recreation Opportunity Spectrum, Visual Quality Objectives (VQOs), timber management practices, and OHV use assigned to it.

[40] More specifically, the project boundary around the reservoirs is often a contour line a set number of feet above the high water line. In some instances, the project boundary around the reservoirs is defined by surveyed metes and bounds. The project boundary around man-made waterways, including canals, flumes, tunnels, pipelines, and penstocks, is between 25 and 100 feet on each side of the waterway. The project boundary along transmission lines and primary project roads includes 25 feet on either side.

Forest-specific management areas in the vicinity of Upper Drum-Spaulding and Deer Creek Projects include Henness, Meadow Lake, Grouse, South Yuba, Meadow, Twenty, Mears, Red, Loch Leven, Yuba Gap, Blue Castle, Chalk, Emigrant, Monumental, Fordyce, and Fuller. Forest-specific management areas in the vicinity of the Yuba-Bear Project include Henness, Milton-Jackson, Pinoli, Bowman, South Yuba, Grouse, Fuller, and Chalk.

Roads within the Tahoe National Forest are managed in accordance with the 2010 Forest Service Motorized Travel Management EIS and Record of Decision. The plan designates roads, trails, and other areas that are open to motor vehicle use on NFS lands. The plan also prohibits the use of motor vehicles off designated roads, trails, and other areas, as well as motor vehicle use not consistent with the designations. Roads that are on NFS lands within the boundaries of the Drum-Spaulding and Yuba-Bear Projects are subject to the provisions of this plan.

Additionally, in accordance with Forest Service regulations, a special use authorization or permit is necessary to occupy, use, or build on NFS land, whether the duration is temporary or long term. NID holds two active, Forest Service special use permits related to the expansion of the Bowman Development (construction, operation, and maintenance of the Bowman powerhouse and Bowman-Spaulding transmission line) on NFS land. PG&E holds eight special use permits from the Forest Service for recreation facilities, road maintenance, and stream gages.

**Sierra Resource Management Plan**

The BLM lands within the Deer Creek (10.6 acres) and Yuba-Bear (208.5 acres) Projects boundaries are managed in accordance with the Sierra Resource Management Plan. The plan defines the role of BLM in managing and providing open space, safety from wildfire, clean abundant water, economic opportunities, protection and interpretation of the area's rich historical heritage, and diverse, resilient habitats for enjoyment and ecosystem health. In Placer County, the Sierra Resource Management Plan proposed an Area of Critical Environmental Concern proximate to the Yuba-Bear Project.

**Nevada County General Plan and County Zoning Ordinance**

Nevada County manages private land uses in accordance with the 1996 Nevada County General Plan, as amended. The plan is a long-term development planning guide for the County. The Nevada County zoning ordinance identifies 26 land use categories, 7 of which apply in the vicinity of the projects: general agriculture, residential agriculture, forest, timberland production zone, open space, public, and recreation.

**Placer County General Plan and County Zoning Ordinance**

The 1994 Placer County General Plan guides the County's long-term land use and development. The plan addresses land use, circulation (transportation), housing, conservation, open space, noise, and safety. The Placer County zoning ordinance provides 14 land use categories, 4 of which are pertinent to the project area: forestry, timberland production zone, resort, and residential forest.

**Sierra County General Plan and County Zoning Ordinance**

The 1996 Sierra County General Plan, as amended, focuses on elements of open space, conservation, agriculture, and economic development. The goals of the plan are to maintain rural life quality and natural features and functions, foster compatible and historic land uses, and direct development toward those areas already developed. The Sierra County zoning ordinance

promotes the regulation of health, safety, and general welfare. Land use categories affecting the projects include: general forest, forest recreation, and timberland preservation zone.

**Shoreline Management**

There is privately owned land and/or residences along Kidd, Fuller, Rucker, Culbertson, and Rock Creek Lakes at the Upper Drum-Spaulding Project. Currently, there is no private development along any of the Yuba-Bear Project reservoirs. PG&E and NID do not have formal, written shoreline management policies for uses and facilities on lands adjacent to the project reservoirs. Applicant and privately owned lands along the reservoir shorelines are managed in accordance with the applicable county general plan and zoning ordinance. Federal- and state-owned lands along the reservoir shorelines are managed in accordance with the applicable federal or state land management plan. Shoreline development may be allowed when it is consistent with project operational requirements, public safety, the project's recreation plan, and other resource management plans, and is compliant with all federal, state, and local regulations.

**Project Access and Roads**

PG&E identified 72 road segments, totaling about 50 miles, as primary project roads at the Upper Drum-Spaulding, Lower Drum, Deer Creek Projects (table 3-250). Primary project roads are non-general use roads, used primarily for the project, located within the project boundary on NID, Forest Service, BLM, Reclamation, and private lands. The surface of the majority of the primary project roads is native rock/soil and/or gravel. Some road segments are asphalt. Of these primary project roads, 75 percent are considered to be in good or excellent condition and 25 percent in poor condition. Poor road conditions are attributed to the condition of road crossings, drainage features, or environmental conditions, such as erosion/landslides and the presence of hazardous trees. PG&E also identified certain recreation access roads, primary campground circulation loops, and parking areas on NFS lands (table 3-251) that provide access to the project.

Table 3-250. Upper Drum-Spaulding, Lower Drum, Deer Creek, Projects primary project roads. (Source: PG&E, 2011a)

| Road Name | Road ID[a] | Mile Marker-Start (mi) | Mile Marker-End (mi) | Land Ownership | Total Length (mi) | Surface Type |
|---|---|---|---|---|---|---|
| Carr-Lindsey Road[b] | DS001 | 0.00 | 2.75 | Forest Service, PG&E, and private | 2.75 | Native rock |
| Upper Lindsey Lake Road[b] | DS002 | 0.00 | 0.46 | PG&E | 0.46 | Native rock |
| Lower Peak Road[b] | DS004 | 0.00 | 0.38 | PG&E and Forest Service | 0.38 | Native rock |
| Lang's Crossing Spillway Road[b] | DS005 | 0.00 | 0.62 | PG&E and private | 0.61 | Native rock |
| Drum Canal/YB-28 Access Road[b] | DS006 | 0.00 | 0.56 | PG&E | 0.56 | Gavel/rock |

Table 3-250. Upper Drum-Spaulding, Lower Drum, Deer Creek, Projects primary project roads. (Source: PG&E, 2011a)

| Road Name | Road ID[a] | Mile Marker-Start (mi) | Mile Marker-End (mi) | Land Ownership | Total Length (mi) | Surface Type |
|---|---|---|---|---|---|---|
| Chicken Ladder Road[b] | DS007 | 0.00 | 1.29 | Private and PG&E | 1.293 | Gravel/rock |
| Burnt Point Road[b] | DS007-1 | 0.00 | 0.06 | PG&E | 0.06 | Gravel |
| Drum Canal Access Road[b] | DS007-3 | 0.00 | 0.30 | PG&E | 0.30 | Native rock |
| Drum Canal/US Highway 20 | DS008 | 0.00 | 0.53 | PG&E and private | 0.54 | Gravel |
| Lake Valley Diversion Dam Road | DS009 | 0.00 | 0.72 | Private | 0.72 | Native rock |
| Drum Canal Road | DS010 | 0.00 | 4.0 | PG&E, Forest Service, and private | 4.0 | Gravel |
| Drum Canal Access Road[b] | DS011 | 0.00 | 1.72 | PG&E | 1.72 | Gravel |
| Camp 2 Road | DS013 | 0.00 | 1.17 | PG&E and Forest Service | 1.17 | Gravel |
| PG&E Access Road | DS014 | 0.00 | 0.47 | PG&E | 0.47 | Native rock |
| Drum Canal Rd/ Old Highway 40 | DS015 | 0.00 | 1.67 | PG&E | 1.67 | Native rock |
| Pittman Spill Channel North Road[b] | DS017 | 0.00 | 1.87 | PG&E and private | 1.87 | Native rock |
| Pittman Spill Channel South Road[b] | DS0018 | 0.00 | 1.47 | PG&E | 1.47 | Native rock |
| Drum Canal Road/Drum Forebay Road | DS020 | 0.00 | 0.81 | PG&E | 0.81 | Gravel |
| Drum #3 Penstock Access Road[b] | DS021 | 0.00 | 0.24 | PG&E | 0.24 | Native rock |
| Wheel House Road[b] | DS022 | 0.00 | 0.52 | PG&E | 0.52 | Native rock |
| Access Road[b] | DS023 | 0.00 | 0.48 | PG&E | 0.48 | Native soil |

Table 3-250. Upper Drum-Spaulding, Lower Drum, Deer Creek, Projects primary project roads. (Source: PG&E, 2011a)

| Road Name | Road ID[a] | Mile Marker-Start (mi) | Mile Marker-End (mi) | Land Ownership | Total Length (mi) | Surface Type |
|---|---|---|---|---|---|---|
| Downstream End of Little Tunnel Road | DS026 | 0.00 | 1.00 | Private and Forest Service | 1.0 | Native rock |
| Telephone House Road | DS027 | 0.00 | 0.73 | Private | 0.73 | Native soil |
| South Yuba Canal Access Road[b] | DS028 | 0.00 | 0.69 | Private | 0.69 | Native rock |
| Canal Road | DS029 | 0.00 | 0.34 | Forest Service | 0.34 | Native rock |
| Downstream Steephollow 1 Road | DS030 | 0.00 | 1.35 | Forest Service and private | 1.34 | Native rock |
| East Excelsior Point Road[b] | DS031 | 0.00 | 1.33 | Forest Service and private | 1.34 | Native rock |
| Growers Road | DS032 | 0.00 | 0.22 | Forest Service | 0.22 | Native soil |
| Chalk Bluff Spur Road | DS035 | 0.00 | 0.79 | Forest Service | 0.79 | Native rock |
| Big Tunnel Spring Road | DS036 | 0.00 | 0.37 | Forest Service | 0.37 | Native soil |
| Deer Creek Spur Road | DS037 | 0.00 | 0.39 | Forest Service | 0.39 | Native soil |
| Deer Creek Spur Road | DS038 | 0.00 | 0.49 | Forest Service | 0.49 | Native soil |
| South Yuba Canal Access Road[b] | DS039 | 0.00 | 0.79 | Forest Service | 0.79 | Native rock |
| Drum Powerhouse Road | DS041 | 0.00 | 4.36 | Forest Service, private, and PG&E | 4.78 | Paved |
| Dutch Flat Surge Tank Road[b] | DS042 | 0.00 | 0.60 | PG&E, private, and Forest Service | 0.6 | Native rock |
| Simpson Spill Access Road | DS045 | 0.00 | 2.01 | Private | 2.01 | Native soil |

Table 3-250. Upper Drum-Spaulding, Lower Drum, Deer Creek, Projects primary project roads. (Source: PG&E, 2011a)

| Road Name | Road ID[a] | Mile Marker-Start (mi) | Mile Marker-End (mi) | Land Ownership | Total Length (mi) | Surface Type |
|---|---|---|---|---|---|---|
| Downstream End of Meadow Gate Road | DS046 | 0.00 | 1.43 | Private | 1.43 | Gravel |
| Wise Tunnel 7, 8, and 9 Access Road | DS047 | 0.00 | 1.02 | PG&E and private | 1.02 | Gravel |
| Fiddler Green Flume Access Road | DS048 | 0.00 | 0.33 | PG&E and private | 0.33 | Native rock |
| Rock Creek Road | DS051 | 0.00 | 0.26 | PG&E and private | 0.27 | Gravel |
| Rock Creek Arch Dam Road | DS051-1 | 0.00 | 0.26 | PG&E | 0.26 | Native rock |
| Newcastle Power House Road | DS052 | 0.00 | 0.64 | Private, PG&E, and Reclamation | 0.64 | Gravel |
| Deer Creek Spur Road | DS053 | 0.00 | 0.28 | BLM and PG&E | 0.28 | Native rock |
| Feeley Lake Road[b] | DS054[b] | 0.00 | 0.27 | Forest Service | 0.27 | Native rock |
| Feeley Lake Road[b] | DS055 | 0.00 | 0.05 | Forest Service | 0.05 | Gravel |
| Lake Spaulding Road | DS056 | 0.00 | 1.05 | Private and PG&E | 1.05 | Paved |
| Drum Forebay Road | DS057 | 0.00 | 0.12 | PG&E | 0.12 | Native rock/Gravel |
| Drum Forebay Road | DS058 | 0.00 | 0.18 | PG&E | 0.18 | Gravel |
| Drum Butterfly Valve House Road[b] | DS059 | 0.00 | 0.09 | PG&E | 0.09 | Gravel |
| Boot Road[b] | DS060 | 0.00 | 1.17 | Forest Service | 1.17 | Gravel |
| Downstream of Boot Road | DS060-2 | 0.00 | 0.26 | Forest Service | 0.26 | Native soil |
| Downstream of Boot Road | DS060-3 | 0.00 | 0.02 | Forest Service | 0.02 | Native rock |

Table 3-250. Upper Drum-Spaulding, Lower Drum, Deer Creek, Projects primary project roads. (Source: PG&E, 2011a)

| Road Name | Road ID[a] | Mile Marker-Start (mi) | Mile Marker-End (mi) | Land Ownership | Total Length (mi) | Surface Type |
|---|---|---|---|---|---|---|
| Steephollow Road | DS060-4 | 0.00 | 0.04 | Forest Service | 0.04 | Native rock |
| 13 Mile Spill Road | DS060-5 | 0.00 | 0.47 | Forest Service | 0.47 | Native rock |
| 13 Mile Spill Road | DS060-6 | 0.00 | 0.03 | Forest Service | 0.03 | Gravel |
| Spaulding No. 3 Power House Header Box Access Road[b] | DS062 | 0.00 | 0.45 | PG&E | 0.45 | Native soil |
| Alta Power House Road | DS063 | 0.00 | 0.21 | PG&E and Private | 0.21 | Gravel |
| Canal Road | DS064 | 0.00 | 0.36 | Forest Service | 0.36 | Native soil |
| Upper Access to YB-34 Road[b] | DS067 | 0.00 | 0.01 | Forest Service and PG&E | 0.70 | Native soil |
| Boardman Diversion Dam Road | DS069 | 0.00 | 0.11 | Forest Service | 0.11 | Native rock |
| Little Tunnel Road | DS071 | 0.00 | 0.18 | Forest Service | 0.18 | Native soil |
| Spillway Access Road[b] | DS074 | 0.00 | 0.17 | Forest Service | 0.17 | Native rock |
| Chalk Bluff Spur Road | DS075 | 0.00 | 0.26 | Forest Service | 0.26 | Native soil |
| Deer Creek Road | DS076 | 0.00 | 0.32 | PG&E and BLM | 0.32 | Native soil |
| Bear River Canal Access Road | DS077 | 0.00 | 0.19 | Private | 0.19 | Gravel |
| Krause Flume Access Road | DS078 | 0.00 | 0.28 | Private | 0.28 | Native soil |
| Bowman Yard Rd | DS080 | 0.00 | 0.27 | PG&E | 0.27 | Native soil |
| Bowman Yard Road | DS081 | 0.00 | 0.08 | PG&E and private | 0.08 | Gravel |

Table 3-250. Upper Drum-Spaulding, Lower Drum, Deer Creek, Projects primary project roads. (Source: PG&E, 2011a)

| Road Name | Road ID[a] | Mile Marker-Start (mi) | Mile Marker-End (mi) | Land Ownership | Total Length (mi) | Surface Type |
|---|---|---|---|---|---|---|
| Downstream End of Little Tunnel Road | DS082 | 0.00 | 0.71 | Forest Service | 0.71 | Native soil |
| Downstream End of Little Tunnel Spur Road | DS082-1 | 0.00 | 0.10 | Forest Service | 0.10 | Native soil |
| South Yuba Canal Access Road[b] | DS083 | 0.00 | 0.07 | Forest Service and PG&E | 0.07 | Native soil |
| Bear Valley Spill Rd – South Yuba Canal Access | DS084 | 0.00 | 0.04 | Forest Service and PG&E | 0.04 | Native soil |

[a] Road ID pertains to the road segment designation used in PG&E's proposed Transportation Management Plan.

[b] PG&E proposes to amend the project boundary to include these road segments. These road segments are part of the proposed project.

Table 3-251. Upper Drum-Spaulding Project recreation roads on NFS lands. (Source: PG&E, 2011a)

| Project Recreation Area | Recreation Facility Name |
|---|---|
| Meadow Lake | Meadow Lake Campground |
| | Meadow Knoll Group Campground |
| | Meadow Lake Shoreline Campground |
| | Meadow Lake Day-Use Area |
| Lake Sterling | Lake Sterling Picnic Area |
| Lower Lindsey Lake | Lower Lindsey Lake Campground |
| | Lindsey Creek Campground |
| Fuller Lake | Fuller Lake Day-Use Area and Boat Launch |
| Rucker Lake | Rucker Lake Drive-In Campground |
| Lower Peak Lake | Lower Peak Lake Primitive Campsites |

NID identified 23 road segments, totaling about 17 miles, as primary project roads (table 3-252) located within the project boundary on NID, Forest Service, BLM, and private lands. The surface of the majority of the primary project roads is native rock/soil and/or gravel. Of the primary project roads, 64 percent are considered to be in excellent condition and 36 percent to be in poor condition. NID also identified certain recreation access roads, primary campground circulation loops, and parking areas on NFS lands (table 3-253) that provide access to the project.

Table 3-252. Yuba-Bear Project primary project roads. (Source: NID, 2011a)

| Road Name | Road ID[a] | Mile Marker-Start (mi) | Mile Marker-End (mi) | Land Ownership | Total Length (mi) | Surface Type |
|---|---|---|---|---|---|---|
| Bowman-Spaulding Berm Road | YBBSC_001 | 0.00 | 0.942 | NID and private | 0.9 | Gravel/asphalt /native |
| Texas Creek Diversion Access Road | YBBSC_003 | 0.00 | 0.358 | NID | 0.4 | Gravel |
| Box Car Section Road | YBBSC_004 | 0.00 | 1.325 | Forest Service and private | 1.3 | Gravel |
| Bowman-Spaulding Berm Road | YBBSC_006 | 0.00 | 3.508 | Forest Service, PG&E, and private | 3.5 | Gravel |
| Bowman Powerhouse Access Road | YBBPH_001 | 0.00 | 0.36 | NID | 0.4 | Gravel |
| Chicago Park Forebay Road | YBCPF_001 | 0.00 | 0.1745 | BLM and private | 1.7 | Gravel/native |
| Chicago Park Forebay Road | YBCPF_003 | 0.00 | 0.180 | BLM and private | 0.2 | Native |
| Chicago Park Powerhouse/ Access Road | YBCPH_001 | 0.00 | 0.159 | NID and BLM | 0.2 | Asphalt |
| French Lake Road | YBFL_001 | 0.00 | 2.092 | Private, Forest Service, and NID | 2.1 | Native |
| Rollins Dam Spillway Access Road | YBRDS_001 | 0.00 | 0.934 | NID | 0.9 | Native |
| Connroy Place | YBRMS_001 | 0.00 | 0.062 | NID | 0.1 | Gravel |
| Rollins Powerhouse Access Road | YBRPA_001 | 0.00 | 0.133 | NID | 0.1 | Asphalt |

Table 3-252. Yuba-Bear Project primary project roads. (Source: NID, 2011a)

| Road Name | Road ID[a] | Mile Marker-Start (mi) | Mile Marker-End (mi) | Land Ownership | Total Length (mi) | Surface Type |
|---|---|---|---|---|---|---|
| Low Level Outlet Access Road | YBJMO_001 | 0.00 | 0.153 | Forest Service | 0.2 | Gravel |
| Pipeline Outlet Access Road | YBMBP_001 | 0.00 | 0.978 | Forest Service and NID | 1.0 | Native |
| Wilson Creek Diversion Road | YBWCD_001 | 0.00 | 0.185 | Forest Service | 0.2 | Native |
| Bowman Dam Access Road | YBBND_001 | 0.00 | 0.336 | Forest Service | 0.3 | Native /gravel |
| Bunkhouse Road | YBBNK_001 | 0.00 | 0.11 | Forest Service | 0.1 | Gravel |
| Dutch Flat No. 2 Conduit Intake Access Road | YBDFI_001 | 0.00 | 0.383 | Forest Service and PG&E | 0.4 | Native |
| "B" Alarm Road | YBBAL_001 | 0.00 | 1.484 | PG&E and Forest Service | 1.5 | Native |
| Stump Canyon Intake Access Road | YBSCS_001 | 0.00 | 0.823 | PG&E and Forest Service | 0.9 | Native |
| Stump Canyon Siphon Low Level Valve Access Road | YBSCS_002 | 0.00 | 0.156 | PG&E | 0.12 | Native |
| Stump Canyon Siphon Outlet Access Road | YBSCS_003 | 0.00 | 0.691 | NID and Forest Service | 0.7 | Gravel |
| Canal Access Road | YBZION_001 | 0.00 | 0.322 | PG&E | 0.3 | Gravel |

[a] Road ID pertains to the road segment designation used in NID's proposed Transportation Management Plan.

Table 3-253. Yuba-Bear Project recreation roads on NFS lands. (Source: NID, 2011a)

| Road ID Number | Forest Service ID Number | Project Reservoir | Recreation Facility | Total Length (mi) |
|---|---|---|---|---|
| RR01 | 70-80-10 | Jackson Meadows | East Meadow Campground | 0.505 |

Table 3-253. Yuba-Bear Project recreation roads on NFS lands. (Source: NID, 2011a)

| Road ID Number | Forest Service ID Number | Project Reservoir | Recreation Facility | Total Length (mi) |
|---|---|---|---|---|
| RR02 | TBA | Jackson Meadows | Pass Creek Campground | 0.305 |
| RR03 | 301-65-1 | Jackson Meadows | Pass Creek Overflow Campground | 0.150 |
| RR04 | 301-65 | Jackson Meadows | Pass Creek Boat Launch | 0.330 |
| RR05 | 301-55 | Jackson Meadows | Aspen Group Campground | 0.185 |
| RR06 | 301-52 | Jackson Meadows | Aspen Picnic Area | 0.215 |
| RR07 | TBA | Jackson Meadows | Sanitary Dump Station | 0.110 |
| RR08 | TBA | Jackson Meadows | Jackson Meadows Vista | NA |
| RR09 | 956-2 | Jackson Meadows | Woodcamp Access Road | 0.730 |
| RR10 | TBA | Jackson Meadows | Findley Campground | 0.295 |
| RR11 | TBA | Jackson Meadows | Fir Top Campground | 0.180 |
| RR12 | TBA | Jackson Meadows | Woodcamp Campground | 0.265 |
| RR13 | TBA | Jackson Meadows | Woodcamp Picnic Area | 0.180 |
| RR14 | TBA | Jackson Meadows | Woodcamp Boat Launch | 0.155 |
| RR15 | TBA | Jackson Meadows | Silvertip Group Campground | 0.180 |
| RR16 | 956-15 | Jackson Meadows | Administrative Site | 0.145 |
| RR17 | TBA | Milton Diversion Impoundment | Day-Use Area/Hand Launch | NA |
| RR18 | TBA | Milton Diversion Impoundment | Primitive Campsites | NA |
| RR19 | TBA | French Lake | No facilities | NA |

Table 3-253. Yuba-Bear Project recreation roads on NFS lands. (Source: NID, 2011a)

| Road ID Number | Forest Service ID Number | Project Reservoir | Recreation Facility | Total Length (mi) |
|---|---|---|---|---|
| RR20 | TBA | Bowman Lake | Bowman Lake Campground and Boat Launch | 0.310 |
| RR21 | TBA | Sawmill Lake | Sawmill Lake Family Campground | NA |
| RR22 | TBA | Sawmill Lake | Sawmill Lake Group Campground | NA |
| RR23 | TBA | Canyon Creek | Canyon Creek Campground | 0.280 |
| RR24 | TBA | Faucherie Lake | Faucherie Lake Group Campground | 0.065 |
| RR25 | TBA | Faucherie Lake | Faucherie Lake Day-Use and Boat Ramp | 0.145 |

**Public Safety and Law Enforcement**

PG&E has a formal relationship with the Placer County Sheriff's office, which allows the Placer County Sheriff to enforce civil and criminal codes on PG&E property without PG&E being present. PG&E also cooperates with Nevada County and the Forest Service to allow its law enforcement agents the rights to access and enforcement on PG&E property.

NID does not have any formal agreements with local law enforcement agencies for law enforcement on project lands.

**Fire Risk and Prevention**

The potential for wildfires and associated destruction exists within the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Project areas. During the period June 2000 through August 2009, the Forest Service documented 70 wildfires that burned a total of 84.1 acres within a 1-mile buffer of the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. Campfires were the common cause of the wildfires; no wildfires were related to operation and maintenance of the project. Additionally, in 2001, there was a fire (not documented by the Forest Service) that destroyed two short sections of the Drum-Spaulding Project Lake Valley canal flume and about 2,500 acres. The cause of the fire was a campfire at a nearby recreation area on Forest Service lands. During the period June 2000 through August 2009, the Forest Service documented 37 reported fire ignitions within a 1-mile buffer of the Yuba-Bear Project, on a total of 19 acres. More than half (27) of the ignitions were related to campfires; no ignitions were related to the operation and maintenance of the project.

PG&E and NID take measures to prevent wildfires, which include following federal, state, and local rules and regulations. PG&E's and NID's crews are not trained in forest fire suppression and are not required to fight fires. While working in the field, crew vehicles and contractor vehicles follow emergency response preparedness requirements. Vehicles are required to have a shovel, 5-gallon back pump, and chemical fire extinguisher at all times while in the field. Additional, specialized equipment may be required, and certain restrictions may apply during work that involves burning debris. In the case of an emergency, the appropriate emergency response agencies are notified.

**Aesthetic Resources**

The Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects are located in Nevada and Placer Counties, California, with a portion of the Yuba-Bear Project also located in Sierra County, California. The projects are located on private land, NFS land (Upper Drum-Spaulding, Deer Creek Projects, and Yuba River Projects), and public land administered by BLM (Deer Creek and Yuba River Projects). The Lower Drum Project is also located on public land administered by Reclamation. The facilities and features of the projects are located in the northern Sierra Nevada and Sierra Nevada foothills, which generally provide a wooded, natural, scenic backdrop.[41] The South Yuba River (39 miles) is designated as a California Wild and Scenic River, which adds to the visual quality of the area.

Land management activities on NFS lands must meet specific VQOs as established by the Tahoe National Forest LRMP. The pertinent VQOs within the Upper Drum-Spaulding, Deer Creek, and Yuba-Bear Project boundaries include "Retention," "Partial Retention," and "Modification." The Retention VQO allows management activities that are not visually evident. The Partial Retention VQO allows management activities that remain visually subordinate to the characteristic landscape. The Modification VQO allows management activities that may visually dominate the original characteristic landscape, but activities that alter vegetative and land form must borrow from the naturally established form, line, color, or texture and be at an appropriate scale. The Forest Service VQOs apply to existing and proposed project facilities on NFS lands within the project boundaries.

The Sierra Resource Management Plan establishes Visual Resource Classes (VRCs) on land administered by BLM, and land management activities on BLM lands must meet the specific VRCs. VRC objective III directs land management activities to partially retain existing character. VRC objective III applies to existing and proposed project facilities on BLM lands within the Drum-Spaulding and Yuba-Bear Project boundaries.

The Resource Management Plan directs the management of public lands administered by Reclamation. Lands proximate to the Drum-Spaulding Newcastle powerhouse are administered by Reclamation. Reclamation does not have a system for evaluating scenic values.

The Nevada, Placer, and Sierra County general plans, discussed in previously in this section, also have goals to maintain or enhance the visual quality of the land, with an emphasis on protecting views from scenic highways.

[41] The main exception to the characterization of the landscape as natural are the two reservoirs, three powerhouses, and several miles of canal located in the vicinity of the city of Auburn where the landscape is more residential and commercial.

**Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects**

To determine if Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects facilities are in compliance with visual direction from the Forest Service, BLM, and Reclamation, 52 project facilities were assessed using those agencies' visual assessment protocols. All of the facilities meet the Forest Service's land management visual direction, as outlined in the Tahoe National Forest LRMP, from background and most from middle ground with the exception of certain penstocks that are painted silver and are in strong contrast to the surrounding landscape. At a viewing distance of about 2 miles, larger project dams, such as Lake Spaulding and Lake Valley dams, start to show contrast with the surrounding landscape. Other linear facilities, such as transmission lines and canals, generally are not visible and generally meet land management visual direction, with the exception of a few immediate foreground situations. Of the 12 project powerhouses, only 1 powerhouse, the Newcastle powerhouse (Lower Drum Project), is located on public land and presents a contrast to the foreground views from an equestrian trail and Folsom Lake. Of the remaining 11 powerhouses, 6 are visible to the public, 5 of which (Drum no. 1, Dutch Flat no. 1, and Spaulding no. 3—Upper Drum-Spaulding Project; Halsey and Wise—Lower Drum Project) are of traditional architecture and are quite visible due to their traditional light yellow buff color. These powerhouses contribute to the landscape from a historical perspective.

**Yuba-Bear Project**

To determine if Yuba-Bear Project facilities are in compliance with visual direction from both the Forest Service and BLM, 23 project facilities were assessed using those agencies' visual assessment protocols. All of the facilities meet the Forest Service or BLM land management visual direction from the back and middle grounds. At around 2 miles, Sawmill Lake dam and Dutch Flat no. 2 conduit meet land management visual direction. However, at this same distance, the larger dams, such as Jackson Meadows and Rollins dams, start to show contrast with the surrounding landscape. The Bowman-Spaulding conduit, Bowman-Spaulding transmission line, and Jackson Lake dam meet, with few exceptions, the land management visual direction, because these facilities are generally not seen and are rarely viewed by the public. The rest of the project facilities do not meet land management visual direction in the foreground or immediate foreground.

### 3.3.7.2 Environmental Effects

**Land Use Resources**

**Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects**

*Changes to Existing Facilities and the Project Boundary*

PG&E proposes to split the existing Drum-Spaulding Project into three, separately-licensed projects: (1) the Upper Drum-Spaulding Project, which would include the Spaulding No. 3, Spaulding No. 1 and No. 2, Alta, Drum No. 1 and No. 2, and Dutch Flat No. 1 Developments; (2) the Lower Drum Project, which would include the Halsey, Wise, Wise No. 2, and Newcastle Developments; and (3) the Deer Creek Project, which would include only the Deer Creek Development.

In addition to the above changes to the project boundary, PG&E proposes the following changes to the existing project facilities within the proposed Upper Drum-Spaulding Project boundary:

- Retirement of the Alta powerhouse unit 2;
- Decommissioning of the Jordan Creek diversion; and
- Inclusion of certain new and rehabilitated recreation facilities.

PG&E proposes to officially retire Alta powerhouse unit 2, which ceased operations in 2007 and is hydraulically disconnected from the penstock. The retirement of unit 2 at the Alta powerhouse would not physically change the project boundary.

PG&E also proposes to decommission the Jordan Creek diversion and related conveyance system because the facilities are not necessary for current or future operations. These facilities would be removed from the project and would no longer be within the proposed Upper Drum-Spaulding Project boundary.

Additionally, PG&E proposes to include certain roads and new and/or rehabilitated recreation facilities at Meadow Lake, Lake Sterling, Fordyce Lake, Lake Spaulding, Lower Lindsey Lake, Fuller Lake, Lower Peak Lake, and Lake Valley reservoir within the proposed Drum-Spaulding Project boundary.

PG&E also proposes to include the rehabilitated recreation facilities at the Halsey forebay and Wise forebay within the proposed Lower Drum Project boundary.

Land ownership within the existing and proposed project boundaries is summarized in table 3-254.

In an order dated October 5, 2012, the Commission approved certain Phase I project boundary adjustments at the project. The Phase I adjustments were related to a transmission line separation, geographic information system (GIS) conversion, and former actions requiring map updates. In a letter dated September 10, 2012, the Forest Service requested that any future, or Phase II, project boundary adjustments, specifically related to roads and recreation facilities, be consistent with final 4(e) conditions for the project.

Table 3-254. Summary of land ownership within the existing and proposed project boundaries. (Source: PG&E 2011a)

| | **Existing Drum-Spaulding Project** | | **Proposed Upper Drum-Spaulding Project** | | **Proposed Lower Drum Project** | | **Proposed Deer Creek Project** | |
|---|---|---|---|---|---|---|---|---|
| **Owner** | **Acres** | **% of Total** | **Acres** | **% of Total** | **Acres** | **% of Total** | **Acres** | **% of Total** |
| Forest Service | 978.3 | 18 | 949.3 | 22 | 0 | 0 | 179.6 | 54 |
| BLM | 10.6 | <1 | 0 | 0 | 0 | 0 | 5.6 | <1 |
| Reclamation | 5.1 | <1 | 0 | 0 | 5.3 | <1 | 0 | 0 |
| PG&E | 3,443,9 | 63 | 3,071.1 | 73 | 246.4 | 35 | 92 | 27 |
| State or county | 20.4 | <1 | 0 | 0 | 20.1 | <1 | 0 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Other patented non-federal | 1,061.9 | 19 | 199.4 | <1 | 425 | 61 | 57.7 | 17 |
| **Total federal lands** | **994.0** | **18** | **949.3** | **22** | **5.3** | **<1** | **185.2** | **55** |
| **Total non-federal lands** | **4,526.2** | **82** | **3,270.5** | **78** | **691.5** | **99** | **149.7** | **45** |
| **Total** | **5,520.2** | **100** | **4,219.8** | **100** | **696.8** | **100** | **334.9** | **100** |

Our Analysis

PG&E's proposed changes to the project boundary would separate the existing Drum-Spaulding Project into three, separately licensed projects. The Upper Drum-Spaulding Project would continue to encompass lands owned by the U.S. and managed by the Forest Service, and would no longer encompass lands managed by BLM or Reclamation. The Jordan Creek diversion and related conveyance system would be removed from the project boundary because these facilities are not necessary for current or future operations. The Lower Drum Project would encompass lands owned by the U.S. and managed by Reclamation. The Deer Creek Project would encompass lands owned by the U.S. and managed by the Forest Service and BLM.

The proposed project boundary for each of the three projects would continue to encompass all facilities and features necessary for the operation of the project, including all primary project roads and existing, new, and/or rehabilitated recreation areas and recreation access roads. It is necessary that all primary project roads, including recreation access roads, and recreation areas be included in the licensed project boundary so the Commission has the authority to ensure that PG&E maintains adequate and safe public access to project lands and waters.

*Transportation Management Plan*

The roads used by PG&E to access project facilities at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects are federal (Forest Service, BLM, and/or Reclamation), state, county, and/or private roads.

PG&E filed a Transportation Management Plan on April 12, 2011, and a revised Transportation Management Plan on August 29, 2012. The revised Transportation Management Plan addresses road management at all three proposed projects. PG&E proposes to implement the Transportation Management Plan upon Commission approval. The plan describes the scope of road improvements needed for road design, construction, and maintenance, including road planning, road rehabilitation, and road operation and maintenance for the primary project roads at the three proposed projects identified in table 3-250. Additionally, PG&E proposes to treat certain identified recreation roads with the same level of maintenance provided to primary project roads. Generally, recreation roads include recreation access roads, primary campground circulation loops, and parking areas. The plan includes an implementation schedule and discusses ongoing monitoring.

Forest Service 4(e) condition 57 specifies that, upon Commission approval, PG&E implement the Transportation Management Plan filed separately with the Commission by PG&E, dated August 2012.

BLM 4(e) condition 22 specifies that, upon Commission approval, PG&E implement the Transportation Management Plan filed separately with the Commission by PG&E, dated August 2012.

California Fish and Wildlife measure 20 also recommends implementation of the Transportation Management Plan.

Our Analysis

Roads in the project area are operated and maintained by different entities, including the Forest Service, BLM, the state, the counties and/or private organizations. These roads are shared by many different users at varying use levels. The Forest Service and BLM use these roads to access federal lands and resources. PG&E uses many of these roads to access project facilities. Others, such as recreationalists, use these roads to access recreational facilities available at the project and on NFS lands. This use has the potential to affect the overall condition of the roads. These roads must be maintained to ensure safe public access and the adequate protection of natural and environmental resources in the project area.

The Transportation Management Plan (August 2012) filed by PG&E clarifies the roles and responsibilities of the various stakeholders in road operation and maintenance. PG&E is responsible for the maintenance of all project roads within the three project boundaries (table 3-250). Under the plan, PG&E would be responsible for certain recreation roads, such as recreation access roads, primary campground circulation loops, and parking areas. Implementation of the Transportation Management Plan would assure that all project roads are maintained to current, applicable standards, would improve access to the project, and would minimize the potential for adverse environmental effects due to roads and road use.

A separate agreement between PG&E and the Forest Service resolves certain issues and responsibilities for roads that are outside the project boundaries. The agreement addresses shared road (non-project) management responsibilities and funding (PG&E, 2011a).

*Fire Prevention and Response Plan*

Continued project operations and ongoing operations and maintenance of existing facilities (e.g., transmission lines, generators, and construction equipment), and increased recreational use over the term of a new license may contribute to fire danger in the project area. Fires in the project area may, among other things, affect public safety, property, aesthetics, and air quality. The threat of and potential damage from wildfires in the project area would remain an issue under a new project license.

PG&E filed a Fire Prevention and Response Plan on Federal Land on April 12, 2011. The plan addresses fire prevention, protection, response, reporting, and investigation at project facilities on federal lands within the project boundary. PG&E filed a revised Fire Prevention and Response Plan in November 2013 (PG&E, 2013), which addresses fire prevention and response on federal lands at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects. The revised Fire Prevention and Response Plan incorporates specific requirements of the Forest Service and BLM with regard to notifications and reporting, prior approvals and permitting,

inspections, and applicable codes and regulations. PG&E proposes to implement the Fire Prevention and Response Plan upon Commission approval.

Forest Service 4(e) condition 58 and BLM 4(e) condition 18 specify that, upon Commission approval, PG&E would implement the Fire Management and Response Plan filed by PG&E in November 2013. Under 10(a), California Fish and Wildlife also recommends, as condition 21, the implementation of the Fire Management and Response Plan.

Our Analysis

The implementation of a Fire and Fuels Management Plan developed in consultation with the Forest Service, BLM, California Department of Forestry and Fire Protection, potentially affected tribes, and other interested parties, and approved by the Forest Service and BLM, that incorporates the measures proposed by PG&E and specified by the Forest Service and BLM would improve planning, management, and coordination of wildfire protection and prevention measures. Additionally, the implementation of the plan would lead to a reduction in the occurrence and suppression of wildfires in the project area, minimizing damage to natural resources and other potential effects. The geographic scope of PG&E's plan excludes non-federal lands within the project boundary, which are also susceptible to fire danger. Additionally, there is no discussion of a period of review and revision of the plan. The plan includes certain information, such as key personnel and contact information that may need to be updated on a regular basis. Expanding the geographic scope of the plan to non-federal lands would provide additional fire protection.

*Hazardous Substance Management Plan*

Forest Service 4(e) condition 21 specifies that, within 1 year of license issuance or prior to undertaking activities on NFS lands, PG&E file a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup. The plan would be developed in consultation with the California Water Board, California Fish and Wildlife, and the Regional Water Quality Control Board and would require PG&E to maintain suitable spill cleanup equipment in the project area; to periodically inform the Forest Service of the location, type, and quantity of oil and hazardous substances stored in the project area; and to inform the Forest Service immediately of the magnitude, nature, time, date, location, and action taken for any spill. The plan would also include a monitoring plan that details corrective actions if a spill occurs and weekly reporting requirements during periods of construction. Additionally, the plan would require PG&E to notify the Forest Service of any new construction or maintenance not addressed in the plan, so that the Forest Service, in consultation with others, can make a determination whether a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup is necessary. Any such plan would also be filed with the Commission. BLM 4(e) condition 49 is identical to Forest Service 4(e) condition 21 except BLM's condition addresses activities on BLM lands and requires notification and consultation with BLM.

Reclamation 4(e) condition b.10 specifies that PG&E not allow contamination or pollution of federal lands, waters, or facilities and that PG&E take reasonable precautions to prevent such contamination or pollution by third parties. Substances causing contamination or pollution include, but are not limited to, hazardous materials, thermal pollution, refuse, garbage, sewage effluent, industrial waste, petroleum products, mine tailings, mineral salts, misused pesticides, pesticide containers, or any other pollutants.

California Fish and Wildlife condition 23 is consistent with the Forest Service condition and specifics that, within 1 year of license issuance or prior to undertaking activities on federal

lands, PG&E file a plan for oil and hazardous substances storage and spill prevention and cleanup. The plan would be developed in consultation with California Fish and Wildlife, among others.

PG&E proposes to file a plan approved by the Forest Service and BLM for oil and hazardous substances storage and spill prevention and cleanup at the Upper Drum-Spaulding and Deer Creek Projects within 1 year of license issuance or prior to undertaking activities on federal lands.

Our Analysis

The potential exists for PG&E to spill hazardous substances within the project boundary and to impact area resources. PG&E is responsible for such spills and would be required to identify acceptable prevention and mitigation measures. The development and implementation of a Hazardous Substances Plan in consultation with the California Water Board, California Fish and Wildlife, and the Regional Water Quality Control Board and approved by the Forest Service and BLM would ensure that spills of hazardous substances are promptly contained and cleaned up to avoid/minimize the potential extent of adverse environmental effects, including impacts to water quality. Expanding the geographic scope of the plan to non-federal lands would provide additional spill protection.

**Yuba-Bear Project**

*Changes to Existing Facilities and the Project Boundary*

NID proposes the following changes to the existing project boundary:

- Use of contours as a partial replacement to survey metes and bounds around Jackson Meadows reservoir, Bowman reservoir, French Lake, Jackson Lake, Sawmill Lake, Faucherie Lake, Dutch Flat forebay, and Dutch Flat afterbay;

- Removal of the mineral survey area south of the Dutch Flat afterbay;

- Removal of the administrative site at Jackson Meadows reservoir and the recreation road that provides access to it;

- Inclusion of the East Meadow campground, Fir Top campground, Bowman Lake campground, and Canyon Creek campground recreation sites; and

- Inclusion of certain primary project road segments, including a right-of-way of 20 feet on road centerline.

Land ownership within the Yuba-Bear existing and proposed project boundaries is summarized in table 3-255.

Table 3-255. Summary of land ownership within the existing and proposed Yuba-Bear Project boundary. (Source: NID, 2011a)

| Owner | Existing Boundary | | Proposed Boundary | |
|---|---|---|---|---|
| | Acres | % of Total | Acres | % of Total |
| Forest Service | 1,540.8 | 25 | 1,435.5 | 24 |
| BLM | 208.5 | 3 | 231.1 | 4 |
| NID | 4,056.3 | 64 | 4,107.6 | 68 |
| Other private | 447.0 | 7 | 308.0 | 5 |
| **Total federal lands** | **1,749.3** | **28** | **1,666.6** | **28** |
| **Total non-federal lands** | **4,503.3** | **72** | **4,415.6** | **72** |
| **Total** | **6,252.6** | **100** | **6,082.2** | **100** |

Our Analysis

NID's proposed changes to the project boundary would decrease the area within the project boundary by about 170 acres. The proposed project would continue to encompass lands owned by the U.S. and managed by the Forest Service and BLM. The areas proposed to be removed from the project boundary, which include the mineral survey area south of the Dutch Flat afterbay, and the administrative site at Jackson Meadows reservoir and the recreation road that provides access to it, are not necessary for continued project operations. The proposed project boundary would encompass all facilities and features necessary for the operation of the project, including all primary project roads and existing, new, and/or rehabilitated recreation areas and recreation access roads. It is necessary that all primary project roads, including recreation access roads, and recreation areas be included in the licensed project boundary so the Commission has the authority to ensure that NID maintains adequate and safe public access to project lands and waters.

*Transportation Management Plan*

The roads used by NID to access project facilities are federal (Forest Service and BLM), state, county, and/or private roads.

NID filed a Transportation Management Plan on April 12, 2011, and a revised Transportation Management Plan on June 18, 2012, and August 29, 2012. NID proposes to implement the Transportation Management Plan upon Commission approval. The plan describes the scope of road improvements needed for road design, construction, and maintenance including road planning, road rehabilitation, and road operation and maintenance for the primary project roads identified in table 3-251. Additionally, NID proposes to treat certain identified recreation roads with the same level of maintenance provided to primary project roads. Generally, recreation roads include recreation access roads, primary campground circulation loops, and parking areas. The plan includes an implementation schedule and discusses ongoing monitoring.

Forest Service 4(e) condition 61 specifies that, upon Commission approval, NID implement the Transportation Management Plan filed separately with the Commission by NID, dated August 2012.

BLM 4(e) condition 39 specifies that, upon Commission approval, NID implement the Transportation Management Plan filed separately with the Commission by NID, dated August 2012.

California Fish and Wildlife measure 20 recommends that, within 1 year of license issuance, NID file with the Commission a Road and Transportation Management Plan, approved by the Forest Service and BLM, for the protection and maintenance of project and project-affected roads that are on or affect NFS or BLM lands.

Our Analysis

Roads in the project area are operated and maintained by different entities, including the Forest Service, BLM, the state, the counties, and/or private organizations. These roads are shared by many different users at varying use levels. The Forest Service and BLM use these roads to access federal lands and resources. NID uses many of these roads to access project facilities. Others, such as recreationalists, use these roads to access recreational facilities available at the project and on NFS lands. This use has the potential to affect the overall condition of the roads. These roads must be maintained to ensure safe public access and the adequate protection of natural and environmental resources in the project area.

The Transportation Management Plan, as proposed by NID and specified by the resource agencies, would clarify the roles and responsibilities of the various stakeholders in road operation and maintenance. NID is responsible for the maintenance of all project roads within the project boundary (table 3-251). Under the plan, NID would also be responsible for certain recreation roads, such as recreation access roads, primary campground circulation loops, and parking areas. Implementation of a Transportation Management Plan would ensure that all project roads are maintained to current, applicable standards, would improve access to the project, and would minimize the potential for adverse environmental effects due to roads and road use.

*Fire Prevention and Response Plan*

Continued project operations and existing facilities (e.g., transmission lines, generators, and construction equipment), and increased recreational use over the term of a new license may contribute to fire danger in the project area. Fires in the project area may, among other things, affect public safety, property, aesthetics, and air quality. The threat of and potential damage from wildfires in the project area would remain an issue under a new project license.

NID filed a Fire Prevention and Response Plan on Federal Land on April 12, 2011, and revised versions of the plan on June 18, 2012, and November 21, 2013. NID proposes to implement the plan upon Commission approval. The plan addresses fire prevention, protection, response, reporting, and investigation at project facilities on federal lands within the project boundary.

Forest Service 4(e) condition 62 specifies that, upon Commission approval, NID implement the Fire Prevention and Response Plan filed separately with the Commission by NID in November 2013. BLM 4(e) condition 40 is identical to Forest Service 4(e) condition 62. Under 10(a), California Fish and Wildlife recommends as condition 21 the implementation of a Fire and Fuels Management Plan.

Our Analysis

The implementation of the Fire Prevention and Response Plan would improve planning, management, and coordination of wildfire protection and prevention measures. Additionally, the implementation of the plan would lead to a reduction in the occurrence and suppression of wildfires in the project area, minimizing damage to natural resources and other potential effects. The geographic scope of NID's plan excludes non-federal lands within the project boundary, which are also susceptible to fire danger. Additionally, there is no discussion of a period of review and revision of the plan. The plan includes certain information, such as key personnel and contact information that may need to be updated on a regular basis. Expanding the geographic scope of the plan to non-federal lands would provide additional fire protection.

*Hazardous Substance Management Plan*

NID proposes to develop a plan approved by the Forest Service and BLM for oil and hazardous substances storage and spill prevention and cleanup on federal lands within the project boundary. NID proposes to file the plan with the Commission within 1 year of license issuance or prior to undertaking activities on federal lands.

Forest Service 4(e) condition 21 specifies that, within 1 year of license issuance or prior to undertaking activities on NFS lands, NID file a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup. The plan would be developed in consultation with the California Water Board, California Fish and Wildlife, and the Regional Water Quality Control Board and would require NID to maintain suitable spill cleanup equipment in the project area; to periodically inform the Forest Service of the location, type, and quantity of oil and hazardous substances stored in the project area; and to inform the Forest Service immediately of the magnitude, nature, time, date, location, and action taken for any spill. The plan would also include a monitoring plan that details corrective actions if a spill occurs and weekly reporting requirements during periods of construction. Additionally, the plan would require NID to notify the Forest Service of any new construction or maintenance not addressed in the plan, so that the Forest Service, in consultation with others, can make a determination whether a plan approved by the Forest Service for oil and hazardous substances storage and spill prevention and cleanup is necessary. Any such plan would also be filed with the Commission.

BLM 4(e) condition 52 specifies that NID identify and report all known or observed hazardous conditions on or directly affecting BLM lands within the project boundary. Additionally, NID would abate these conditions, except those caused by third parties or not related to the occupancy and use of BLM lands. Any non-emergency actions to abate such hazardous conditions on BLM lands would be performed only after consultation with BLM. In emergency situations, NID would notify BLM of its actions as soon as possible, but not more than 48 hours after such actions have been taken. Whether or not BLM is notified or provides consultation, NID would be solely responsible for all abatement measures performed. Other hazards would be reported to the appropriate agency as soon as possible.

California Fish and Wildlife condition 23 is consistent with the Forest Service condition and specifics that, within 1 year of license issuance or prior to undertaking activities on federal lands, NID file a plan for oil and hazardous substances storage and spill prevention and cleanup. The plan would be developed in consultation with California Fish and Wildlife, among others.

Our Analysis

The potential exists for NID to spill hazardous substances within the project boundary and to impact area resources. NID is responsible for such spills and would be required to identify acceptable prevention and mitigation measures. NID proposes to develop Spill Prevention, Control, and Countermeasure plans specific to the proposed Rollins upgrades and new/rehabilitated recreation-related construction. The development of a single, comprehensive plan, in consultation with the California Water Board, California Fish and Wildlife, and the Regional Water Quality Control Board, and approved by the Forest Service and BLM to address spills within the project area during any project-related activity would better ensure that spills of hazardous substances are promptly contained and cleaned up to avoid/minimize the potential extent of adverse environmental effects, including impacts to water quality. Expanding the geographic scope of the plan to non-federal lands would provide additional spill protection.

**Aesthetic Resources**

**Upper Drum-Spaulding, Lower Drum, Deer Creek Projects**

*Visual Resource Management Plan*

PG&E filed a Visual Resource Management Plan on April 12, 2011, and a revised Visual Resource Management Plan on June 18, 2012. PG&E proposes to implement the plan at the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects upon Commission approval. The goal of the plan is to improve the visual quality of the project by reducing the visual contrast of existing and proposed project facilities on federal lands administered by the Forest Service, BLM, and Reclamation. The plan includes an implementation schedule.

Forest Service 4(e) condition 55 specifies that, upon Commission approval, PG&E implement the Visual Resource Management Plan filed separately with the Commission by PG&E in June 2012. .

BLM 4(e) condition 20 specifies that, upon Commission approval, PG&E implement the Visual Resource Management Plan filed separately with the Commission by PG&E in June 2012.

Our Analysis

Certain project facilities on federal lands at the proposed Upper Drum-Spaulding and Deer Creek Projects do not meet current, applicable visual resource management objectives as defined by the Forest Service, BLM, and Reclamation. Silver penstocks, large dams, and powerhouses create visual contrast with the surrounding landscape. The plan identifies the project facilities that would be painted a darker color to reduce visual contrast and includes an implementation schedule. The plan also addresses consultation during implementation and reporting, and establishes a process to evaluate future activities at the project that may result in changes to the visual environment.

The implementation of the plan would reduce color contrast, make project facilities more consistent with established visual quality objectives, and improve overall visual quality in the project area. An annual coordination meeting would allow PG&E to work cooperatively with the Forest Service, BLM, and Reclamation to review the visual mitigation activities planned for the upcoming year, identify any revisions needed, and make any adjustments to the plan or schedule, as appropriate. Additionally, consultation with the Forest Service, BLM, and/or Reclamation, as appropriate, on any new project facilities or enhancements to existing project facilities would

ensure that the facilities are designed and constructed to be consistent with applicable visual quality objectives.

**Yuba-Bear Project**

*Visual Resource Management Plan*

NID filed a Visual Resource Management Plan on April 12, 2011, and a revised Visual Resource Management Plan on June 18, 2012. NID proposes to implement the plan upon Commission approval. The goal of the plan is to reduce the visual contrast of existing and proposed project facilities on federal lands administered by the Forest Service and BLM. The plan includes an implementation schedule.

Forest Service 4(e) condition 59 specifies that, upon Commission approval, NID implement the Visual Resource Management Plan filed separately with the Commission by NID in June 2012.

Under 10(a), California Fish and Wildlife recommends as condition 18 the finalization of a Visual Resource Management Plan, in consultation with the Forest Service and BLM, to be submitted to the Forest Service and BLM for approval. NID would implement the plan upon Commission approval.

Our Analysis

Certain project facilities on federal lands do not meet current, applicable visual resource management objectives as defined by the Forest Service and BLM. Project buildings, fences, guard rails, and spoil piles create visual contrast with the surrounding landscape. The plan identifies the project facilities that would be painted a darker color and the spoil piles that would be removed to reduce visual contrast and includes an implementation schedule. The plan also addresses consultation during implementation and reporting, and establishes a process to evaluate future activities at the project that may result in changes to the visual environment.

The implementation of the plan would make project facilities more consistent with established visual quality objectives and would improve overall visual quality in the project area. An annual coordination meeting would allow NID to work cooperatively with the Forest Service and BLM to review the visual mitigation activities planned for the upcoming year, identify any revisions needed, and make any adjustments to the plan or schedule, as appropriate. Additionally, consultation with the Forest Service and BLM, as appropriate, on any new project facilities or enhancements to existing project facilities would ensure that the facilities are designed and constructed to be consistent with applicable visual quality objectives.

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# 4.0 DEVELOPMENTAL ANALYSIS

In this section, we analyze the economic power benefits of the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, and we estimate the annual cost of the projects, including costs for any construction, operation, maintenance, and environmental measures. We use this cost information in the *Comprehensive Development and Recommended Alternative* sections (section 5.1.2 for the Upper Drum-Spaulding Project; section 5.2.2 for the Lower Drum Project, section 5.2.3 for the Deer Creek Project, and section 5.2.5 for the Yuba-Bear Project) to support our recommended licensing alternative and protection, mitigation, and enhancement measures for each project license.

Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corporation (Corp)*,[1] the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead Corp*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

## 4.1 UPPER DRUM-SPAULDING PROJECT

In this section, we look at the Upper Drum-Spaulding Project's use of the Yuba and Bear Rivers for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. Because PG&E has requested that the Commission approve separate licenses for the Lower Drum Project (existing Halsey, Wise, Wise No.2 and Newcastle Developments) and Deer Creek Project (existing Deer Creek Development), which are all currently part of the existing Drum-Spaulding Project, we have performed a separate economic analysis of the Lower Drum and Deer Creek Projects. The project costs, benefits, and proposed protection, mitigation, and enhancement measures are discussed separately from the Upper Drum-Spaulding Project, in sections 4.2 and 4.3.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EIS for the protection, mitigation, and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost; and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power.

### 4.1.1 Power and Developmental Benefits of the Upper Drum-Spaulding Project

Table 4-1 summarizes the assumptions and economic information we use in our analysis. This information was provided by PG&E in its license application. We find that the values provided by PG&E are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal O&M cost; and Commission fees.

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[1] See *Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

Table 4-1. Parameters for economic analysis of the Upper Drum-Spaulding Project. (Source: PG&E and staff)

| Assumption | Value |
|---|---|
| Period of analysis (years) | 30 |
| Term of financing (years) | 20 |
| Federal and state tax rate | 40.75% |
| Insurance rate | 1.2% |
| Base year for costs and benefits | 2011 |
| Total original net investment ($2011) [a] | $123,305,000 |
| Total relicensing cost ($2011) [a] | $34,437,000 |
| Future major capital cost ($2011) [a] | $14,172,000 |
| Operation and Maintenance, including insurance ($2011/year) [a] | $11,215,000 |
| Commission Fees ($2011/year) [b] | $507,000 |
| Property Taxes ($2011/year) [c] | $723,000 |
| Peak/Off-peak energy value (mills/kWh)[d] | 95.0 |
| Dependable capacity value ($/kW-yr)[c] | 0 |
| Interest rate [e] | 8.79% |
| Discount rate | 8.79% |

[a] PG&E (2011a) Supplement No. 3 to PG&E's License Application, as Amended, Table 3.0-1, adjusted to remove Lower Drum project costs, analyzed separately.

[b] PG&E (2011a) Non-Material Application Amendment Requesting the Issuance of a Separate License for the Lower Drum Project. Table 4.1-2a, adjusted to remove Lower Drum project costs, analyzed separately.

[c] PG&E (2011a) Amended Exhibit D, Statement of Project Costs and Financing, Page D-4, Section 4.2, adjusted to remove Lower Drum project costs, analyzed separately.

[d] Based on Exhibit H of the application, we assumed the power value, along with the State's Renewable Portfolio Standards (RPS) credit accounts for the capacity value.

[e] PG&E (2011a) Supplement No. 3 to PG&E's License Application, as Amended, Section 2.1, Page 2.

### 4.1.2 Comparison of Upper Drum-Spaulding Alternatives

Table 4-2 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EIS: no action, PG&E's proposal, the staff alternative, and the staff alternative with mandatory conditions.

Table 4-2. Summary of the Annual Cost of Alternative Power and Annual Project Cost for Four Alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| | **No Action** | **PG&E's Proposal** | **Staff Alternative** | **Staff Alternative with Mandatory Conditions** |
|---|---|---|---|---|
| Installed capacity (MW) | 192.5 | 146.1[c] | 146.1 | 146.1 |
| Annual generation (MWh)[a] | 571,400 | 510,000 | 510,000 | 510,000 |
| Dependable capacity (MW) | 136.4 | 113 [c] | 113 | 113 |
| Annual power value ($) | $54,283,000 | $48,450,000 | $48,450,000 | $48,450,000 |
| Annual power value ($/MWh) | $95.0 | $95.0 | $95.0 | $95.0 |
| Annualized cost of plant and current environmental measures ($) | $48,043,000 | $48,043,000 | $48,043,000 | $48,043,000 |
| Annualized cost of new environmental measures (including energy losses contained in the power values above) ($) | $0 | $14,476,000 | $14,854,000 | $15,748,000 |
| Annualized cost of new environmental measures (excluding energy losses contained in the power values above) ($) | $0 | $8,643,000 | $9,021,000 | $9,915,000 |
| Annual cost ($) | $48,043,000 | $56,686,000 | $57,064,000 | $57,958,000 |
| Annual cost ($/MWh) | $84.08 | $111.15 | $111.89 | $113.64 |
| Annual net benefit ($) | $6,240,000 | ($8,236,000) | ($8,614,000) | ($9,508,000) |
| Annual net benefit ($/MWh) | $10.92 | ($16.15) [b] | ($16.89) [b] | ($18.64) [b] |

[a] The annual generation for the no-action alternative is based upon power generation calculated using average 2001-2009 water supply deliveries. The annual generation for PG&E's proposal is based upon power generation calculated using existing (2001-2009) water deliveries as well.

[b] A number in parentheses denotes that the difference between the cost of alternative power and project cost is negative; thus, the total project cost is greater than the cost of alternative power.

[c] PG&E (2011a) Amended Exhibit A, Project Description. Sections 1.7 through 1.10.

#### 4.1.2.1 No-Action Alternative

PG&E provided an estimate of average annual output of the project under the no-action alternative (current conditions) of 571.4 GWh, which would provide annual power benefits of $54,283,000. Subtracting the current costs of $48,043,000 yields an annual net benefit of $6,240,000.

#### 4.1.2.2 PG&E's Proposal

The measures that PG&E proposes, summarized in table 4-3, increase the annualized costs from $48,043,000 to $56,686,000 relative to the no-action alternative. PG&E proposes some operational changes which would reduce annual generation by 61.4 GWh, resulting in annual power benefits of $48,450,000 and an annual net loss of $8,236,000. This equals an overall reduction in annual net benefits of $14,476,000 relative to the no-action alternative. The decrease in net benefit from $10.92/MWh under the no-action alternative to a net loss of $16.15/MWh for the proposed action represents a total decrease in net benefits of $27.07/MWh.

#### 4.1.2.3 Staff Alternative

The measures included in the staff alternative, summarized in table 4-3, would increase annualized costs from $48,043,000 to $57,064,000 relative to the no-action alternative. Operational changes would reduce annual generation from 571,400 MWh to 510,000 MWh. The staff alternative would provide annual power benefits of $48,450,000 and an annual net loss of $8,614,000. This represents an overall reduction in annual net benefits of $14,854,000 relative to the no-action alternative. Therefore, the staff alternative would further decrease the net benefits of the project by $0.74/MWh compared to the proposed project.

#### 4.1.2.4 Staff Alternative with Mandatory Conditions

The measures included in the staff alternative with mandatory conditions, summarized in table 4-3, would increase annualized costs from $48,043,000 to $57,958,000 relative to the no-action alternative. Operational changes would reduce annual generation from 571,400 MWh to 510,000 MWh. The staff alternative with mandatory conditions would provide annual power benefits of $48,450,000 and an annual net loss of $9,508,000. Therefore, the added cost of the mandatory measures would further reduce the net benefits of the project by $1.75/MWh compared to the staff alternative.

### 4.1.3 Cost of Upper Drum-Spaulding Environmental Measures

Table 4-3 gives the cost of each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost. Costs are taken from the final license application filed in 2011 and Supplement No. 3 to PG&E's License Application, as amended (PG&E, 2011a), or estimated by Staff using PG&E's costs as a basis. Table 4-3 summarizes the capital and O&M costs by major resource area for the Upper Drum-Spaulding Project. Changes in power benefits are addressed in section 4.1.2.

Appendix D-1 includes capital and O&M costs for individual measures proposed by PG&E and included in terms, conditions, and recommendations received from agencies and other interested parties.

Table 4-3. Cost of Environmental Mitigation and Enhancement Measures Considered in Assessing the Environmental Effects of Continuing to Operate the Upper Drum-Spaulding Project.[a] (Source: PG&E and staff)

| Resource Area | PG&E's Proposed Action | | | Staff Alternative | | | Staff Alternative with Mandatory Conditions | | |
|---|---|---|---|---|---|---|---|---|---|
| | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (excluding energy) | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (including energy) | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (including energy) |
| General | $25,000 | $125,000 | $150,000 | $25,000 | $125,000 | $150,000 | $25,000 | $125,000 | $150,000 |
| Geology and Soils | $0 | $0 | $0 | $143,000 | $6,000 | $149,000 | $143,000 | $6,000 | $149,000 |
| Aquatic resources | $3,156,000 | $991,000 | $4,147.000 | $3,205,000 | $1,071,000 | $4,276,000 | $3,404,000 | $1,766,000 | $5,170,000 |
| Terrestrial resources | $489,000 | $263,000 | $752,000 | $503,000 | $276,000 | $779,000 | $490,000 | $266,000 | $756,000 |
| Recreation resources | $1,065,000 | $1,028,000 | $2,093,000 | $1,048,000 | $1,109,000 | $2,157,000 | $1,057,000 | $1,123,000 | $2,180,000 |
| Cultural resources | $722,000 | $49,000 | $771,000 | $722,000 | $49,000 | $771,000 | $722,000 | $49,000 | $771,000 |
| Land use and aesthetic resources | $384,000 | $346,000 | $730,000 | $393,000 | $346,000 | $739,000 | $393,000 | $346,000 | $739,000 |
| Total | $5,841,000 | $2,802,000 | $8,643,000 | $6,039,000 | $2,982,000 | $9,021,000 | $6,234,000 | $3,681,000 | $9,915,000 |

[a] This summary does not include mitigation measures that are directly associated with the Lower Drum or Deer Creek Projects.

## 4.2 LOWER DRUM PROJECT

### 4.2.1 Power and Developmental Benefits of the Lower Drum Project

Because PG&E requested that the Commission approve a separate license for the Lower Drum Project (which consists of the existing Halsey, Wise, Wise No. 2, and Newcastle Developments) we have performed a separate economic analysis of these four developments.

Table 4-4 summarizes the assumptions and economic information we use in our analysis. This information was provided by PG&E in its license application. We find that the values provided by PG&E are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal O&M cost; and Commission fees.

Table 4-4. Parameters for Economic Analysis of the Lower Drum Project. (Source: PG&E and staff)

| Assumption | Value |
|---|---|
| Period of analysis (years) | 30 |
| Term of financing (years) | 20 |
| Federal and state tax rate | 40.75% |
| Insurance rate | 1.2% |
| Base year for costs and benefits | 2011 |
| Total original net investment ($2011) [a] | $20,488,000 |
| Total relicensing cost ($2011) [a] | $5,720,000 |
| Future major capital cost ($2011r) [a] | $2,328,000 |
| Operation and Maintenance, including insurance ($2011/year) [a] | $1,885,000 |
| Commission Fees ($2011/year) [a] | $78,000 |
| Property Taxes ($2011/year) | $117,000 |
| Peak/Off-peak energy value (mills/kWh) | 95.0 |
| Dependable capacity value ($/kW-yr) [b] | 0 |
| Interest rate [c] | 8.79% |
| Discount rate | 8.79% |

[a] PG&E (2011a) Supplement No. 3 to PG&E's License Application, as Amended, Page 10, Table 4.2-2 used to estimate Lower Drum project costs.

[b] Based on Exhibit H of the application, we assumed the power value, along with the State's RPS credit accounts for the capacity value.

[c] PG&E (2011a) Supplement No. 3 to PG&E's License Application, as Amended, Section 2.1, Page 2.

### 4.2.2 Comparison of Lower Drum Alternatives

Table 4-5 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EIS: no action, PG&E's proposal, the staff alternative, and the staff alternative with mandatory conditions.

Table 4-5. Summary of the Annual Cost of Alternative Power and Annual Project Cost for Four Alternatives for the Lower Drum Project. (Source: staff)

| | **No Action** | **PG&E's Proposal** | **Staff Alternative** | **Staff Alternative with Mandatory Conditions** |
|---|---|---|---|---|
| Installed capacity (MW) | 39.7 | 39.7[c] | 39.7 | 39.7 |
| Annual generation (MWh) | 155,400 | 142,100 | 142,100 | 142,100 |
| Dependable capacity (MW) | 23.0 | 23.0 [c] | 23.0 | 23.0 |
| Annual power value ($) | $14,763,000 | $13,500,000 | $13,500,000 | $13,500,000 |
| Annual power value ($/MWh) | $95.0 | $95.0 | $95.0 | $95.0 |
| Annualized cost of plant and current environmental measures ($) | $7,989,000 | $7,989,000 | $7,989,000 | $7,989,000 |
| Annualized cost of new environmental measures (including energy losses contained in the power values above) ($) | $0 | $1,847,000 | $2,287,000 | $2,287,000 |
| Annualized cost of new environmental measures (excluding energy losses contained in the power values above) ($) | $0 | $584,000 | $1,024,000 | $1,024,000 |
| Annual cost ($) | $7,989,000 | $8,573,000 | $9,012,000 | $9,012,000 |
| Annual cost ($/MWh) | $51.41 | $60.33 | $63.42 | $63.42 |
| Annual net benefit ($) | $6,774,000[b] | $4,927,000 [b] | $4,487,000 | $4,487,000 |

Table 4-5. Summary of the Annual Cost of Alternative Power and Annual Project Cost for Four Alternatives for the Lower Drum Project. (Source: staff)

| | No Action | PG&E's Proposal | Staff Alternative | Staff Alternative with Mandatory Conditions |
|---|---|---|---|---|
| Annual net benefit ($/MWh) | $43.59 [b] | $34.67 [b] | $31.58 [b] | $31.58 [b] |

[a] The annual generation for the no-action alternative is based upon power generation calculated using average 2001-2009 water supply deliveries. The annual generation for PG&E's proposal is based upon power generation calculated using existing water deliveries.

[a] A number in parentheses denotes that the difference between the cost of alternative power and project cost is negative; thus, the total project cost is greater than the cost of alternative power.

[c] PG&E (2011a) Amended Exhibit A, Project Description. Sections 1.7 through 1.10.

#### 4.2.2.1 No-Action Alternative

PG&E provided an estimate of average annual output of the project under the no-action alternative (current conditions) of 155.4 GWh, which would provide annual power benefits of $14,763,000. Subtracting the current costs of $7,989,000 yields an annual net benefit of $6,774,000.

#### 4.2.2.2 PG&E's Proposal

The measures that PG&E proposes, summarized in table 4-6, increase the annualized costs from $7,989,000 to $8,573,000 relative to the no-action alternative. PG&E proposes some operational changes which would reduce annual generation by 13.3 GWh, resulting in annual power benefits of $13,500,000 and an annual net benefit of $4,927,000. This equals an overall reduction in annual net benefits of $1,847,000 relative to the no-action alternative. The decrease in net benefit from $43.59/MWh under the no-action alternative to a net benefit of $34.67/MWh for the proposed action represents a total decrease in net benefits of $8.92/MWh.

#### 4.2.2.3 Staff Alternative

The measures included in the staff alternative, summarized in table 4-6, would increase annualized costs from $7,989,000 to $9,012,000 relative to the no-action alternative. Operational changes would reduce annual generation from 155,400 MWh to 142,100 MWh. The staff alternative would provide annual power benefits of $13,500,000 and an annual net benefit of $4,487,000. This represents an overall reduction in annual net benefits of $2,287,000 relative to the no-action alternative. Therefore, the staff alternative would further decrease the net benefits of the project by $3.09/MWh compared to the proposed project.

#### 4.2.2.4 Staff Alternative with Mandatory Conditions

The measures included in the staff alternative with mandatory conditions, summarized in table 4-6, would increase annualized costs from $7,989,000 to $9,012,000 relative to the no-action alternative. Operational changes would reduce annual generation from 155,400 MWh to 142,100 MWh.

The staff alternative with mandatory conditions would provide annual power benefits of $13,500,000 and an annual net benefit of $4,487,000. This represents an overall reduction in annual net benefits of $2,287,000 relative to the no-action alternative. The added cost of the mandatory measures would not change net benefits of the project compared to the staff alternative.

### 4.2.3 Cost of Lower Drum Environmental Measures

Table 4-6 gives the cost of each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost. Costs are taken from the final license application filed in 2011 and Supplement No. 3 to PG&E's License Application, as Amended (PG&E, 2011a) or estimated by Staff using PG&E's costs as a basis. Table 4-6 summarizes the capital and O&M costs by major resource area for the Lower Drum Project. Changes in power benefits are addressed in section 4.2.2.

Appendix D-2 includes capital and O&M costs for individual measures proposed by PG&E and included in terms, conditions, and recommendations received from agencies and other interested parties.

Table 4-6. Cost of Environmental Mitigation and Enhancement Measures Considered in Assessing the Environmental Effects of Continuing to Operate the Lower Drum Project.[a] (Source: PG&E and staff)

| Resource Area | PG&E's Proposed Action | | | Staff Alternative | | | Staff Alternative with Mandatory Conditions | | |
|---|---|---|---|---|---|---|---|---|---|
| | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (excluding energy) | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (including energy) | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (including energy) |
| General | $2,000 | $15,000 | $17,000 | $2,000 | $15,000 | $17,000 | $2,000 | $15,000 | $17,000 |
| Geology and Soils | $0 | $0 | $0 | $286,000 | $13,000 | $299,000 | $286,000 | $13,000 | $299,000 |
| Aquatic resources | $233,000 | $66,000 | $299,000 | $234,000 | $81,000 | $315,000 | $234,000 | $81,000 | $315,000 |
| Terrestrial resources | $10,000 | $35,000 | $45,000 | $40,000 | $103,000 | $143,000 | $40,000 | $103,000 | $143,000 |
| Recreation resources | $7,000 | $91,000 | $98,000 | $10,000 | $113,000 | $123,000 | $10,000 | $113,000 | $123,000 |
| Cultural resources | $117,000 | $8,000 | $125,000 | $117,000 | $8,000 | $125,000 | $117,000 | $8,000 | $125,000 |
| Land use and aesthetic resources | $0 | $0 | $0 | $1,000 | $0 | $1,000 | $1,000 | $0 | $1,000 |
| Total | $369,000 | $215,000 | $584,000 | $690,000 | $333,000 | $1,024,000 | $690,000 | $333,000 | $1,024,000 |

[a] This summary does not include mitigation measures that are directly associated with the Upper Drum-Spaulding or Deer Creek Projects.

## 4.3 DEER CREEK PROJECT

### 4.3.1 Power and Developmental Benefits of the Deer Creek Project

Because PG&E requested that the Commission approve a separate license for the existing Deer Creek Development, we have performed a separate economic analysis of the development.

Table 4-7 summarizes the assumptions and economic information we use in our analysis. This information was provided by PG&E in its license application. We find that the values provided by PG&E are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal O&M cost; and Commission fees.

Table 4-7. Parameters for Economic Analysis of the Deer Creek Project. (Source: PG&E and staff)

| Assumption | Value |
|---|---|
| Period of analysis (years) | 30 |
| Term of financing (years) | 20 |
| Federal and state tax rate | 40.75% |
| Insurance rate | 1.2% |
| Base year for costs and benefits | 2011 |
| Total original net investment ($2011) [a] | $13,806,000 |
| Total relicensing cost ($2011) [a] | $3,843,000 |
| Future major capital cost ($2011r) [a] | $1,000,000 |
| Operation and Maintenance, including insurance ($2011/year) [a] | $1,400,000 |
| Commission Fees ($2011/year) [a] | $14,000 |
| Property Taxes ($2011/year) | $63,000 |
| Peak/Off-peak energy value (mills/kWh) | 95.0 |
| Dependable capacity value ($/kW-yr) [b] | 0 |
| Interest rate [c] | 8.79% |
| Discount rate | 8.79% |

[a] PG&E (2011a) Supplement No. 3 to PG&E's License Application, as Amended, Page 10, Table 4.2-2.

[b] Based on Exhibit H of the application, we assumed the power value, along with the State's RPS credit accounts for the capacity value.

[c] PG&E (2011a) Supplement No. 3 to PG&E's License Application, as Amended, Section 2.1, Page 2.

### 4.3.2 Comparison of Deer Creek Alternatives

Table 4-8 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EIS: no action, PG&E's proposal, the staff alternative, and the staff alternative with mandatory conditions.

Table 4-8. Summary of the Annual Cost of Alternative Power and Annual Project cost for Four Alternatives for the Deer Creek Project. (Source: staff)

| | **No Action** | **PG&E's Proposal** | **Staff Alternative** | **Staff Alternative with Mandatory Conditions** |
|---|---|---|---|---|
| Installed capacity (MW) | 5.7 | 5.7 | 5.7 | 5.7 |
| Annual generation (MWh) | 22,600 | 22,400 | 22,400 | 22,400 |
| Dependable capacity (MW) | 3.4 | 3.4 | 3.4 | 3.4 |
| Annual power value ($) | $2,147,000 | $2,128,000 | $2,128,000 | $2,128,000 |
| Annual power value ($/MWh) | $95.0 | $95.0 | $95.0 | $95.0 |
| Annualized cost of plant and current environmental measures ($) | $5,339,000 | $5,339,000 | $5,339,000 | $5,339,000 |
| Annualized cost of new environmental measures (including energy losses contained in the power values above) ($) | $0 | $384,000 | $589,000 | $604,000 |
| Annualized cost of new environmental measures (excluding energy losses contained in the power values above) ($) | $0 | $365,000 | $570,000 | $585,000 |
| Annual cost ($) | $5,339,000 | $5,704,000 | $5,909,000 | $5,924,000 |
| Annual cost ($/MWh) | $236.22 | $254.64 | $263.80 | $264.47 |
| Annual net benefit ($) | ($3,192,000)[b] | ($3,576,000)[b] | ($3,781,000)[b] | ($3,796,000)[b] |

Table 4-8. Summary of the Annual Cost of Alternative Power and Annual Project cost for Four Alternatives for the Deer Creek Project. (Source: staff)

| | No Action | PG&E's Proposal | Staff Alternative | Staff Alternative with Mandatory Conditions |
|---|---|---|---|---|
| Annual net benefit ($/MWh) | ($141.22) [b] | ($159.64) [b] | ($168.80) [b] | ($169.47) [b] |

[a] The annual generation for the no-action alternative is based upon power generation calculated using average 2001-2009 water supply deliveries. The annual generation for PG&E's proposal is based upon power generation calculated using existing water deliveries.

[b] A number in parentheses denotes that the difference between the cost of alternative power and project cost is negative; thus, the total project cost is greater than the cost of alternative power.

#### 4.3.2.1 No-Action Alternative

PG&E provided an estimate of average annual output of the project under the no-action alternative (current conditions) of 22.6 GWh, which would provide annual power benefits of $2,147,000. Subtracting the current costs of $5,339,000 yields an annual net loss of $3,192,000.

#### 4.3.2.2 PG&E's Proposal

The measures that PG&E proposes, summarized in table 4-9, increase the annualized costs from $5,339,000 to $5,704,000 relative to the no-action alternative. PG&E proposes some operational changes which would reduce annual generation by 0.2 GWh, resulting in annual power benefits of $2,128,000 and an annual net loss of $3,576,000. This equals an overall reduction in annual net benefits of $384,000 relative to the no-action alternative. The increase in net loss from $141.22/MWh under the no-action alternative to a net loss of $159.64/MWh for the proposed action represents a total decrease in net benefits of $18.42/MWh.

#### 4.3.2.3 Staff Alternative

The measures included in the staff alternative, summarized in table 4-9, would increase annualized costs from $5,339,000 to $5,909,000 relative to the no-action alternative. Operational changes would reduce annual generation from 22,600 MWh to 22,400 MWh. The staff alternative would provide annual power benefits of $2,128,000 and an annual net loss of $3,781,000. This represents an overall reduction in annual net benefits of $589,000 relative to the no-action alternative. Therefore, the staff alternative would further decrease the net benefits of the project by $9.16/MWh compared to the proposed project.

#### 4.3.2.4 Staff Alternative with Mandatory Conditions

The measures included in the staff alternative with mandatory conditions, summarized in table 4-9, would increase annualized costs from $5,339,000 to $5,924,000 relative to the no-action alternative. Operational changes would reduce annual generation from 22,600 MWh to 22,400 MWh. The staff alternative with mandatory conditions would provide annual power benefits of $2,128,000 and an annual net loss of $3,796,000. This represents an overall reduction in annual net benefits of $604,000

relative to the no-action alternative. Therefore, the mandatory measures would further decrease the net benefits of the project by $0.67/MWh compared to the staff alternative project.

### 4.3.3 Cost of Deer Creek Environmental Measures

Table 4-9 gives the cost of each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost. Costs are taken from the final license application filed in 2011 and Supplement No. 3 to PG&E's License Application, as Amended (PG&E, 2011a), or estimated by Staff using PG&E's costs as a basis. Table 4-9 summarizes the capital and O&M costs by major resource area for the Deer Creek Project. Changes in power benefits are addressed in section 4.3.2.

Appendix D-3 includes capital and O&M costs for individual measures proposed by PG&E and included in terms, conditions, and recommendations received from agencies and other interested parties.

Table 4-9. Cost of Environmental Mitigation and Enhancement Measures Considered in Assessing the Environmental Effects of Continuing to Operate the Deer Creek Project.[a] (Source: PG&E and staff)

| Resource Area | PG&E's Proposed Action | | | Staff Alternative | | | Staff Alternative with Mandatory Conditions | | |
|---|---|---|---|---|---|---|---|---|---|
| | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (excluding energy) | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (including energy) | Annualized Capital Cost | Annualized O&M Cost | Total Annualized Cost (including energy) |
| General | $2,000 | $11,000 | $13,000 | $2,000 | $11,000 | $13,000 | $2,000 | $11,000 | $13,000 |
| Geology and Soils | $0 | $0 | $0 | $143,000 | $6,000 | $149,000 | $143,000 | $6,000 | $149,000 |
| Aquatic resources | $2,000 | $28,000 | $30,000 | $3,000 | $31,000 | $34,000 | $3,000 | $31,000 | $34,000 |
| Terrestrial resources | $11,000 | $45,000 | $56,000 | $40,000 | $66,000 | $106,000 | $40,000 | $66,000 | $106,000 |
| Recreation resources | $1,000 | $4,000 | $5,000 | $1,000 | $5,000 | $6,000 | $1,000 | $20,000 | $21,000 |
| Cultural resources | $11,000 | $2,000 | $13,000 | $11,000 | $2,000 | $13,000 | $11,000 | $2,000 | $13,000 |
| Land use and aesthetic resources | $129,000 | $119,000 | $248,000 | $130,000 | $119,000 | $249,000 | $130,000 | $119,000 | $249,000 |
| Total | $156,000 | $209,000 | $365,000 | $330,000 | $240,000 | $570,000 | $330,000 | $256,000 | $585,000 |

[a] This summary does not include mitigation measures that are directly associated with the Upper Drum-Spaulding or Lower Drum Projects.

## 4.4 YUBA-BEAR PROJECT

In this section, we analyze the Yuba-Bear Project's use of the Yuba and Bear Rivers for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. As part of its Amended Application, NID proposes to construct the Rollins no. 2 powerhouse adjacent to the existing Rollins powerhouse. The estimated construction cost of this project is about $22 million (2010 dollars). Although the proposed powerhouse is included in NID's proposal, we have analyzed the costs and benefits of this project separately, so that the feasibility of the powerhouse construction project can be more accurately assessed. The project costs, benefits, and proposed environmental measures associated with the Rollins no. 2 powerhouse are discussed separately in section 4.3.4.

### 4.4.1 Power and Developmental Benefits of the Yuba-Bear Project

Table 4-10 summarizes the assumptions and economic information we use in our analysis. This information was provided by NID in its license application. We find that the values provided by NID are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal O&M cost; and Commission fees.

Table 4-10. Parameters for Economic Analysis of the Yuba-Bear Project. (Source: NID and staff)

| Assumption | Value |
|---|---|
| Period of analysis (years) | 30 |
| Term of financing (years) | 20 |
| Insurance rate | 0% |
| Base year for costs and benefits | 2010 |
| Total original net investment [a] ($2010) | $20,413,000 |
| Total relicensing cost [b] ($2010) | $11,000,000 |
| Federal, state, and local annual taxes ($2010/year)[c] | $500,000 |
| Annual depreciation expense ($2010/year)[c] | $2,500,000 |
| Operation and Maintenance ($2010/year) [c] | $2,487,000 |
| Commission Fees ($2010/year) [c] | $367,000 |
| Transmission Costs ($2010/year) [c] | $300,000 |
| Operating Reserve ($2010/year) [c] | $600,000 |
| Power Purchase Contract Management ($2010/year) [c] | $40,000 |
| Peak/Off-peak energy value (mills/kWh) | 76.0 |
| Dependable capacity value ($/kW-yr)[d] | 0 |
| Interest rate [e] | 5.0% |

Table 4-10. Parameters for Economic Analysis of the Yuba-Bear Project. (Source: NID and staff)

| | |
|---|---|
| Discount rate | 5.0% |

[a] NID (2011a) Supplement No. 1 to NID's License Application, as Amended, Page 5, Table 3.1-1.

[b] NID (2011a) Supplement No. 2 to NID's License Application, as Amended, Section 3.1.8

[c] NID (2011a) Supplement No. 2 to NID's License Application, as Amended, Page 5, Table 3.1-1.

[d] Based on exhibit H of the application, we assumed that the power value, along with the State's RPS credit accounts for the capacity value.

[e] NID (2011a) Supplement No. 2 to NID's License Application, as Amended, Page 5, Section 3.1.3.

### 4.4.2 Comparison of Yuba-Bear Alternatives

Table 4-11 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EIS: no-action, NID's proposal, the staff alternative, and the staff alternative with mandatory conditions.

Table 4-11. Summary of the Annual Cost of Alternative Power and Annual Project Cost for Four Alternatives for the Yuba-Bear Project. (Source: staff)

| | **No Action** | **NID's Proposal** | **Staff Alternative** | **Staff Alternative with Mandatory Conditions** |
|---|---|---|---|---|
| Installed capacity (MW) | 79.3 | 79.3 | 79.3 | 79.3 |
| Annual generation (MWh)[a] | 266,000 | 236,000 | 236,000 | 236,000 |
| Dependable capacity (MW) | 47 | 45 | 45 | 45 |
| Annual power value ($) | $20,216,000 | $17,936,000 | $17,936,000 | $17,936,000 |
| Annual power value ($/MWh) | $76.0 | $76.0 | $76.0 | $76.0 |
| Annualized cost of plant and current environmental measures ($) | $8,470,000 | $8,470,000 | $8,470,000 | $8,470,000 |

Table 4-11. Summary of the Annual Cost of Alternative Power and Annual Project Cost for Four Alternatives for the Yuba-Bear Project. (Source: staff)

| | No Action | NID's Proposal | Staff Alternative | Staff Alternative with Mandatory Conditions |
|---|---|---|---|---|
| Annualized cost of new environmental measures (including energy losses contained in the power values above) ($) | $0 | $7,001,000 | $7,578,000 | $7,896,000 |
| Annualized cost of new environmental measures (excluding energy losses contained in the power values above) ($) | $0 | $4,721,000 | $5,298,000 | $5,616,000 |
| Annual cost ($) | $8,470,000 | $13,192,000 | $13,768,000 | $14,087,000 |
| Annual cost ($/MWh) | $31.84 | $55.90 | $58.34 | $59.69 |
| Annual net benefit ($) | $11,745,000 | $4,744,000 | $4,168,000 | $3,849,000 |
| Annual net benefit ($/MWh) | $44.16 | $20.10 | $17.66 | $16.31 |

[a] The annual generation for the no-action alternative is based upon power generation calculated using average 2001-2009 water supply deliveries. The annual generation for NID's proposal is based upon power generation calculated using existing water deliveries, and not including construction of the proposed Rollins no. 2 powerhouse.

#### 4.4.2.1 No-Action Alternative

NID provided an estimate of average annual output of the project under the no-action alternative (current conditions) of 266 GWh, which would provide annual power benefits of $20,216,000. Subtracting the current costs of $8,470,000 yields an annual net benefit of $11,745,000.

#### 4.4.2.2 NID's Proposal

The measures that NID proposes, summarized in table 4-12, increase the annualized costs from $8,470,000 to $13,192,000 relative to the no-action alternative. NID proposes some operational changes which would reduce annual generation by 30.0 GWh, resulting in annual power benefits of $17,936,000 and an annual net benefit of $4,744,000. This equals an overall reduction in annual net benefits of $7,001,000 relative to the no-action alternative. The decrease in net benefits from $44.16/MWh under the no-action alternative to $20.10/MWh for the proposed action represents a total decrease in net benefits of $24.06/MWh.

#### 4.4.2.3 Staff Alternative

The measures included in the staff alternative, summarized in table 4-12, would increase annualized costs from $8,470,000 to $13,768,000 relative to the no-action alternative. Operational changes would reduce annual generation from 266,000 MWh to 236,000MWh. The staff alternative would provide annual power benefits of $17,936,000 and an annual net benefit of $4,168,000. This represents an overall reduction in annual net benefits of $7,578,000 relative to the no-action alternative. Therefore, the staff alternative would further decrease the net benefits of the project by $2.44/MWh compared to the proposed project.

#### 4.4.2.4 Staff Alternative with Mandatory Conditions

The measures included in the staff alternative with mandatory conditions, summarized in table 4-12, would increase annualized costs from $8,470,000 to $14,087,000 relative to the no-action alternative. Operational changes would reduce annual generation from 266,000 MWh to 236,000 MWh. The staff alternative with mandatory conditions would provide annual power benefits of $17,936,000 and an annual net benefit of $3,849,000. This represents an overall reduction in annual net benefits of $7,896,000 relative to the no-action alternative. Therefore, the added cost of the mandatory measures would further reduce the net benefits of the project by $1.35/MWh compared to the staff alternative.

### 4.4.3 Cost of Yuba-Bear Environmental Measures

Table 4-12 gives the cost of each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost. Costs are taken from the final license application filed in 2011 and Supplement No. 2 to NID's License Application, as Amended (NID, 2011a). Table 4-12 summarizes the capital and O&M costs by major resource area for the Yuba-Bear Project.

Proposed environmental measures that are directly associated with the proposed Rollins no. 2 powerhouse are not included in table 4-12. The capital and O&M costs by major resource area associated with the construction of the proposed Rollins no. 2 powerhouse are included separately in table 4-13.

Appendix E includes capital and O&M costs for individual measures proposed by NID and included in terms, conditions, and recommendations received from agencies and other interested parties.

Table 4-12. Cost of Environmental Mitigation and Enhancement Measures Considered in Assessing the Environmental Effects of Continuing to Operate the Yuba-Bear Project.[a] (Source: NID and staff)

| | NID's Proposed Action | | | Staff Alternative | | | Staff Alternative with Mandatory Conditions | | |
|---|---|---|---|---|---|---|---|---|---|
| **Resource Area** | **Annualized Capital Cost** | **Annualized O&M Cost** | **Total Annualized Cost (excluding energy)** | **Annualized Capital Cost** | **Annualized O&M Cost** | **Total Annualized Cost (including energy)** | **Annualized Capital Cost** | **Annualized O&M Cost** | **Total Annualized Cost (including energy)** |
| General | $4,000 | $43,000 | $47,000 | $4,000 | $40,000 | $44,000 | $4,000 | $40,000 | $44,000 |
| Geology and soils | $193,000 | $25,000 | $218,000 | $359,000 | $210,000 | $569,000 | $359,000 | $210,000 | $569,000 |
| Water resources | $4,000 | $0 | $4,000 | $4,000 | $0 | $4,000 | $4,000 | $0 | $4,000 |
| Aquatic resources | $319,000 | $664,000 | $983,000 | $321,000 | $911,000 | $1,232,000 | $307,000 | $1,026,000 | $1,333,000 |
| Terrestrial resources | $12,000 | $75,000 | $87,000 | $13,000 | $75,000 | $88,000 | $13,000 | $75,000 | $88,000 |
| Recreation resources | $2,018,000 | $1,098,000 | $3,116,000 | $2,078,000 | $1,012,000 | $3,089,000 | $2,226,000 | $1,079,000 | $3,305,000 |
| Cultural resources | $102,000 | $14,000 | $116,000 | $102,000 | $14,000 | $116,000 | $102,000 | $14,000 | $116,000 |
| Land use and aesthetic resources | $53,000 | $97,000 | $150,000 | $60,000 | $97,000 | $157,000 | $60,000 | $97,000 | $157,000 |
| Total | $2,705,000 | $2,016,000 | $4,721,000 | $2,941,000 | $2,359,000 | $5,300,000 | $3,075,000 | $2,541,000 | $5,616,000 |

Table 4-13. Summary of Annualized Costs by Resource Area for Measures Included in the Proposed Action and Proposed Action with Staff Modifications for the Yuba-Bear Project. [This summary includes only measures that are directly associated with construction of the proposed Rollins no. 2 powerhouse. (Source: staff)]

| | NID's Proposed Action | | | Staff Alternative | | | Staff Alternative with Mandatory Conditions | | |
|---|---|---|---|---|---|---|---|---|---|
| **Resource Area** | **Annualized Capital Cost** | **Annualized O&M Cost** | **Total Annualized Cost (excluding energy)** | **Annualized Capital Cost** | **Annualized O&M Cost** | **Total Annualized Cost (including energy)** | **Annualized Capital Cost** | **Annualized O&M Cost** | **Total Annualized Cost (including energy)** |
| General | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Geology and soils | $2,000 | $0 | $2,000 | $2,000 | $0 | $2,000 | $2,000 | $0 | $2,000 |
| Water resources | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Aquatic resources | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Terrestrial resources | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Recreation resources | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Cultural resources | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Land use and aesthetic resources | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Total | $2,000 | $0 | $2,000 | $2,000 | $0 | $2,000 | $2,000 | $0 | $2,000 |

### 4.4.4 Comparison of Alternatives for NID's Proposed Rollins No. 2 Powerhouse

To develop the hydro potential of higher instream releases that may be required in any new license, NID proposes to install a new unit at the Rollins powerhouse below Rollins dam on the Bear River. NID estimates an 11.4-MW powerhouse would produce 17 GWh of annual generation and would have a one-time capital cost of $21,986,000. We estimate that additional annual costs, including operation and maintenance, taxes, fees, operating reserve, insurance, and transmission costs amount to $221,000. In table 4-14, we present our estimate of the power value, annual costs, and net benefits of the proposed Rollins no. 2 powerhouse.

Table 4-14. Summary of Annual Net Benefits and Costs for the Proposed Rollins No. 2 Powerhouse of the Yuba-Bear Project. (Source: staff)

| | **Rollins no. 2 11.4 MW** |
|---|---|
| Total original net investment ($2010)[a] | $21,986,000 |
| Operation and Maintenance ($2010/year) [a] | $175,000 |
| Annual taxes, fees, etc. ($2010/year) [a] | $46,000 |
| Annualized cost of plant and environmental measures ($) | $2,000 |
| Annual power value ($2010) | $1,292,000 |
| Annual power value ($2010/MWh) | $76.0 |
| Total Annual cost ($) | $1,653,000 |
| Total Annual cost ($/MWh) | $97.13 |
| Annual net benefit ($) | ($361,000) |
| Annual net benefit ($/MWh) | ($21.13) |

[a] NID (2011a) Supplement No. 1 to NID's License Application, as Amended, Page 9, Table 4.1-2.

As table 4-14 shows, the Rollins no. 2 powerhouse that NID is considering would have initial annual costs that exceed the current power value. Although Commission staff does not explicitly account for the effects inflation may have on the future cost of electricity, the fact that hydropower generation is relatively insensitive to inflation compared to fossil-fueled generators is an important economic consideration for power producers and the consumers they serve. NID must also consider whether this hydro proposal would qualify as part of its state requirement to develop renewable resources. Based on the Commission's policy under the Mead decision, it is the applicant who must decide whether to accept any license and the financial risk that entails.

# 5.0 CONCLUSIONS AND RECOMMENDATIONS

## 5.1 UPPER DRUM-SPAULDING PROJECT

### 5.1.1 Comparison of Proposed Project and Alternatives

In this section, we compare the developmental and non-developmental effects of PG&E's proposal, PG&E's proposal as modified by staff (staff alternative), and the no-action alternative.

We estimate the annual generation of the Upper Drum-Spaulding Project (Spaulding No. 3, Spaulding No. 1 and No. 2, Alta, Drum No. 1 and No. 2, and Dutch Flat No. 1 Developments) under the three alternatives identified above. Our analysis shows that the generation would be 510,000 MWh for the proposed action; 510,000 MWh for the staff alternative; and 571,400 MWh for the no-action alternative.

We summarize the environmental effects of the different alternatives in table 5-1.

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Generation** | 571.4 GWh | 510.0 GWh | 510.0 GWh |
| **Geology and Soils** | Project-related erosion and sedimentation occurring on project lands or waters resulting from project operation would continue to occur. | Implementation of the Erosion and Sediment Control and Management Plan, filed April 11, 2014, would minimize short- and long-term erosion and sedimentation resulting from project operation and proposed project construction. | Same as proposed action. |
| | Project-related erosion and sedimentation occurring below project canal release points would continue to occur. | Implementation of the Canal Release Point Monitoring Plan, filed April 11, 2014, would minimize short- and long-term erosion and sedimentation resulting from operation of project canals. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Potential for geomorphic degradation of stream channel, banks, and riparian habitat in Bear River. | Modify Drum canal winter operations and outage spills and assessment of baseline conditions in Bear Valley meadow to minimize degradation of riparian habitat and channel structure. | Same as proposed action. Develop Bear River Management Plan in Bear River above Drum afterbay on National Forest System Lands. Conduct channel morphology and riparian vegetation assessment in the vicinity of Bear Valley, consistent with Forest Service condition 50 and recommendation 7, to establish baseline conditions and determine the need for remedial measures. |
| | Potential for impacts to riparian habitat. | Monitor riparian vegetation in accordance with the Forest Service/BLM Riparian Vegetation Monitoring Plan (filed April 11, 2014). Monitoring of riparian vegetation would allow a continued assessment of the effects to riparian vegetation in areas affected by project operations. | Same as proposed action. |
| **Aquatic Resources** | Existing minimum streamflows do not vary with type of water year, creating restricted seasonal and interannual flow variability typical of regulated streams with limited aquatic habitat and fish production. | Water Year Type – To provide interannual flow variation minimum instream flow requirements would be dependent on six different water year types: extremely critically dry; critically dry; dry; below normal; above normal; and wet. Implement extreme critically dry water year type flows in 3 project-affected stream reaches in a critically dry year that follows a critically dry or extreme critically dry year. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Provide existing minimum streamflows in 16 stream reaches; 7 project-affected stream reaches would continue to have no required minimum streamflow providing no aquatic habitat. Three additional stream reaches would have minimum streamflows by other agreements with California Fish and Wildlife and/or the Forest Service. | Minimum Streamflows − Provide same or higher minimum streamflows depending on water year in 15 project-affected reaches; new minimum streamflows in 10 project-affected reaches with no minimum streamflows in the existing license; and no minimum streamflow at 1 previous compliance point. The higher streamflows would increase fish habitat for all resident fish species. | Same as proposed action. |
| | Fish would continue to be lost due to canal dewatering and reduction of minimum flows would adversely affect downstream aquatic habitat. | Canal Outages – To facilitate planning for resources protection, notify licensing participants of all annual planned and non-routine planned canal outages; provide required minimum instream flow or inflow whichever is less. For canal outages expected to extend past 30 days consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the outage period; notify agencies within one business day in event of emergency outage: Drum canal would not be taken out of service at the same time as Lower Drum Project's Bear River canal. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Fordyce Lake operated to retain meltwater for release later in summer, reducing streamflow and aquatic habitat in spring and early summer. | Fordyce Lake Drawdown to enhance recreational boating opportunities in Fordyce Creek and manage the cold water pool in Lake Spaulding to support Supplemental Flow measure for water temperature management in South Yuba River. Manage discharge from Fordyce Lake after spills cease at Fordyce Lake and Lake Spaulding. The high target flow (475-250 cfs) from Fordyce Lake should not cause additional spill from Lake Spaulding. End of year carryover storage at Fordyce Lake would be 7,500 to 10,000 acre-feet. Releases would be apportioned between 29,000 and 10,000 acre-feet. Higher streamflows also provide additional opportunity for recreational boating in Fordyce Creek. A 10-day special event flow of 50 cfs would begin in the third week of August. | Same as proposed action. |
| | No continuous minimum streamflow released at Drum canal spill gate, reducing aquatic habitat. | Minimum Streamflow Releases to Bear River below Drum canal as measured at gage YB-137 − Construction and operation of two flow release devices near Drum canal spillway, releasing 1 cfs in extremely critically dry and critically dry water years and 2 cfs in all other water years, would minimize effects to aquatic habitat. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Flows decline rapidly once spill terminates; water depth in downstream reach decreases rapidly with the potential for stranding aquatic organisms. | Spill Cessation and Minimization of Flow Fluctuations in South Yuba River – Implementation of a spill cessation schedule at Lake Spaulding to minimize rapid flow reduction and fluctuation in the South Yuba River downstream would protect aquatic organisms. | Same as proposed action. |
| | Minimum streamflows of 5 cfs year round in South Yuba River at Lang's Crossing (YB-29), resulting in elevated summer water temperatures adversely affecting resident fish. | South Yuba River Supplemental Flows – Management goal to maintain 20°C in South Yuba River above Canyon Creek confluence to benefit resident rainbow trout and protect foothill yellow-legged frog populations. | Same as proposed action. |
| | Some fish residing in canals may be lost when canals are drained during an outage. | Implement Fish Protection and Management During Canal Outages Plan, filed November 21, 2013, to minimize loss of fish during drawdown of canals. | Same as proposed action. |
| | Existing stream gages would continue to operate as designed. Unable to monitor compliance with minimum flows for stream reaches without gages. | Gaging Plan, filed April 11, 2014 by Forest Service, would require measurement of streamflow for each of the project-affected reaches to demonstrate compliance with minimum streamflow requirements. Modify existing gages or install new streamflow gages in some of the reaches with a higher or new minimum instream flow requirement. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | No active plan to limit or prevent spread and growth of aquatic invasive species. | Develop and implement Aquatic Invasive Species Management and Monitoring Plan consistent with Forest Service condition 37 would minimize the spread of aquatic invasive species. | Same as proposed action. |
| | No ongoing fish population monitoring, so effectiveness of existing measures unknown. | Implement Fish Population Monitoring Plan, filed November 21, 2013, to assess the effects of the proposed flow modifications. | Same as proposed action. |
| | Breeding populations of foothill yellow-legged frog (FYLF) may be affected by project operations through the modification of flows and stream temperatures as a result of project discharges. No ongoing frog monitoring, so effectiveness of existing measures unknown. | Implement Foothill Yellow-legged Frog Monitoring Plan, filed November 21, 2013, to assess the effects of the proposed flow modifications. | Same as proposed action. |
| | No ongoing channel morphology monitoring, so effectiveness of existing measures unknown. | Implement Channel Morphology Monitoring Plan, filed November 21, 2013, to assess the effects of the proposed flow modifications. | Same as proposed action. |
| | Potential for impacts to riparian habitat. | Monitor riparian vegetation in accordance with the Forest Service/BLM Riparian Vegetation Monitoring Plan (filed April 11, 2014). Monitoring of riparian vegetation would allow a continued assessment of the effects to riparian vegetation in areas affected by project operations. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | No ongoing water temperature and stage monitoring, so effectiveness of existing measures unknown. | Implement Forest Service/BLM Water Temperature and Stage Monitoring Plan, filed April 11, 2014, to assess the effects of the proposed flow modifications. | Same as proposed action. |
| | No ongoing monitoring of western pond turtles so effectiveness of existing measures unknown. | Implement Western Pond Turtle Incidental Observations to document and report distribution of species in project-affected area. | Same as proposed action. |
| | No ongoing aquatic benthic macroinvertebrate monitoring, so effectiveness of existing measures unknown. | Develop and implement monitoring plan for Aquatic Benthic Macroinvertebrates based on Forest Service condition 51. | Same as proposed action. |
| | No ongoing large woody debris management program, so effectiveness of existing measures unknown. | Develop and implement a Large Woody Debris Management Program would enhance aquatic habitat. | Same as proposed action. |
| **Terrestrial** | The spread of non- native invasive plants can impact wildlife habitat. | Implement the March 2013 Integrated Vegetation Management Plan to control the spread of non-native invasive plants and protect wildlife habitat. | Same as proposed action but modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Special-status species plants may be affected by operation and maintenance activities at the project. | As part of PG&E's March 2013 Integrated Vegetation Management Plan, PG&E would review special-status species at the project at an annual consultation meeting with federal and state resource agencies. Review and updating of the special-status species list would ensure that project managers are aware of species and their habitats, and what measures may be necessary to protect these species from project O&M activities. | Same as proposed action. |
| | Potential impacts to culturally significant plants. | Same as no-action. | Consult with tribes to identify culturally significant plants and modify the March 2013 Integrated Vegetation Management Plan to identify and protect culturally important species. |
| | No restrictions on use of pesticides or herbicides on federal land that could result in harm to environmental resources. | Implement Integrated Vegetation Management Plan that contains specific provisions for the use of pesticides and herbicides on federal lands and would help protect sensitive species and their habitats. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Mortality of deer and other target species would continue to occur and wildlife movement would be restricted. | Consult with appropriate agencies prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings; monitor animal losses in project canals, including details of mortality. Implement a wildlife crossing plan to retrofit existing footbridges or construct new wildlife crossings at specified locations on the Drum and South Yuba canals. These measures would enhance wildlife crossing and reduce project impacts to wildlife. | Same as proposed action, but include proposed wildlife protection and monitoring measures in a Wildlife Crossing Management Plan for the project. |
| | Project operation and maintenance activities and recreational use and disturbance could affect nesting bald eagles. No project-wide plan for the protection of bald eagles or bald eagle nests. | Implementation of the July 2013 Bald Eagle Management Plan would minimize impacts from operation and maintenance and recreational use. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Project transmission lines could result in mortality of raptors and other birds from electrocution and collision. Continued implementation of system-wide Avian Protection Plan for protection of birds from power lines would minimize effects. | Record annually all incidental observations by licensee's operations staff of bird collisions/electrocutions along project powerlines. Utilize raptor-safe powerline configurations consistent with Avian Protection on Power Lines guidelines for new powerlines and when replacing existing structures. Replace or retrofit powerlines where avian interaction/mortality is substantial. Implementation of these measures would reduce project impacts to avian resources and would minimize risk of avian mortality. If bird collision or electrocution issues are detected, recording incidents and retrofitting structures using the same guidelines would benefit avian resources. | Same as proposed action but include all proposed measures for avian protection at the project in an Avian Management Plan. |
| | Bats that use project buildings may be affected by project operation and maintenance and other human activity. | Document all known bat roosts within project buildings. If bats or signs of roosting are present where staff have routine presence, place human exclusion devices to prevent occupation by bats, and annually inspect exclusion devices. These measures would minimize any impacts to bats. Same as no-action alternative. | Same as proposed action, but include proposed measures for bat documentation and protection in a Bat Management Plan for the project. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | California spotted owl, Northern goshawk nesting may be affected by project operation and maintenance activities associated with planned outages of the South Yuba canals. | Monitor activities associated with annual planned outages and non-routine planned outages along the South Yuba Canal. Record activities that may generate noise disturbances that occur between February 15 through September 15 within 0.25 mile of California spotted owl and northern goshawk Protected Activity Centers (PACs), and within suitable habitat for these species. Implement the March 2013 Integrated Vegetation Management Plan, which establishes limits of operation during the period March 1 through August 15 to minimize potential disturbances to breeding activities and avoid nest failure. | Same as proposed action. |
| **Threatened and Endangered Species** | VELB may be affected by the loss of its critical habitat, elderberry plants, as a result of project operation and maintenance. No federally listed threatened or endangered species or designated critical habitat would be affected. | Implement the VELB management provisions of the March 2013 Integrated Vegetation Management Plan, which include compliance with the March 2003 VELB Conservation Program, consistent with FWS' Biological Opinion. This measure would ensure that the VELB would be protected if elderberry plants are identified in the project area in the future. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Recreation Resources** | Existing project recreation facilities would continue to serve the public but may not meet current demand or expectations. | The September 2013 Recreation Plan would provide for numerous modifications and enhancements to project recreation facilities that would increase public recreation opportunities. | Similar to proposed action, but includes additional improvements to OHV signage at Meadow Lake, campground road improvements at Lake Spaulding, accessible picnic site at Fuller Lake, no specified limit on primitive campsites at Lake Sterling, and a modified schedule for completion of facility improvements at Lake Fordyce, the Lake Spaulding Boat Launch, and Lower Peak Lake campsites. Does not include provision of added amenities (water, septic, etc.) at campground host sites. |
| | Existing trails within the project boundary would continue to serve the public, but may not be sufficient to meet current needs or expectations. | Trail additions and improvements proposed in the September 2013 Recreation Plan would improve trails and enhance trail use. | Similar to proposed action but does not include modifications or enhancements to trails, trailheads, or trail facilities (trailhead parking, kiosks, etc.) that are located outside the project boundary, unless such trails directly connect or are intended to connect two or more project facilities. |
| | Existing boat ramps at the project would continue to provide boat launching opportunities at Lake Valley, Lake Spaulding, and Fuller Lake under some reservoir water level conditions. | Silvertip boat ramp at Lake Valley reservoir would be extended to provide launching capabilities through Labor Day, except in critically dry years. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Project recreation facilities would continue to be maintained on an as needed basis. | Recreation facility operation and maintenance proposed in the September 2013 Recreation Plan would ensure recreation facility maintenance is done on an appropriate schedule and would enhance the condition, usability, and safety of project recreation facilities. Recreation use monitoring proposed in the Recreation Plan would enhance the level of information gathered on recreational use, beyond the Form 80 requirements, at the project facilities, as well as on facility condition. | Same as proposed action. |
| | Monitoring of recreational use at the project would continue to occur on a 6-year cycle, as needed to fulfill the Commission's Form 80 requirements. | Recreation use monitoring proposed in the Recreation Plan would enhance the level of information gathered on recreational use at the project facilities, as well as on facility condition. | Same as proposed action. |
| | Fish stocking would continue at selected project reservoirs. Existing levels of fish stocking may not meet current or future angler demand. | Funding of California Fish and Wildlife up to $15,000 per year to support continued fish stocking at Lake Spaulding. | In lieu of funding California Fish and Wildlife for fish stocking, PG&E's development and implementation of a Fish Stocking Plan for the project would ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Existing streamflows and flow releases would provide whitewater boating opportunities along various project stream reaches at the current frequency. | Spill cessation at Lake Spaulding and Fordyce Lake drawdown (listed under Aquatic Resources) would enhance whitewater boating opportunities at the project. Special event flow would enhance OHV crossing of Fordyce Creek for 10-day period in August. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Streamflow information would continue to be available at existing stream gages and through existing public information outlets. | Develop a plan to provide real-time streamflow information in cfs to the public via the internet for Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam (at Cisco Grove), South Yuba River below Lake Spaulding (at Lang's Crossing), and the Bear River at Highway 20, within one year. Implement Water Temperature and Stage Monitoring Plan (filed April 11, 2014 and listed under Aquatic Resources) that includes installing a monitoring station in the South Yuba River upstream of but as close as possible to Canyon Creek within 3 years that would monitor river stage hourly (15-minute interval readings that would be transmitted hourly) and would be available in real-time (hourly) to the public via the internet. streamflow information (preferably in 15-minute intervals but in no less than hourly intervals) would be available to the public via internet, which would make it easier for recreational users to check on current streamflow conditions at river/stream reaches directly affected by project operations. | Same as proposed action, but modified to include 15-minute interval reporting of streamflow information for these reaches (Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam [at Cisco Grove], South Yuba River below Lake Spaulding at Lang's Crossing, and the Bear River at Highway 20] where it is currently provided in 15-minute intervals and also require submittal of streamflow information plan to the Commission for approval. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | No funding would be required by the FERC license to BLM for BLM's management of public river access, lands, and river-related recreation in the Upper Drum-Spaulding Project along the South Yuba River downstream of Lake Spaulding or BLM's management of BLM lands within the project boundary. | Providing a one-time payment of $95,000 to BLM for BLM recreation improvements on the South Yuba River downstream of Lake Spaulding and providing $30,000 annually to BLM would partially fund the annual operation, maintenance, and administrative costs for BLM's management of public river access, lands, and river-related recreation in the Upper Drum-Spaulding Project along the South Yuba River downstream of Lake Spaulding and BLM's management of BLM lands within the project boundary. | Not included in staff alternative because PG&E is ultimately responsible for those facilities within the FERC boundary and recreation that extends to BLM lands outside the project boundary are outside the Commission's authority. |
| **Cultural** | Significant cultural resources (i.e., historic properties) would be adversely affected by project-related activities. | Implementation of the HPMP upon license issuance would protect cultural resources and resolve project-related adverse effects to historic properties. | Same as proposed action. |
| **Land Use** | There would continue to be a single-licensed project and the project boundary would include facilities not necessary for the continued operation of the project and would not include all primary project roads and recreation facilities. | Revise the project boundary to separate the existing Drum-Spaulding Project into three, separate projects: Upper Drum-Spaulding, Lower Drum, and Deer Creek. Within the proposed Drum-Spaulding Project, also remove the mineral survey area south of the Dutch Flat afterbay, the administrative site at Jackson Meadows reservoir, and the recreation road that provides access to it, and to include certain primary project roads, and new and rehabilitated recreation facilities. | Same as proposed action. |

Table 5-1. Comparison of alternatives for the Upper Drum-Spaulding Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Continue to comply with existing regulations for hazardous materials. | Develop and implement a Hazardous Substances Plan to identify acceptable prevention and mitigation measures and to ensure that hazardous substances are promptly contained or cleaned up. | Same as proposed action, but apply plan to all project lands. |
| | Continue to maintain all project roads and facilities. | Implement the Transportation Management Plan, filed August 29, 2012, to improve road management and to ensure public access to project lands and waters and the adequate protection of natural and environmental resources. | Same as proposed action. |
| | Continue to follow State of California and local rules and regulations. Continue to implement emergency response preparedness requirements. | Implement the Fire Prevention and Response Plan, filed November 21, 2013, for federal lands to reduce the occurrence of wildfires in the project area, and to minimize damage to natural resources. | Revise the Fire Prevention and Response Plan to include all project lands and a periodic review and update of the plan. |
| **Aesthetic Resources** | Visual quality would be impacted by project facilities. | Implement the Visual Resource Management Plan, filed June 18, 2012, to reduce project visual effects and improve visual quality in the project area. | Same as proposed action. |

### 5.1.2 Comprehensive Development and Recommended Alternative

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreation opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for relicensing the Upper Drum-Spaulding Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the staff alternative as the preferred alternative for the Upper Drum-Spaulding Project. This alternative includes elements of the applicant's proposal, section 4(e) conditions, resource agency recommendations, alternative conditions under EPAct, and some additional measures. We recommend this alternative because: (1) issuance of a new hydropower license by the Commission would allow PG&E to operate the project as an economically beneficial and dependable source of water and electrical energy for its customers; (2) the 146.1 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended measures would protect and enhance fish and wildlife resources and would provide improved recreation opportunities at the protect.

Finally, for the reasons outlined in section 5.1.2.3, we recommend that certain 4(e) conditions specified by the Forest Service in whole or in part, not be included in the staff alternative. We recognize, however, that the Commission is required to include valid 4(e) conditions in any license issued for the project. As such, each of the measures that staff recommend be modified in the staff alternative would not be included in any license issued by the Commission. Instead, those staff-modified conditions would be replaced with agencies' corresponding conditions, as filed with the Commission.

Of the 35 Forest Service section 4(e) conditions we consider to be environmental measures, we include 32 of these conditions in the staff alternative as specified by the Forest Service. Of the three Forest Service conditions not wholly included in the staff alternative, we recommend modifying: (1) condition 53, *Recreation Plan*; (2) condition 54, *Recreation Streamflow Information*. We do not recommend Forest Service's condition 44, *Special Status Species*.

In the following section, we make recommendations as to which environmental measures proposed by PG&E or recommended by agencies or other entities should be included in any license issued for the project. In addition to PG&E's proposed environmental measures, we recommend additional staff-recommended environmental measures to be included in any license issued for the project, and we describe these requirements in the draft license articles in appendix F.

#### 5.1.2.1 Measures Proposed by PG&E

Based on our environmental analysis of PG&E's proposal in section 3, and the costs presented in section 4, we conclude that the following environmental measures proposed by PG&E would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project. Our recommended modifications to PG&E's proposed measures are shown in *italic* text.

**General Measures**

- Consult annually with the Forest Service to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize staff with special-status species, noxious weeds, and sensitive areas known to occur within the project boundary on Forest Service land, and the procedures for reporting to each agency.

- Prepare and implement a Coordinated Operations Plan for the proposed Upper Drum-Spaulding, Lower Drum, and Deer Creek, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

**Geology and Soils**

- Implement an Erosion and Sediment Control Plan (filed April 11, 2014) and Canal Release Point Plan (filed April 11, 2014) to minimize and control project-related erosion; the plan would provide for project-wide implementation of best management practices (BMPs) to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and implementation of repair and restoration plans, as necessary.

- During winter to minimize potential adverse effects of high flows on channel morphology, bank stability, and aquatic and riparian habitat of the Bear River: limit operational flow releases from the Drum canal; implement ramping rates; and limit water spilled from the Drum canal to the upper Bear River through Bear Valley Meadow when the Drum afterbay is forecast to spill and the Dutch Flat no. 1 and no. 2 powerhouses are fully loaded.

- During facility outages that last more than 30 days: operate multiple spill gates from the Drum canal to more evenly distribute flows through Bear Valley Meadow; implement a 2-day ramping rate; and notify the appropriate agencies.

**Aquatic Resources**

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98. Implement extreme critically dry water year type flows in South Yuba River below Spaulding dam, North Fork of the North Fork American River below Lake Valley reservoir dam and below the Lake Valley diversion dam, when a critically dry year has been preceded by a critically dry or extreme critically dry year.

- To enhance aquatic habitat and protect resident aquatic species, provide the same or increased minimum streamflows to six project-affected reaches and provide new minimum streamflows to three project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 of this EIS as listed below.

| **Project-affected Reach** | **Table No. in Appendix A-2** |
|---|---|
| Fordyce Creek – below Fordyce Lake dam | 3-115 |
| South Yuba River – below Kidd Lake dam and Lower Peak Lake dam | 3-120 |
| South Yuba River – below Lake Spaulding dam | 3-121 |
| North Fork of the North Fork American River – below Lake Valley Reservoir dam | 3-126 |
| North Fork of the North Fork American River – below Lake Valley canal diversion dam | 3-129 |
| Bear River – at Highway 20 crossing | 3-133 |
| Bear River – below Drum afterbay | 3-140 |
| Canyon Creek – below Towle canal diversion dam | 3-136 |

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Little Bear River – below Alta powerhouse tailrace | 3-139 |

- Periodically set the low-level outlet at 16 remote project dams to provide the same or increased minimum streamflows in nine project reaches and new minimum streamflows in seven project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 of this EIS as listed below.

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Texas Creek – below Upper Rock Lake dam | 3-102 |
| Texas Creek – below Lower Rock Lake dam | 3-103 |
| Unnamed tributary – below Culbertson Lake dam | 3-104 |
| Lindsey Creek – below Middle Lindsey Lake dam | 3-105 |
| Lindsey Creek – below Lower Lindsey Lake dam | 3-106 |
| Lake Creek – below Feeley Lake dam | 3-107 |
| Lake Creek – below Carr Lake dam | 3-108 |
| Rucker Creek – below Blue Lake dam | 3-109 |
| Rucker Lake – below Rucker Lake dam | 3-110 |
| Unnamed tributary – below Fuller Lake dam | 3-111 |
| Unnamed tributary – below Meadow Lake dam | 3-112 |
| White Rock Creek – below White Rock diversion dam | 3-113 |
| Bloody Creek – below Lake Sterling dam | 3-114 |
| Unnamed tributary – below Kidd Lake dam | 3-118 |
| Cascade Creek – below Lower Peak Lake dam | 3-119 |
| Sixmile Creek – below Kelly Lake dam | 3-128 |

- Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Implement modified minimum streamflows in project canal-affected stream reaches during the first 30 days of canal outages, as shown in appendix A-2, table 3-181. For canal outages anticipated to extend past 30 days, consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage. Drum canal and Lower Drum Project's Bear River canal would not be taken out of service at the same time.

- Construct and operate two 1-cfs flow release devices near the existing spillway at the Drum canal to provide controllable minimum streamflows to the Bear River upstream of the Drum afterbay.

- To reduce the risk of stranding of aquatic resources below Lake Spaulding dam, adhere to Lake Spaulding spill cessation schedules and minimize flow fluctuations in the South Yuba River below Lake Spaulding, as shown in appendix A-2, table 3-182 and table 3-183.

- Provide additional summer flows to the South Yuba River below Lake Spaulding dam (Spaulding No. 1 and No. 2 Development) to manage water temperature for resident aquatic resources by implementing the Supplemental Flow Schedule as specified by Forest Service condition 32.

- Implement Forest Service/BLM Gaging Plan (filed April 11, 2014) to monitor compliance with minimum streamflow and other flow management measures. Design and install new or modify existing streamflow gages to measure new minimum streamflows, as shown in appendix A-2, table 3-188 consistent with Gaging Plan.

- Establish a Consultation Group to support implementation, review, and management of the South Yuba River supplemental flow releases below Lake Spaulding dam.

- Implement the Fish Protection and Management during Canal Outages Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Implement Fish Population Monitoring Plan (filed November 21, 2013) to assess effects of proposed flow modifications in project-affected stream reaches identified in plan.

- Implement Foothill Yellow-legged Frog Monitoring Plan (filed November 21, 2013) to assess effects of proposed flow modifications on populations in project-affected stream reaches identified in plan.

- Implement Forest Service/BLM Water Temperature and Stage Monitoring Plan (filed April 11, 2014) to assess effects of proposed flow modifications on water temperature management in project-affected stream reaches identified in plan.

- Implement Channel Morphology Monitoring Plan (filed November 21, 2013) to assess effects of proposed flow modifications on channel structure and stability in project-affected stream reaches identified in plan.

- Implement Forest Service/BLM Riparian Vegetation Monitoring Plan (filed April 11, 2014) to assess the effects of proposed flow modifications on diversity and persistence of riparian vegetation.

- Implement procedures to document and report incidental observations of western pond turtle during other monitoring surveys and operations consistent with Forest Service condition 51.

- Develop and implement an aquatic invasive species management and monitoring plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

- Develop and implement a Large Woody Debris (LWD) Management Plan that would monitor existing conditions and guide development of stream-reach and facility-specific management plans to pass LWD at project dams and diversions for protection and enhancement of downstream aquatic habitat.

**Terrestrial Resources**

- Implement the March 2013 Integrated Vegetation Management Plan on federal lands that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites *on all project lands* and includes control of non-native invasive species, provisions for special-status species, guidelines for pesticide use, and annual training, consultation, and reporting, *as modified to apply to all accessible project land*s *(particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance), require consultation with tribes to identify culturally significant plants, and protect culturally important species.*

- Monitor animal losses from drowning in project canals.

- Consult with California Fish and Wildlife, the Forest Service, and BLM when replacing wildlife escape and crossing facilities.

- Retrofit existing footbridges or construct new wildlife crossings on Drum and South Yuba canals, at specified locations, to minimize wildlife injury and mortality associated with movement across these project canals and *prepare a Wildlife Crossing Management Plan for the project that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting*.

- Record annually all incidental observations of bird collision/electrocutions along project powerlines and replace or retrofit problem power poles as appropriate. Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality. *Prepare an Avian Management Plan for the project, including provisions for raptor monitoring and protection, and LOPs planned for the protection of special-status birds and their habitat.*

- Implement the November 2013 bat management proposals, including provisions for monitoring and installing exclusion devices to minimize disturbance during project operation and maintenance. *Prepare a Bat Management Plan for the project.*

- Implement a Bald Eagle Management Plan (filed November 21, 2013) to protect eagle nesting from disturbance during project operations and maintenance, and project-related recreation activities.

**Threatened and Endangered Species**

- Implement the VELB provisions of the March 2013 Integrated Vegetation Management Plan, consistent with VELB conservation measures to avoid or minimize the loss of elderberry shrubs.

**Recreation Resources**

- Implement the September 2013 Recreation Plan (filed November 18, 2013) for upgrades, maintenance, and development of new project recreation facilities*, as modified with regard to the implementation schedule, trail development, campground upgrades, accessibility improvements, parking and road improvements, signage, water systems, maintenance, and recreation monitoring and to exclude provisions for campground hosts or added amenities at campground host sites, and enhancements to trails, trailheads, or trail facilities that do not serve a project purpose.*

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet for Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam (at Cisco Grove), South Yuba River below Lake Spaulding (at Lang's Crossing), and the Bear River at Highway 20, within one year of license issuance, *as modified to include 15-minute interval reporting of streamflow information for the four reaches (Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam [at Cisco Grove], South Yuba River below Lake Spaulding at Lang's Crossing, and the Bear River at Highway 20) where it is currently provided in 15-minute intervals and require submittal of the plan to the Commission for approval.*. Implement Water Temperature and Stage Monitoring Plan (filed April 11, 2014 and discussed under Aquatic Resources) that includes installing a monitoring station in the South Yuba River upstream of but as close as possible to Canyon Creek within 3 years that would monitor river stage hourly (15-minute interval readings that would be transmitted hourly) and would be available in real-time (hourly) to the public via the internet.

- To expand recreational whitewater boating opportunities and support Supplemental Flow releases downstream from Lake Spaulding to the South Yuba River, draw down Fordyce Lake beginning in late spring with an initially high target flow (250 to 450 cfs) until the lake reaches 29,000 acre-feet of remaining storage and then make equally apportioned releases throughout the rest of the year to reach an end-of-year storage of 7,500 to 10,000 acre-feet. Measure also supports coldwater pool management in Lake Spaulding for Supplemental Flow releases downstream from Lake Spaulding to the South Yuba River,

- Maintain flows in Fordyce Creek at 50 cfs for 10-day period beginning about the third week of August to enhance stream crossing for OHV event.

- Pay up to a maximum of $15,000 per year to the California Fish and Wildlife for fish stocking in Lake Spaulding to support recreational angling, provided such stocking is performed (Measure DS-AQR3).

**Cultural Resources**

- Implement the HPMP (filed September 23, 2013) upon license issuance to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register.

**Land Use and Aesthetic Resources**

- Revise project boundaries to reflect separation of proposed Upper Drum-Spaulding Project from the existing Drum-Spaulding Project.

- Implement the Transportation Management Plan (filed August 29, 2012) to ensure that project roads are adequately maintained.

- Implement the Fire Prevention and Response Plan (filed November 21, 2013) on federal project lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project, *as revised to include all project lands and to include a period of review and revision.*

- Implement the Visual Resource Management Plan (filed June 18, 2012) on federal lands to protect visual and aesthetic resources on and adjacent to project lands.

- Revise the project boundary to remove the Jordan Creek diversion and conveyance system and to include certain primary project roads, and new and rehabilitated recreation facilities after the facilities are decommissioned at the proposed Drum-Spaulding Project.

- Develop and implement a Hazardous Substances Plan for Oil and Hazardous Substances Storage and Spill Prevention and Cleanup, *as revised to include all project lands*.

#### 5.1.2.2 Additional Measures Recommended by Staff

In addition to PG&E's proposed measures listed above (and modified as indicated), we recommend the following staff-recommended measures in any license that may be issued for the Upper Drum-Spaulding Project:

- Develop and implement a Bear River Management Plan to assess riparian vegetation and bank stability conditions in the Bear River above the Drum afterbay on Forest Service lands that may be affected by high-flow pulses during winter spills from Drum canal. As part of the plan, provide baseline and long-term monitoring of riparian vegetation, erosion and bank stability, and fixed geomorphic baseline channel transects.

- Consistent with Forest Service 10(a) recommendation 7, conduct a channel morphology and riparian vegetation assessment in the vicinity of Bear Valley, including Bear Valley Meadow, to establish baseline conditions and determine the need for remedial measures.

- Develop and implement Jordan Creek diversion decommissioning plan for the proposed removal of water diversion and transport structures that have not been used for project operations for many years.

- Develop in consultation with the agencies and implement aquatic benthic macroinvertebrate monitoring plan to assess the effects of the proposed flow modifications on food resources for resident fish in selected project-affected stream reaches. Identify stream reaches and sites to be monitored where new streamflow conditions would likely have the greatest effect on aquatic habitat and water quality.

- Develop and implement a Fish Stocking Plan that addresses annual stocking in Lake Spaulding, , Lake Valley reservoir, Fuller Lake, and Lower Lindsey Lake; stocking every other year until the first Form 80 reporting year in Fordyce Lake and Meadow Lake, and includes provisions for stocking fish in additional project reservoirs (Carr, Culbertson, Feeley, Upper Lindsey, Lower Rock, Upper Rock, Blue and White Rock Lakes, and Lake Sterling) based on monitoring of recreational use and angling pressure over the term of the new license (replaces PG&E's proposal to pay for fish stocking).

Below, we discuss our rationale for some of the key proposed and additional staff-recommended measures.

*Minimum Streamflows*

To protect and enhance aquatic resources, PG&E, the Forest Service, BLM, and California Fish and Wildlife have agreed on minimum streamflows for all project-affected reaches. These flows would generally be the same or higher than under the existing license and, in some cases, higher than estimated unregulated streamflows during the dry summer period. Many of these project-affected stream reaches have no minimum streamflow requirement under the existing license.

The proposed minimum streamflows vary depending on six water year types from extreme critical dry to wet based on California DWR Bulletin 120. These flows, particularly in larger stream reaches with higher base flows, would create seasonal and interannual flow variability more typical of natural unregulated streams. Extensive analysis by PG&E of the relationship of habitat and flow in these reaches supports the finding that the proposed higher minimum streamflows and increased flow variability would protect and enhance aquatic habitat for resident species by increasing habitat, maintaining stream channel geometry, vegetative structure, and gravel or woody debris movement, initiating spawning or upstream and downstream fish migration, and providing rearing habitat in off-channel, floodplain, or side channel areas. We estimate that the annualized cost to deliver the proposed minimum streamflows would be $2,778,000 with an additional $8,000 annual cost to determine and implement flows based on water year types. We recommend adopting these flow measures because the substantial benefits to fish habitat are worth the cost.

PG&E also proposed two methods for demonstrating compliance with its proposed minimum streamflows depending on the location and accessibility of the dam and the flow control structure. At dams where winter access is not an issue, compliance would be measured by the continuous, instantaneous record from designated existing, modified, or new stream gages maintained and operated consistent with USGS protocols. However, at specified remote locations, particularly where safety is an issue for winter access, compliance with minimum streamflows would be ensured by periodically setting the dam outlet structure to provide the required minimum streamflow. Given the safety constraints, we conclude that this is a reasonable approach for determining compliance with minimum flow requirements. We estimate that the annualized cost to implement these two streamflow compliance measures would be $302,000. We recommend these proposed compliance measures, because they would be an effective mechanism to demonstrate compliance with proposed minimum streamflows at a reasonable cost.

*Spill Cessation and Minimization of Flow Fluctuations in the South Yuba River*

Rapid reductions in flow following a spill event can adversely affect aquatic resources in downstream reaches, particularly life stages that are immobile or have limited mobility. PG&E proposed a schedule for more gradual rate of flow reduction following spills to the South Yuba River from Lake Spaulding dam from May through September. This schedule was also recommended by Forest Service and California Fish and Wildlife. The proposal would establish a two-step schedule for flow reduction: first when flows are greater than 250 cfs following a spill for recreational whitewater boating opportunities; and second when flows are between 250 cfs and the specified minimum streamflow to benefit aquatic resources. The schedule would reduce streamflows from the end of the spill to the specified minimum streamflow over 2-6 days at the higher flow schedule and up to 21 days at the lower flow schedule. In addition, PG&E would make a good faith effort to not make releases from Lake Spaulding dam that result in short-term, high-flow fluctuations; that is, no streamflow increase of 100 percent or greater in the South Yuba River during a 12-hour period.

PG&E's proposed spill cessation measures would minimize the rapid fluctuations in flow associated with the end of spill events at Lake Spaulding dam, which would reduce the likelihood of stranding of aquatic organisms. We recommend adopting this measure because it would result in flow reductions following spill events that mimic the natural recession from high flows and provide a substantial benefit to fish and aquatic habitat at a reasonable annual cost of $53,000.

*Canal Outages*

In certain situations, flows released from project canals to stream reaches provide minimum instream flows for protection of aquatic resources. When these canals are taken out of service during planned maintenance or during unplanned emergencies, the canals drain and become dry. In these instances, flow releases from the canals to the stream reaches are interrupted and flow in the stream

reaches downstream of the canal are maintained only by inflow, which at some locations could be reduced to no flow during some months.

PG&E identified project-affected stream reaches where its ability to deliver minimum streamflows could be affected during maintenance and emergency outages of project canals, conduits, and flumes. During canal outages, PG&E proposes to meet the required minimum flow for that month and water year, or the natural inflow, whichever is less. The Forest Service, BLM, and California Fish and Wildlife recommend PG&E's proposal. NMFS did not address flows during canal outages. PG&E proposes to notify all licensing participants at the annual consultation meeting of the past year unplanned and future year planned canal outages, and also propose to notify and consult with licensing participants if a canal outage is anticipated to extend beyond 30 days. The resource agencies recommend these same procedural measures for canal outages.

PG&E proposes and BLM, Forest Service, and California Fish and Wildlife recommend implementation of a plan to protect fish residing in project canals when a canal is drained during a planned, unplanned, or emergency outage. PG&E filed (August 30 2012) a Fish Protection and Management during Canal Outages Plan that identifies the canals, locations and procedures for fish collection and rescue, and procedures for notifying the resource agencies. The plan would be implemented within the first year following issuance of the license for the Upper Drum-Spaulding Project. We estimate that the annualized cost of this plan would be $30,000. We recommend adopting this measure because it would reduce fish mortality associated with canal outages during planned maintenance and during unplanned emergencies at a reasonable cost.

*Fordyce Lake Drawdown*

PG&E proposes a schedule for drawdown of Fordyce Lake beginning in the spring once spills at Fordyce Lake and Lake Spaulding have ceased in order to sustain higher flows in Fordyce Creek during spring and early summer. This measure is also specified by the Forest Service and recommended by California Fish and Wildlife. This measure is proposed primarily to enhance recreational whitewater boating opportunities, but also benefits resident trout populations in Fordyce Creek below Fordyce Lake dam and management of the coldwater in Lake Spaulding to support the Forest Service Supplemental Flows condition for South Yuba River below Spaulding dam. Depending on available storage in Fordyce Lake, this measure would result in a gradual reduction in flows in Fordyce Creek below Lake Fordyce dam from high spring flows to the minimum streamflow specified for the month and water year type. After spills from Fordyce Lake and Lake Spaulding cease in the spring, flows in Fordyce Creek would be maintained between 475 cfs and 250 cfs until storage in Fordyce Lake reaches about 59 percent (29,000 acre-feet) of maximum storage. The next 19,000-21,500 acre-feet of storage would be equally apportioned through the end of the year, leaving 7,500-10,000 acre-feet of carryover to meet winter minimum streamflows. At the end of the third week of August, flows in Fordyce Creek would be held at about 50 cfs for a 10-day period to accommodate an annual OHV recreational event.

PG&E's proposal would result in a Fordyce Lake drawdown earlier in the year than under the existing license. However, this would augment the coldwater pool downstream in Lake Spaulding necessary to support supplemental flow measures for water temperature management in South Yuba River below Lake Spaulding dam. We recommend adopting this measure because it would provide a substantial benefit to fish habitat and recreation at a reasonable annual cost of $5,000.

*South Yuba River Supplemental Flows*

PG&E's studies and hydrologic and habitat modeling provided extensive information related to the relationship between flow and water temperature in the South Yuba River between Lake Spaulding dam and Englebright reservoir. The South Yuba River below Lake Spaulding provides coldwater habitat

for populations of resident rainbow trout and brown trout and provides recreational angling opportunities. Breeding populations of foothill yellow-legged frog have also been found in this reach. The State Water Board classifies South Yuba River above Englebright reservoir as coldwater habitat and lists this stream reach as impaired where water temperatures frequently exceed 20°C during summer. Forest Service (2012) indicates that it is not realistic to maintain water temperatures below 20°C in South Yuba River for the entire reach from Spaulding dam to Englebright reservoir, but has proposed the Supplemental Flow condition to increase the longitudinal distribution of suitable rainbow trout habitat while protecting the existing foothill yellow-legged frog populations.

Under current project operations, elevated water temperatures in some reaches, particularly during hot dry years, can be stressful to resident rainbow trout, but higher flows and associated lower water temperatures can be stressful to other components of the aquatic community, including the foothill yellow-legged frog. Optimum temperatures for breeding and development of foothill yellow-legged frogs are at the upper end of the range of temperatures that are suitable to rainbow trout. Thus, cooler summer water temperatures in some streams that benefit trout may inhibit development of foothill yellow-legged frog eggs and tadpoles. Minimum flows proposed by PG&E (and specified by the Forest Service) would increase flow and reduce temperatures, particularly between Lake Spaulding dam (RM 41.1) and the confluence of Canyon Creek (RM 32.5); however, during drier water years, some augmentation of flows during the summer could provide additional enhancement for rainbow trout aquatic habitat.

Forest Service condition 34 includes a Supplemental Flow measure to manage water temperatures in the 8.5-mile reach of South Yuba River between Lake Spaulding dam and Canyon Creek. Based on PG&E's water temperature modeling, Forest Service predicts that this measure in combination with new minimum streamflows would provide 8 miles of thermally suitable habitat for cold water species, including rainbow trout, in all water year types (except extreme critical), while minimizing effects on foothill yellow-legged frogs. PG&E agrees to and recommends implementation of the Supplemental Flow measure.

California Fish and Wildlife (recommendation 2.9) and Foothills Water Network also recommend a Block Flow measure to manage water temperatures over a longer reach of South Yuba River. They recommend allocation of up to 2,500 acre-feet of water (Block Flows) each year for management of water temperature in the South Yuba River between Lake Spaulding dam and Canyon Creek (RM 32.4). They indicate that one objective of the Block Flow measure would be to extend optimum rainbow trout habitat farther downstream to areas that are more accessible to anglers by reducing water temperatures in the 4.4-mile-long reach between Canyon Creek and Poorman Creek.

The objective of the Forest Service Supplemental Flow condition for South Yuba River is to maintain water temperatures above Canyon Creek at 20°C or less. California Fish and Wildlife's Block Flow management objective is to achieve 19°C or cooler above Canyon Creek. The reach of the South Yuba River downstream of Canyon Creek is also affected by inflows from the Yuba-Bear Project Bowman Development upstream on Canyon Creek. As a consequence of these inflows and non-project withdrawals downstream of Canyon Creek, PG&E cannot fully control temperatures in South Yuba River downstream of Canyon Creek. Thus, California Fish and Wildlife's ultimate management goal of maintaining water temperatures at less than 20°C above the confluence of Poorman Creek is not included as part of their recommendation for the Upper Drum-Spaulding Project license. To achieve California Fish and Wildlife's management objective of 19°C at Canyon Creek, temperatures in foothill yellow-legged frog habitat identified between Lake Spaulding and Canyon Creek would be substantially less than 17°C. As noted above, these colder summer water temperatures would likely have an adverse effect on development of foothill yellow-legged frog eggs and tadpoles in the South Yuba River above Canyon Creek.

Given the potential of the higher flows proposed in California Fish and Wildlife's Block Flow proposal to adversely affect foothill yellow-legged frog, a Forest Service special-status species and California species of special concern, we conclude that implementation of the Forest Service's Supplemental Flow schedule would better protect and enhance the aquatic community as a whole, including populations of both resident trout and foothill yellow-legged frog, in the affected stream reach. Implementation of the Block Flow recommendation could require flow increases as frequently as 8-hour intervals, particularly during warm periods which could result in pulses of increased flow followed by decreased flows when temperatures stabilize at the temperature management objective of 19°C that could also harm foothill yellow-legged frogs.

PG&E estimates that the cost to implement the Forest Service Supplemental Flow condition would average $149,000 per year over the life of a 30-year license while the California Fish and Wildlife Block Flow condition would cost an additional $164,000 per year. Because the Supplemental Flow condition would better balance the habitat requirements for resident rainbow trout and foothill yellow-legged frog populations and would have less than half the cost to implement, we do not recommend the Block Flow recommendation of California Fish and Wildlife and Foothills Water Network. Instead, we recommend the Forest Service Supplemental Flow schedule which we find to be easier and more efficient to implement on an operational basis. Implementation of the Forest Service's Supplemental Flow condition in conjunction with aquatic monitoring proposed for this reach (Fish Population Monitoring, Foothill Yellow-legged Frog Monitoring, and Water Temperature and Stage Monitoring) would provide data adequate to assess the benefits of these additional flows over a multiple year timeframe and evaluate if further flow adjustments would be necessary.

*Aquatic Invasive Species Management Plan*

The Forest Service (condition 37) specifies and California Fish and Wildlife (recommendation 6) recommends that PG&E prepare and implement an aquatic invasive species management and monitoring plan. These agencies identify the types of information that should be included in the plan. PG&E concurs with the Forest Service condition. In general, the condition includes prevention and educational measures, monitoring, contingency measures if invasive species are found in project waters, and provisions for modification of the plan if more-effective control measures are developed in the future. We believe this plan would limit the spread of aquatic invasive species within project-affected reaches and other reaches further downstream. We recommend that PG&E develop an aquatic invasive species management and monitoring plan consistent with Forest Service condition 37. PG&E would submit the plan to the Commission within 1 year of license issuance and implement the plan upon Commission approval. The estimated annualized cost for implementation of PG&E's plan is about $17,000. This would be a reasonable cost to the project and would provide protection from aquatic invasive species within the project boundary.

*Monitoring Program*

As discussed in section 3.3.2.2, proposed increases in minimum flows, supplemental flows, and management of spill cessation flows could affect habitat for resident fish species and the foothill yellow-legged frogs resulting from changes in habitat suitability, water temperature, aquatic and riparian vegetation, and channel morphology. Forest Service (condition 51) specifies implementation of a Monitoring Program comprised of individual monitoring plans for fish populations, foothill yellow-legged frog, western pond turtle, aquatic benthic macroinvertebrates, water temperature and stage, channel morphology, and riparian vegetation. On November 21, 2013, Forest Service filed the following monitoring plans agreed to by PG&E: (1) Fish Population Monitoring Plan; (2) Foothill Yellow-legged Frog Monitoring Plan; and (3) Channel Morphology Monitoring Plan. The agreed to Water Temperature and Stage Monitoring Plan and Riparian Vegetation Monitoring Plan were filed on April 11, 2014. A

monitoring plan for aquatic benthic macroinvertebrates would be developed after consultation with the agencies within 1 year of license issuance and implemented upon Commission approval. Incidental observations of western pond turtle would be documented and reported annually. The proposed monitoring plans would assess the effects of new license conditions on the distribution, abundance, and conditions of aquatic resources in selected stream reaches that are most likely to be affected by those new license conditions. Water temperature, water stage, and stream channel morphology would be monitored to evaluate the effects of the license conditions on aquatic habitat.

California Fish and Wildlife (recommendation 8) recommends a more comprehensive monitoring program covering multiple project-affected resources including monitoring of aquatic species, non-native invasive species, sensitive plants, recreation resources, cultural resources, wildlife crossing placement and effectiveness and sensitive raptors. Monitoring for recreation resources, cultural resources, wildlife crossing placement and effectiveness, and sensitive raptors are included within the analysis of those specific resources.

PG&E proposes to implement the Monitoring Plans filed with the Commission in November 2013 and April 2014 in conjunction with Forest Service condition 51.

**Fish Population Monitoring Plan**

The Fish Population Monitoring Plan filed with the Commission November 21, 2013 by Forest Service and PG&E identifies the specific sampling methods (electrofishing and snorkel observation), frequency, and stream reaches that would be sampled. PG&E indicates (May 12, 2014) that it is prepared to implement the filed plan. The plan describes qualitative and quantitative levels (Level I and Level II, respectively) of sampling intensity depending on the stream reach. The purpose of Level I would be to determine presence/absence and individual fish length and weight; Level II would provide data for fish population estimates. Fourteen stream reaches where winter compliance with minimum streamflows would be through flow setting in early November would be sampled using Level I during summer or fall following any year when the minimum flow setting could not be met. An additional 9 stream reaches would be sampled quantitatively including sites on Trap Creek, Fall Creek, Fordyce Creek, Bear River in Bear Valley and below Drum afterbay, the North Fork of the North Fork American River below Lake Valley reservoir dam, and 3 reaches of South Yuba River between Fall and Canyon Creeks, between Canyon and Poorman Creeks and between Poorman and Humbug Creeks. Quantitative sampling in these reaches (except between Fall and Canyon Creeks) would be sampled during late September/early October in years 3, 4, 9, 10, 14, 15, 19, 20, 24, and 25 of the license and assumes that sampling after year 25 would be part of the next relicensing process. The South Yuba River between Fall and Canyon Creeks also provides habitat for foothill yellow-legged frog and would be particularly affected by recommended new minimum streamflow, spill cessation, and supplemental flow conditions below Spaulding dam. This stream reach would be sampled during years 1-10, then years 14, 15, 19, 20, 24, and 25 of the license. Information on physical and chemical habitat conditions would be recorded during each sampling event.

The plan provides specific direction for types of habitat to sample, data recording, and data analyses including age structure, population size and biomass, and fish size and condition. PG&E would provide a draft monitoring for a 45-day written comment period. Copies of the draft report would be provided to the Forest Service, BLM, California Fish and Wildlife, and California Water Board and any other parties who submit a written request for a copy of the draft report. PG&E would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If PG&E does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. PG&E would file the final monitoring report with the Commission.

We recommend implementation of the Fish Population Monitoring Plan and estimate that it would cost about an average of $273,000 per year to implement. The information generated by the Fish Population Monitoring Plan would be valuable and necessary to assess the effects of the various flow conditions in the new license on fish resources in project-affected reaches and worth the estimated cost to implement.

**Foothill Yellow-legged Frog Monitoring Plan**

The Foothill Yellow-legged Frog Monitoring Plan filed with the Commission November 21, 2013 by the Forest Service identifies the specific sampling methods, frequency, and stream reaches that would be sampled. Seven stream reaches are identified for sampling including 4 in South Yuba River including 2 above Canyon Creek, Bear River below Drum afterbay, Canyon Creek below Towle canal diversion dam, and North Fork of the North Fork American River below Lake Valley diversion dam. As appropriate, sampling locations would be co-located with fish sampling sites. The South Yuba River at Fall Creek would be sampled 3 times during the first 5 years of the license then years 9, 10, 14, 15, 19, 20, 23, 24, and 25. South Yuba River at Canyon Creek would be sampled in years 1-10, 14, 15, 19, 20, 23, 24, and 25. All other sites would be sampled during 3 of the first 5 years, then in years 14, 15, 24, and 25. During the first 5 years PG&E would attempt to sample once during a wet or above normal year, during a below normal year, and during a dry, critically dry or extreme critically dry year.

The plan describes field methods for observation, photo documentation, and data recording. Three survey visits would be conducted at each site during a year when monitoring occurs. Two visits in the spring/early summer for the detection of eggs and early tadpoles, and one in the late summer/early fall to detect older tadpoles and recently metamorphosed frogs. To ensure that the survey schedule coincides with the FYLF breeding season in stream reaches where surveys would occur, stream temperatures would be monitored at selected locations prior to the anticipated commencement of surveys. The first spring survey visit would occur after water temperature reach 10ºC and there is a corresponding reduction in spring high flows. On Towle Canal Diversion Dam Reach and Lake Valley Canal Diversion Dam Reach where foothill yellow-legged frogs were not collected during relicensing studies, two visits in the spring/early summer would occur; if evidence of foothill yellow-legged frog breeding is found, a third survey would occur in late summer/early fall. At the end of the first 10 years of monitoring, the results would be reviewed by Forest Service, California Fish and Wildlife, California Water Board, and PG&E to determine whether the monitoring schedule or monitoring locations should be modified for years 11 through the end of the license.

The plan describes data recording and analyses and specifically requires PG&E to analyze the relationship between streamflows in the South Yuba River downstream of Lake Spaulding dam and foothill yellow-legged frog abundance at survey sites. Results would be summarized after each sampling season to compare foothill yellow-legged frog abundance and life stage timing for each year in which monitoring occurs. Data would be provided to agencies and other interested parties. PG&E would provide a draft monitoring report to the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other parties who submit a written request for a copy of the draft report for a 45-day written comment period. PG&E would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If PG&E does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. PG&E would file the final monitoring report with the Commission.

PG&E agrees (May 12, 2014) to implement the Foothill Yellow-legged Frog Monitoring Plan filed by Forest Service (November 21, 2013) and we estimate the cost for implementation to be about an average of $62,000 per year. We recommend implementation of the plan. The information generated by the Foothill Yellow-legged Frog Monitoring Plan would be valuable and necessary to assess the effects of

the various flow conditions in the new license on existing populations of this frog in project-affected reaches and worth the estimated cost to implement.

**Western Pond Turtle Incidental Observations**

Forest Service condition 51 requires PG&E to record and report incidental observations for western pond turtles during all monitoring work. A written report would be compiled annually and provided at the Annual Consultation meeting. PG&E has agreed to implement this measure.

Specific surveys for western pond turtle are not necessary because it is unlikely that this species would be affected by project O&M activities. Nesting and hatching success, key factors affecting the success of populations of western pond turtle that occur in terrestrial habitat, are not affected by changes in project flows and riparian habitat. In addition, effective survey methods for identification of nesting sites have not been developed and focused surveys for western pond turtle in the project boundary are not likely to provide any more detailed data than PG&E's recording of incidental observations. We recommend implementation of the incidental observation and recording of western pond turtle described in Forest Service condition 51 and consider the estimated cost of about $2,000 annually to be worth the additional information provided on distribution and abundance of this sensitive species.

**Channel Morphology Monitoring Plan**

The Channel Morphology Monitoring Plan filed with the Commission November 21, 2013 by Forest Service and PG&E identifies the specific sampling methods and frequency. Monitoring would occur at two stream reaches that would be affected by flow changes under the proposed new license conditions. Monitoring would occur in Fordyce Creek below Lake Fordyce dam that would be affected by new minimum streamflows and higher flows during the Lake Fordyce drawdown and in South Yuba River above the confluence of Canyon Creek, affected by new minimum streamflows, spill cessation, and supplemental flows for water temperature management. To the extent possible, the sites would be located where channel morphology or instream flow sampling occurred during PG&E's relicensing studies. The sites would be co-located with riparian vegetation monitoring sites and would be selected in coordination with Forest Service, BLM, California Fish and Wildlife, and California Water Board.

Monitoring at each site during the first full year after license issuance would establish permanent cross-sections and collect baseline data on channel structure and morphology for comparison with subsequent monitoring in order to assess channel stability. During the next nine years, PG&E would monitor each site up to three years in which spill events occur. After Year 10, monitor once at each site following spring runoff after each larger flood event (25 year recurrence flow and greater). PG&E would monitor at least once during every 10-year period of the license even if no large flow events occur within that 10-year period.

The plan describes the data to be collected at each cross-section monitoring site including the entire alluvial valley and specific channel structure and components Other data include pebble counts, scaled site and facies maps, residual pool depth, bank erosion, channel stability, fine particles in spawning gravel beds, and photo documentation. The plan establishes guidelines for data entry and analyses. The effects on the stream channel from large flood events evaluated relative to conditions under normal operations. The analyses for each site would evaluate changes in cross section, channel location and orientation, substrate, channel or bank stability, pool depth, fine material in spawning-sized gravel, or other pertinent project-related factors that affect the site.

PG&E would provide a draft monitoring report to the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other parties who submit a written request for a copy of the draft report for a 45-day written comment period. PG&E would issue a final monitoring report incorporating

revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If PG&E does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. PG&E would file the final monitoring report with the Commission.

PG&E has agreed (May 12, 2014) to implement the Channel Morphology Monitoring Plan. We recommend implementation of the plan and estimate the average annual cost to implement at about $42,000. The information generated under the plan would be used to assess the effects of increased flows under the new license on channel structure and stability and associated aquatic habitat in the selected project-affected reaches.

**Riparian Vegetation Monitoring Plan**

The Riparian Vegetation Monitoring Plan filed with the Commission April 11, 2014 by Forest Service, BLM, and PG&E identifies the specific sampling methods and frequency. Monitoring would occur at three stream reaches that would be affected by flow changes under the proposed new license conditions. Monitoring would occur in Fordyce Creek below Lake Fordyce dam that would be affected by new minimum streamflows and higher flows during the Lake Fordyce drawdown, in South Yuba River above the confluence of Canyon Creek, affected by new minimum streamflows, spill cessation, and supplemental flows for water temperature management, and in North Fork of the North Fork American River below Lake Valley reservoir. To the extent possible, the sites would be located where channel morphology or instream flow sampling occurred during PG&E's relicensing studies and would be co-located with monitoring cross-sections established for the Channel Morphology Monitoring Plan. The sites would be selected in coordination with Forest Service, BLM, California Fish and Wildlife, and California Water Board.

Monitoring at each site during the first full year after license issuance would establish permanent cross-sections and collect baseline data on diversity and density of riparian herbaceous and woody vegetation for comparison with subsequent monitoring in order to assess persistence and changes in vegetation. PG&E would monitor each during years 5 and 10 of the new license and one additional year during the first 10 years of the license following a spill event. The plan defines the flow conditions that would constitute a spill event for each stream reach.

The analyses for each site would identify significant (20 percent) changes in non-native species, changes in lateral distribution, abundance, and richness of woody vegetation. The focus of riparian vegetation monitoring is to track woody riparian vegetation recruitment and establishment over time since an important component of riparian plant community health is successful reproduction of the native plants within that plant community. Other observations, such as premature leaf drop, insect infestation, trampling from animals or people, and disease, which may or may not be related to the project, would also be documented and reported. During each monitoring period, the hydrology, climate, and other environmental factors that may affect the trends in riparian resource condition, (upward or downward) since the previous sampling period would be assessed. Climate trends would also be evaluated, such as distribution of particularly wet or dry years and particularly hot and cold years in between sampling periods. Other activities or changes in the magnitude of activities within the watersheds, such as recreation and fire would also be assessed. Other trends also would be evaluated, such as the distribution of high and non-spill years in between sampling periods.

In addition to the data analysis, an observational description would be developed to illustrate the general state of the riparian community. The description would be inclusive of the data captured in the vegetation transects (i.e. richness and abundance), but would also focus on factors considered in riparian assessments, including the lateral and horizontal distribution of plant groups, diversity in age of native woody riparian species, presence or absence of nonnative invasive or special-status plants, bank

protection (e.g. tree roots or sod-forming herbaceous plants), and the general vigor of the plants in the riparian plant community. Any additional factors contributing to the condition of the riparian plant community (e.g. impacts from recreational users or sediment from an upslope fire) would be included in the description.

PG&E has agreed (May 12, 2014) to implement the Forest Service/BLM Riparian Vegetation Monitoring Plan. The information generated under the plan would be used to assess the effects of increased flows under the new license on vegetation and bank stability and associated aquatic habitat in the selected project-affected reaches. We recommend implementation of the plan and estimate the average annual cost to implement at about $30,000.

**Aquatic Benthic Macroinvertebrate Monitoring**

PG&E's alternative (December 20, 2013) to Forest Service monitoring conditions for benthic macroinvertebrates is generally consistent with the Forest Service's proposed framework but are more limited in location, frequency, and season. PG&E's alternative benthic macroinvertebrate monitoring plan would survey the same stream reaches proposed by Forest Service (3 sites on South Yuba River, 1 site on Fordyce Creek, and 2 sites on North Fork of the North Fork American River), but only in conjunction with the fish population surveys and at fewer sampling locations within each reach. PG&E proposes to monitor aquatic benthic macroinvertebrate populations only through the tenth year following license issuance while Forest Service proposes to continue monitoring after year 10 during each year that fish monitoring surveys occur. Forest Service and PG&E have not agreed on details of a final plan. Consequently, Forest Service condition 51 requires PG&E to develop an Aquatic Benthic Macroinvertebrate Monitoring Plan after consultation with the agencies within 1 year of license issuance. The plan would describe the sampling locations, methods, frequency, data recording, analyses, and reporting. The plan would be filed with the Commission and implemented upon Commission approval.

Following each sampling year PG&E would provide a draft annual monitoring report for aquatic benthic macroinvertebrates to the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other parties who submit a written request for a copy of the draft report for a 45-day written comment period. PG&E would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If PG&E does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. PG&E would file the final monitoring report with the Commission.

PG&E has agreed (May 12, 2014) to develop, after consultation with the agencies, an Aquatic Benthic Macroinvertebrate Monitoring Plan for the Upper Drum-Spaulding Project. We recommend that PG&E develop an Aquatic Benthic Macroinvertebrate Monitoring Plan after consultation with Forest Service and other agencies for implementation within 1 year of license issuance consistent with Forest Service condition 51. We estimate the average annual cost to implement this plan at about $39,000. The information related to the response of the benthic macroinvertebrate community, which is a major food source for resident rainbow trout to flow modifications in project-affected reaches would be worth the cost for implementation.

**Water Temperature and Stage Monitoring**

The Water Temperature and Stage Monitoring Plan filed with the Commission April 11, 2014 by Forest Service and PG&E identifies the specific sampling locations, methods, and frequency. The plan identifies the following monitoring sites: Fordyce Creek at RM 6.2 in years of fish population surveys; South Yuba River at Lang's Crossing (RM 40) (annually), vicinity of Fall Creek (RM 35.7) (annually), upstream of Canyon Creek confluence (RM 32.5) (annually), downstream of Canyon Creek (RM 32.3) (annually), upstream of Poorman Creek (RM 28.1) (annually), upstream of Humbug Creek one year for

each water year type and then in years of fish population and foothill yellow-legged frog surveys, and upstream of Purdon Creek one year for each water year type; Bear River below Drum afterbay; and North Fork of the North Fork American River in the vicinity of RM 10 and RM 0.3. Bear River and North Fork of the North Fork American River would be sampled only during years of fish population and foothill yellow-legged frog surveys. Monitoring would be year round at the 5 locations in South Yuba River upstream of Poorman Creek (RM 28.1). Monitoring at all other locations would occur between April 1 and November. .

PG&E would provide a draft annual report for water temperature and stage monitoring to the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other parties who request a copy. PG&E would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If PG&E does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. PG&E would file the final monitoring report with the Commission.

Implementation of proposed minimum streamflows, Supplemental Flows in the South Yuba River, spill cessation schedules, and Lake Fordyce drawdown have been proposed in part to maintain cooler water temperatures to benefit aquatic resources in the affected reaches. Implementation of the Water Temperature and Stage Monitoring Plan in conjunction with the other plans discussed above would provide information about the response of aquatic habitat and aquatic resources within the project boundary to changes in instream flows and project operations included in the new license and would further facilitate evaluation of the effects of flow and operational changes in the new project license. We estimate the average annual cost for implementation of this plan would be $76,000 and we conclude that the information about the condition of aquatic resources and habitat generated by these programs would be worth this cost.

*LWD Management Plan*

LWD currently passes over small high elevation dams and diversion dams during periods of high flow. At larger project dams (e.g., Lake Spaulding dam), LWD is collected periodically and stockpiled for burning or disposal. Forest Service condition 52 specifies and California Fish and Wildlife recommends a project-wide LWD management program, including survey of locations and quantity of LWD collected and identification of appropriate locations downstream of project dams for reintroduction of LWD for mobilization during 2- and 5-year flow events. PG&E has agreed to develop, after consultation with the agencies, and implement an LWD management plan that meets these specifications.

NMFS and FWS recommend development of a specific LWD management plan for future implementation to enhance habitat for eventual reintroduction of spring-run Chinook salmon and Central Valley steelhead in the South Yuba River below Lake Spaulding dam. NMFS also recommends an interim measure for passage of LWD at Lake Spaulding dam beginning at license issuance until a LWD management plan can be developed and implemented when reintroduction occurs.

Available information suggests that some existing habitat conditions associated with LWD would likely support anadromous salmonids. PG&E's studies indicated that the amount of LWD observed in project-affected stream reaches is less than observed in other Sierra Nevada streams and is frequently not immersed within the stream channel (section 3.3.2.2, *Aquatic Resources, Environmental Effects*). Studies in the central Sierra Nevada region outside the project area reported that LWD is typically stable with little movement and played a limited role in aquatic habitat formation and cover. PG&E reported that the volume of LWD transported to and removed from project reservoirs is also relatively low and that LWD passes over most project dams and diversion dams (if it is not captured by log booms) during periods of high flow.

We recommend the development and implementation of an LWD management plan that includes the criteria defined in California Fish and Wildlife's recommendation 9, and Forest Service condition 52. The combination of these measures identifies specific locations for LWD management, and describes the extent and frequency of surveys to assess the effectiveness of LWD mobilization and dispersal in the downstream reaches. LWD contributes to productive aquatic ecosystems and is an important component in the formation of complex aquatic habitat units and channel maintenance in some systems. PG&E has agreed to develop this plan after consultation with the agencies. We recommend adopting this measure because additional LWD surveys would identify stream reaches that require LWD management and could provide a substantial benefit to fish habitat at a reasonable annual cost of $58,000.

Finally, we do not recommend implementation of the interim LWD measure proposed by NMFS for introduction of LWD into the South Yuba River below Lake Spaulding dam. The LWD management plan that we recommend above would require an LWD survey that would provide information for developing LWD management plans that would be implemented for specific stream reaches, as appropriate. This information would be used to evaluate the need for introduction and quantity of LWD in project-affected stream reaches and is more appropriate to the existing aquatic resources in the South Yuba River.

*Bear River Management*

Under current project operations of the Drum canal, occasional high flows that are released from the canals, particularly during winter operations and outages of Drum canal or Drum no. 1 and no. 2 powerhouses, could affect the condition of the stream channel and riparian habitat of the Bear River between the canal release points and Drum afterbay. However, PG&E and PCWA submitted qualitative information including a 70-year historical aerial photographic record that indicates that spill operations at the Drum and South Yuba canals have not had the expected adverse effects on aquatic and riparian habitat in the upper Bear River above Drum afterbay and that the location of the Bear River channel in this reach is stable and relatively unchanged over the past 70 years. These data also suggest that aquatic and riparian impacts in this stream reach may be associated, at least in part, with historical non-project land uses. Despite these data, PG&E proposed to perform a qualitative assessment of sustained flows above 350 cfs to provide information regarding potential impacts to channel morphology and riparian vegetation and inform the development of protection and mitigation measures. PG&E also proposed interim measures for management of spill flows, reducing the magnitude of spills and more evenly distributing the spills over and longer reach of the Bear River to further reduce potential effects on aquatic and riparian habitat.

Forest Service condition 50, *Bear River Management Plan in Bear River above Drum Afterbay on National Forest System Lands* subpart*,* specifies development of a plan to assess riparian vegetation and bank stability conditions on National Forest lands in Bear River above Drum afterbay at locations approved by the Forest Service. The baseline study would create fixed surveyed transects to be used to document changes in channel morphology over time and in response to high flow events, in particular. Ongoing annual monitoring and event (flows greater than 400 cfs at gage YB-198) monitoring for comparison to documented baseline conditions would continue for 5 years and thereafter at 3-year intervals. If monitoring identifies project-related effects, revegetation or other remedial actions may be required. PG&E recommended adoption and agreed to implement the Forest Service measures.

In addition, the Forest Service recommends (recommendation 7, *Bear River Management through Bear River Valley*) that PG&E conduct an assessment to establish new baseline conditions in the vicinity of Bear Valley upstream of Forest Service lands. Based on the baseline, the Forest Service recommends that PG&E evaluate changes in riparian vegetation and channel stability in the portion of Bear River Reach #2 that runs through Bear Valley (between RM 35.0 to RM 32.7) from release of project flows into

the Bear River in the vicinity of the Bear River Valley, including Bear Valley Meadow. The Forest Service recommends consultation and review of monitoring results and implementation of protection actions if adverse effects are determine. The Forest Service also recommends measures to reduce the magnitude and distribute the locations of spills to the Bear River from Drum canal upstream of federal lands during winter operation (typically between November and May) and during canal outages..

California Fish and Wildlife, in their comments on the draft EIS, recommends that the Commission require both Forest Service condition 50 and Forest Service recommendation 7.

Existing studies have shown that the meadow sub-reach of Bear River Reach #2 was rated as "Functional, At Risk" (PG&E and NID, 2011a). This study also documented this Bear River Reach #2 as having an incised channel with some localized bank failures; a head-cut migration from the main channel; an incised main channel with vertical banks that are susceptible to failure; and additional small, localized failures.

The historical photo evidence provides qualitative evidence that riparian conditions have improved in some areas but provides no quantitative baseline information for comparison to future monitoring for evaluation of the effects of high flow events. It remains unclear the relative contribution of project effects as compared to non-project effects. Data is needed to establish baseline condition and to compare trends over time.

We recommend that PG&E develop a plan to assess riparian vegetation and bank stability conditions on National Forest System lands in Bear River above Drum afterbay, consistent with Forest Service condition 50, and conduct an assessment of channel morphology and riparian vegetation in Bear River upstream of the federal lands, consistent with Forest Service recommendation 7. These measures would provide a mechanism to distinguish project-related effects from effects associated with other non-project historical land uses and to recommend focused plans to mitigate specific project-related effects that might be identified during this monitoring program. Annual reports would provide recommendations for mitigation of adverse effects associated with project operations in these reaches of the Bear River. We also recommend that PG&E implement the Forest Service recommendation to manage winter operations spills and outage spills from Drum canal to Bear River, consistent with Forest Service recommendation 7, to reduce project effects.

We believe that the estimated annualized cost to implement Forest Service condition 50 (Bear River Management) and recommendation 7 of $365,000 is worth the benefits to channel geomorphology, bank stability, and protection of riparian vegetation in the Bear River that is impacted by project operation.

*Integrated Vegetation Management Plan*

PG&E's proposed March 2013 Integrated Vegetation Management Plan provides guidance for the management of vegetation on federally owned project lands, as well as vegetation management related to PG&E's operation and maintenance activities within the project boundary. The proposed Integrated Vegetation Management Plan includes provisions for the management of non-native invasive plants, vegetation management related to O&M activities, sensitive area protections, including provisions for special-status plants and wildlife, VELB management, as well as provisions for training, consultation and reporting. The Integrated Vegetation Management Plan does not apply to all project lands (e.g., invasive species control only applies to federal lands and does not contain any provisions for the recognition of culturally significant plants and their protection. Invasive weed populations are known to occur outside federal lands and are subjected to similar project-related effects within PG&E's project boundary. Therefore, we recommend that PG&E modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands, particularly recreation sites and sensitive

habitats and lands disturbed by future construction, recreational use, and project maintenance, and to include a list of culturally significant plant species that occur in the project area, developed after consultation with tribes. The Integrated Vegetation Management Plan should also include provisions for appropriate monitoring and protection of culturally significant plants species. The estimated annualized cost for the recommended modified Integrated Vegetation Management Plan is about $84,000 per year and the benefits would be worth the cost. Modifying and expanding the plan to apply to all project lands and to incorporate measures for culturally significant plants, would negligibly increase the annualized cost. This would be a reasonable cost to the project and would ensure implementation of protective vegetation management practices would occur on all project lands and would provide adequate protection to culturally significant plants within the project boundary.

*Wildlife Crossings for Drum, South Yuba, and Towle Canals*

PG&E proposes to retrofit existing footbridges or construct new wildlife crossings on Drum and South Yuba canals (Upper Drum-Spaulding and Deer Creek Projects), at specified locations. Specifications for wildlife crossing facilities (slope, width, fence height, etc.) are also specified in the proposal. PG&E also proposes to monitor animal losses from drowning in project canals, and to consult with agencies when replacing escape and crossing facilities. PG&E's proposals are consistent with Forest Service conditions 39, 40, and 41. Implementation of these measures would minimize wildlife entrapment points, create and/or maintain wildlife passage opportunities, and would prevent wildlife mortalities at the project.

We recommend that all of PG&E's proposals relative to wildlife crossing of canals be incorporated into a single Wildlife Crossing Management Plan for the project. Consolidation of these activities into a single management plan would benefit wildlife by ensuring consistency in managing and modifying wildlife crossings, as necessary, over the term of the new license. The plan would also ensure consistency in consulting with appropriate agencies regarding canal mortalities and potential changes to wildlife crossings or escape facilities. The wildlife crossing measures proposed by PG&E for the proposed Upper Drum-Spaulding Project canals are estimated to cost $193,000 annually. The development and implementation of a Wildlife Crossing Management Plan is estimated to negligibly increase the annualized cost. We believe that the benefits to wildlife would be worth the cost.

*Project Powerlines and Raptor Collisions/Electrocutions*

PG&E proposes to record annually all incidental observations of bird collisions/electrocutions along project powerlines. PG&E also proposes to utilize raptor-safe powerline configurations consistent with APLIC's "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006, the most current version of this document for new powerlines and when replacing existing structures. If raptor monitoring indicates a substantial raptor-project transmission line interaction issue, the poles where the interaction issue occurs on federal land would be replaced or retrofitted. Implementation of these measures would reduce project impacts to avian resources and would minimize risk of avian mortality. If bird collision or electrocution issues are detected, recording incidents and retrofitting structures using the same guidelines would benefit avian resources. These proposed measures are consistent with measures specified by Forest Service conditions 46 and 47, and recommended by BLM and California Fish and Wildlife. However, the benefits derived from these proposed measures would be further enhanced by the development of an Avian Management Plan for the project, that incorporates the proposed provisions, and provides consistent specifications for monitoring and report avian/powerline interactions, and for the implementation of powerline modifications or retrofits through the use of raptor-safe powerline configurations. The estimated cost of PG&E's proposal regarding avian powerline interactions is $66,000 annually. The estimated additional annualized cost associated with incorporation of the proposed provisions into an Avian Management Plan is negligible and would be worth the benefits.

*Recreation Plan*

The project currently provides public recreation opportunities, and PG&E proposes extensive development, expansions, modifications, upgrades, and maintenance of public recreation facilities in its proposed September 2013 Recreation Plan. However, for reasons noted below, we recommend that PG&E include our additional staff recommended recreation measures in its proposed recreation plan.

Individual recreation measures contained in the September 2013 recreation plan address the majority of project effects and meet identified recreation needs at the project. However, we also recommend several additional elements.

Implementation Schedule—Most of the facilities are in a functioning condition, and visitor needs are currently met by the spectrum of facilities and their existing condition. However, some of the existing recreation facilities are currently, or would soon be, in need of modification and/or reconstruction to meet visitor needs, protect natural resources, and provide for public health and safety. For most facilities, our recommended schedule is the same as that proposed by PG&E in the Recreation Plan. However, for some facilities we recommend an alternative schedule that is based on our assessment of the current condition of the facility and user needs. We recommend that PG&E complete the proposed campsite installation at Fordyce Lake primitive campground within 3 years, rather than within 5 years. At Fordyce Lake, there are currently no developed recreation facilities. Given the current level of demand, campsite development within 3 years would improve recreational use at this project development by providing improved camping facilities to meet existing user needs. We estimate the added cost associated with this modification to the facility development schedule to be minor, on an annualized basis.

Trails—There are numerous trails in proximity to the project, and there is a demonstrated demand for trail use by project visitors. However, as discussed in section 3.3.5.2, *Recreation Resources, Environmental Effects*, and discussed further below, we find that some of the trail measures included in the proposed Recreation Plan include trails and/or trailheads that appear to be outside the project boundary, do not connect two or more project recreation facilities, and do not serve a project purpose. Requiring PG&E to construct, reconstruct, and maintain trails necessary for project purposes would provide additional trails for visitors and ensure they are properly maintained which, in turn, would minimize resource damage, such as erosion, and provide for visitor safety. Therefore, we recommend that the proposed trail improvements included in the Recreation Plan be limited to the construction of, modification to, and maintenance of trails and trailheads that are necessary for project purposes, including: (1) the Meadow Lake pedestrian trail, which connects Meadow Knolls campground to Meadow Lake; (2) the Sierra Discovery Trail; (3) the Rucker Lake trail that connects the designated parking area to the walk-in campground; (4) the Blue Lake pedestrian trail that connects parking area to primitive campsites; and (5) the Carr Lake trail connecting new walk-in campsites.

Campgrounds and Dispersed Campsites—Some existing campgrounds and campsites do not accommodate visitor needs and require expansion. Others are in need of facility upgrades or improvements to address deteriorating facility condition, improve usability and user safety, or improve access. Formalizing dispersed campsites at Lake Sterling, Fordyce Lake, and Lower Peak Lake would help protect shoreline resources by eliminating unmanaged camping at informal sites, which would reduce impacts to vegetation and shoreline habitats. Repaving the campground access roads at Lake Spaulding campground would benefit the recreating public by creating a safer situation for vehicle traffic. Widening of the roads at the time of repaving would have little additional effect on project resources, so long as sound construction and sediment and erosion control practices are followed. The improvements at the Rucker Lake walk-in campground and Meadow Lake shoreline campground would ensure that the facilities are safe and in good repair and that recreation demand is met. Development of the Lower Lindsey Creek campground would ensure that additional demand for camping at Lower Lindsey Lake is

met over the term of the new license. The development of a new group campground at Lake Valley reservoir would alleviate existing use pressure at the Lodgepole campground and some of the camping use pressure at both the Bear Valley group campground and the Kidd Lake group campground. The addition of a boat-in primitive campground at Lake Spaulding would help to alleviate some of the use pressure at the existing campground and would reduce informal camping along the shoreline with its accompanying effects on shoreline resources.

Therefore, in addition to PG&E's proposed actions, we recommend that PG&E base the number of campsites installed at Lake Sterling on future recreation monitoring, as well as resource protection, and not necessarily limit construction to three campsites; that PG&E base its decision to widen campground roads at the Lake Spaulding campground on recreation monitoring information at the time that the roads are repaved; that PG&E complete the Rucker Lake walk-in and Meadow Lake shoreline campground improvements; that PG&E complete proposed improvements in signage and information measures at Lower Lindsey Lake campground; that PG&E install the proposed campsites at Lower Peak Lake; and that PG&E develop a new group campground at Lake Valley reservoir and a boat-in campground at Lake Spaulding.

Operation and Maintenance—PG&E proposes and the Forest Service specifies provisions for campground hosts in the Recreation Plan. PG&E may provide campground host sites, but the responsibility for project recreation facility operation and maintenance is fully the responsibility of PG&E, and campground hosts may or may not be needed. Therefore, we do not recommend including this requirement in the license. In addition, we recommend that the plan be modified to remove any requirements for PG&E to provide water and septic facilities at designated host campsites. We estimate that upgrading these sites would cost an additional $36,000 and cannot be justified.

Costs of Managing Project-Related Recreation—We do not recommend California Fish and Wildlife's recommendation that PG&E develop a plan to address the costs to the Forest Service for managing project-related recreation, fire management, resource protection, and law enforcement. PG&E is responsible for operating and maintaining project-related recreation facilities. Further, PG&E already provides this funding support to help offset these costs through county taxes. If PG&E were to develop a plan to include additional funding to support these activities, the Commission would have no way of ensuring funding provided to the agency for law enforcement would be used for project purposes. Therefore, we do not recommend that PG&E be required to prepare a plan that identifies the cost to the Forest Service for fire management, resource protection, or law enforcement.

We do not recommend PG&E's proposal and BLM condition 6 specifying that PG&E provide a one-time payment of $95,000 to BLM for BLM recreation improvements on the South Yuba River downstream of Lake Spaulding and provide $30,000 annually to partially fund the annual operation, maintenance, and administrative costs for BLM's management of public river access, lands, and river-related recreation in the Upper Drum-Spaulding Project along the South Yuba River downstream of Lake Spaulding and BLM lands within the project boundary. PG&E would only be responsible for project recreation located inside the project boundary and PG&E is ultimately responsible for those recreation facilities within the project boundary. Recreation that extends to BLM lands outside the project boundary are outside the Commission's authority. The Commission would have no way of ensuring funding provided to BLM would be used for project purposes. BLM does not specify the exact location on the South Yuba River of the improvements, O&M, and management that would be funded by the one-time and annual payments. Although, it does appear that these payments would likely fund some improvements, O&M, and management located outside the project boundary, including Edwards Crossing and Purdon Crossing, it is unclear if there would be a direct nexus to the project. The Edwards Crossing and Purdon Crossing areas are located outside the project boundary over 25 miles downstream and do not serve a project purpose nor do they provide access to project facilities. Therefore, it would not

be appropriate to require PG&E to provide funding to BLM for these areas. Providing funding to BLM would not relieve PG&E of its responsibility and, therefore, would not be a necessary measure to include in a new license.

In total, our recommended recreation plan would have an estimated levelized annual cost of about $1,979,500, which is negligibly more than the estimated levelized annual cost of PG&E's proposed recreation plan. We conclude that the benefits of our recommended plan would be worth the cost because it would: (1) address project effects and provide for project visitor use such as providing project trails and modifying recreation facilities; (2) provide a comprehensive recreation management plan that the Commission can use to determine compliance; (3) protect natural resources at recreation developments; and (4) enhance recreation enjoyment for project visitors.

In addition to our recommendations discussed above, there are provisions that we do not recommend.

We do not recommend certain recreation facility improvement measures recommended by California Fish and Wildlife, such as the provision of installing showers at Lake Spaulding campground. We do not recommend the showers at Lake Spaulding because they are not consistent with the level of facilities generally provided at Forest Service recreation sites. In addition, user surveys found that while some users indicated that they would prefer showers at this site, the majority of visitors found the facilities acceptable. No cost estimate was provided by California Fish and Wildlife, but we assume that adding showers at Lake Spaulding campground would add to the cost of the campsite improvements. We do not have enough information to estimate the added cost and, therefore, we cannot conclude that adding showers are justified based on a probable additional cost.

We do not recommend certain improvement measures recommended by California Fish and Wildlife for trails and trailheads. As discussed in section 3.3.5.2, there are numerous trails in the project area, many of which are non-project trails outside the project boundary. In certain locations, trailheads for these non-project trails are located within the project boundary, even if the trail itself is not a project-related facility. Development of, or major modifications to, existing trailhead facilities that lead to Forest Service trails is not necessary for project purposes and, therefore, they are not considered project facilities. We recommend that PG&E continue to maintain these existing trailhead facilities that lie within the project boundary or are associated with project facilities in a safe and useful condition, but we do not recommend major modifications or enhancements to such facilities, nor do we recommend the construction of new trails that connect Forest Service trailheads to project facilities, if the existing trailhead lies outside the project boundary. Therefore, based on the information available to us, we do not recommend the conversion of campground parking into a trailhead with parking at Rucker Lake because the proposed trailhead would be for a trail that is primarily a non-project trail. At Fuller Lake, we do not recommend the construction of a trailhead because the proposed trailhead would connect to a non-project trail. We do not recommend the installation of directional signs for trailheads at Lower Lindsey Lake that serve primarily non-project facilities. We do not recommend the construction and maintenance at Lower Peak Lake of a non-motorized trail connecting the primitive campsites to the non-project Palisades Trail trailhead. We do not recommend the construction, at Upper Peak Lake, of a trail from the gate originally proposed to restrict vehicle access from the shoreline and dam. Since the September 2013 Recreation Plan no longer includes this provision for a gate at Upper Peak Lake and because access would not be restricted by a gate, there would be no need for the trail recommended by California Fish and Wildlife.

We do not recommend the inclusion in the proposed recreation plan of a provision that PG&E cooperate with trail planners on the development and maintenance of the Bear River trail or related trail facilities; however, PG&E is free to cooperate with the trail planners on its own. The bulk of the Bear River trail would be located outside the project boundary and would not serve a project purpose.

Although the proposed location of the trail would coincide or intersect the project boundary at various canals and diversions, the intended purpose of the proposed trail is to provide riverine access that coincides or intersects in several locations with the project boundary, not to provide trail access to or between project recreation facilities. Therefore, we conclude that this trail is not necessary for project purposes.

We do not recommend the California Fish and Wildlife recommendation for PG&E to improve the Blue Lake dam access road to a maintenance level 3 standards. Although the Blue Lake dam access road is used for recreational access, its primary function is to provide access to the dam. Currently the road is maintained at maintenance level 2, which allows access for high clearance and four-wheel drive vehicles as necessary to access the project facilities. Maintaining the Blue Lake dam access road at maintenance level 3 would allow access for all types of vehicles from passenger cars to large commercial vehicles. Since the primary purpose of this road is to provide access to the dam, maintaining the road at maintenance level 2 would be sufficient to allow access to the project facilities. Though no cost estimate was provided by California Fish and Wildlife, we assume that maintaining the road at maintenance level 3 would cost significantly more, and therefore we cannot conclude that a maintenance level 3 is justified based on a probable additional cost.

*Recreation Flow Information*

Real-time information on recreational flow is needed on a year-round basis to support a growing demand for whitewater boating activities, even during the winter. PG&E proposes and Forest Service condition 54 specifies that PG&E develop a plan to provide real-time streamflow information to the public via the Internet for the following project-related stream reaches: Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam (at Cisco Grove), South Yuba River below Lake Spaulding (at Lang's Crossing), and the Bear River at Highway 20. The Forest Service notes a preference for the data to be reported in 15-minute intervals, however, data reported in no less than hourly intervals would be acceptable. The Forest Service also specifies and PG&E proposes to implement the Water Temperature and Stage Monitoring Plan (filed April 11, 2014 and discussed under Monitoring Program under Aquatic Resources) that includes installing a monitoring station in the South Yuba River upstream of but as close as possible to Canyon Creek within three years that would monitor river stage hourly (15-minute interval readings that would be transmitted hourly) and would be available in real-time (hourly) to the public via the internet. We recommend that PG&E continue providing real-time (15-minute intervals) streamflow information to the public on the internet for the four reaches (Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam [at Cisco Grove], South Yuba River below Lake Spaulding at Lang's Crossing, and the Bear River at Highway 20) where it is currently provided in 15-minute intervals on a year-round basis. PG&E is currently providing year-round real-time flow information, and it is appropriate to continue. The plan developed for providing streamflow information on the internet should be filed with the Commission for approval. We estimate the cost of providing year-round flow information to be $8,800 on a levelized annual basis.

Additionally, PG&E's proposed Water Temperature and Stage Monitoring Plan includes installing a monitoring station in the South Yuba River upstream of but as close as possible to Canyon Creek that would monitor river stage hourly (15-minute interval readings that would be transmitted hourly) and would be available in real-time (hourly) to the public via the internet. The proposed stage monitoring would provide stage data to the public on an hourly basis for the South Yuba River in the vicinity of Canyon Creek which would allow the public to better take advantage of whitewater opportunities on this reach and also be better informed on safe flows. We recommend that PG&E implement this measure of the Water Temperature and Stage Monitoring Plan.

*Fish Stocking Plan*

Angling is one of the primary recreational activities associated with the Drum-Spaulding Project. Although natural reproduction occurs in some of the project waters, stocking is necessary to sustain populations of game fish in waters with high angler usage. PG&E proposes to support fish stocking in Lake Spaulding by providing California Fish and Wildlife up to $15,000 per year. California Fish and Wildlife recommendation 17 and the Forest Service's 10(a) recommendation 8 recommend a fish stocking program that includes 16 lakes in addition to Lake Spaulding. We estimate the cost of the California Fish and Wildlife's measures to be about $71,000.

We note that merely funding California Fish and Wildlife's stocking efforts does not relieve PG&E's responsibility for ensuring that fish stocking at project reservoirs would support current and anticipated future fishing pressure. Further, funding California Fish and Wildlife to continue fish stocking at Lake Spaulding only is insufficient to meet the needs of anglers at other project reservoirs.

Lake Spaulding, Lake Valley reservoir, and Fuller Lake receive high recreational use while Halsey forebay, Fordyce, Lower Lindsey, and Meadow Lakes receive moderate recreational use. Lake Sterling and Carr, Culbertson, Blue, Feeley, Rock Creek, Upper Lindsey, Upper Rock, Lower Rock, and White Rock Lakes receive low recreational use. About half or more of the visitors to Lake Spaulding, Halsey forebay, Lake Valley reservoir, Lower Lindsey Lake, and Fuller Lake, participated in angling. Because of the high level of recreational angling that occurs at these five reservoirs coupled with the moderate to high recreational use, these reservoirs would most benefit from annual fish stocking. Other reservoirs receiving moderate recreational use (Fordyce and Meadow lakes) would also benefit from regular periodic fish stocking.

We recommend that PG&E prepare and implement a Fish Stocking Plan for the Drum-Spaulding Project. The plan would be developed after consultation with California Fish and Wildlife, the Forest Service, and FWS and filed for Commission approval. The plan should address annual stocking in Lake Spaulding, Halsey forebay, Lake Valley reservoir, Fuller Lake, and Lower Lindsey Lake, stocking in Fordyce and Meadow lakes every other year until the first Form 80 reporting year after implementation of the plan, and include provisions for stocking fish in additional project reservoirs (Carr, Culbertson, Feeley, Upper Lindsey, Lower Rock, Upper Rock, Rock Creek, Blue and White Rock Lakes and Lake Sterling) based on changes in recreational use and angling pressure over the term of the new license. The plan would provide the means for a coordinated fish stocking program with the flexibility to increase or decrease stocking numbers, change fish stocking sizes, and change the frequency of stocking a particular reservoir over the term of a new license. Including annual consultation in the Fish Stocking Plan would also help address any changes in California Fish and Wildlife fish stocking management targets and the availability of hatchery fish. A Fish Stocking Plan would benefit project visitors and would be worth the estimated levelized annual cost of $71,000.

*Historic Properties Management Plan*

Through implementation of PG&E's final HPMP, project-related adverse effects would be resolved on historic properties. Benefits for the protection and preservation of historic properties would be worth the cost of $771,000 annually.

#### 5.1.2.3 Measures Not Recommended by Staff

Some of the measures recommended or specified by relicensing stakeholders would not contribute to the best comprehensive use of the Yuba River and Bear River water resources, do not exhibit sufficient nexus to the project's environmental effects, or would not result in benefits to non-

power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend such measures.

*Mercury Bioaccumulation Monitoring*

Forest Service revised preliminary condition 35 specifies that PG&E implement a mercury bioaccumulation monitoring program. However, Forest Service did not include this as a final condition indicating that it would accept the determination of the California Water Board on this issue under the State's water quality certification process. PG&E's relicensing studies documented high concentrations of methyl mercury in fish from project waters. Elevated methyl mercury levels in fish tissue have been reported throughout the Sierra Nevada region. PG&E does not propose any substantive changes to reservoir levels or frequency and magnitude of channel modifying flows. Therefore, we do not expect any changes in methyl mercury concentration levels in sportfish as a result of project operations. Although the information generated from implementation of this plan would provide appropriate agencies with data on whether or not to issue health advisories for anglers using project waters, bioaccumulation of mercury is not a project-related effect. Consequently, we conclude that the estimated levelized annual cost of $17,840 for implementation of this plan is not warranted and we do not recommend it as a license condition.

*Bullfrog Eradication*

FWS recommended that PG&E develop a bullfrog eradication plan for all project lakes, reservoirs, and impoundment areas to enhance populations of CRLFs, FYLFs, and other frog species. FWS has not provided any specific evidence of how the project contributes to the presence of in the project area.

As discussed in section 3.3.3.2.2, *Wildlife*, development of a bullfrog eradication program for the project would be impracticable and ineffective. Bullfrogs would likely continue to recolonize the project area from adjacent suitable habitats. Further, bullfrog control has generally been restricted to small ponds that can be drained; control of large reservoirs and rivers has not been shown to be practical (Adams and Pearl, 2007).

Although it is difficult to determine the cost of an eradication program, it is likely to exceed $50,000 per year. We do not believe the benefits would be worth the cost.

*Carnivore Management Plan*

FWS recommended that PG&E develop a Wolverine and Fisher Management Plan to protect these species within designated carnivore management area.

There are no designated wolverine carnivore management areas that overlaps the project area. Although Pacific fisher designated carnivore management areas overlap with some of the project areas, the existing populations of Pacific fisher do not overlap with the project boundary. FWS has not provided any evidence of potential project effects to these species. The development of a management plan, as recommended by FWS, would add limited protection to this species due to its lack of use of the available habitat within the project boundary. If issues arise concerning potential project impacts, they can be addressed through the annual consultation meetings. Therefore, we do not recommend development of a Carnivore Management Plan.

*Protection of Special-status Species*

The construction of proposed or future project facilities has the potential to affect special-status species and critical habitat. Forest Service condition 44 and BLM condition 19 specify that PG&E submit a biological evaluation prior to construction activities that may affect special-status species or critical habitat. California Fish and Wildlife makes a similar recommendation. However, before construction of any new project feature not addressed in this DEIS could occur, PG&E would first need to file with the Commission an application to amend its license. If appropriate, a biological evaluation or, if federally listed species could be involved, a biological assessment for special-status species, would be developed as part of the license amendment proceeding. Consequently, although the intent of this measure would be addressed through the amendment process, we find that there is no need to include this measure as a condition of a new license for this project.

*Watershed Restoration Plan*

California Fish and Wildlife recommends that PG&E develop a Watershed Restoration Plan that describes the slopes below open canals and project facilities by existing erosion condition; describes the methods to resolve slopes that have been and would be damaged by past and future breaches of the open canal system; provides an inspection schedule to identify potential failures that would cause releases of water and subsequent damage to watershed resources; and provides a plan to notify California Fish and Wildlife if damage to watershed resources occurs and to describe the actions that would be taken to repair and restore the damaged site. Forest Service condition 49 specifies and BLM condition 19 recommends that PG&E develop a Slope Assessment and Facility Release Plan to address erosion potential at discharge points from project facilities including past canal breaches.

PG&E proposes an Erosion and Sediment Control and Management Plan and Canal Release Point Monitoring Plan (filed April 11, 2014) that include similar provisions to those recommended by California Fish and Wildlife. These plans addresses both project-wide erosion control and sedimentation management needs and measures and specific issues related to steep slopes at project facilities and drainage structures.

Implementation of the watershed restoration measures recommended by California Fish and Wildlife would alleviate existing erosion damage caused by historical canal operations and spills and minimize any future damage resulting from operations under the new license. We conclude, however, that PG&E's Erosion and Sediment Control and Management Plan and Canal Release Point Monitoring Plan contain similar provisions that are adequate to provide slope protection and restoration. The estimated annualized cost to implement PG&E's Erosion and Sediment Control and Management Plan and Canal Release Point Monitoring Plan is $180,000 and the improvement of PG&E's plan is not worth this cost.

*Recommendations to Support Reintroduction of Spring-run Chinook Salmon and Central Valley Steelhead to the South Yuba River Above Englebright Dam*

Actions to reintroduce Central Valley spring Chinook salmon and Central Valley steelhead upstream of the Corps' Daguerre Point and Englebright dams on the Yuba River have been identified in NMFS' Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead (NMFS, 2014). NMFS anticipates that reintroduction of these anadromous fish species would take place within the term of a new license issued for the Drum-Spaulding Project, but no schedule has been determined.[1]

The Yuba Salmon Forum, a group made up of state and federal agencies, conservation groups, utilities, water agencies, and interested stakeholders has been created "to identify, evaluate, recommend, and seek to achieve implementation of effective near-term and long-term actions to achieve viable salmonid populations in the Yuba River watershed to contribute to recovery goals, while also considering other beneficial uses of water resources and habitat values in neighboring watersheds, as part of Central Valley salmonid recovery actions." The forum is in the process of evaluating preferred alternatives.

NMFS provided two environmental recommendations for the Drum-Spaulding Project to support future reintroduction of these two anadromous species in the upper Yuba River including South Yuba River (section 3.3.2.2.2, *Instream Flows*; section 3.3.2.2.8, *Aquatic Biota*). NMFS recommendation 4 for South Yuba River includes 4 subparts. We consider two additional NMFS recommendations to be administrative and do not evaluate them in this final EIS.

NMFS intention is for these recommendations to be implemented at a future time should steelhead and/or Chinook salmon be reintroduced into upper Yuba River areas influenced by the project. NMFS recommends that the Drum-Spaulding Project operate under the new license in a manner consistent with the Biological Opinion on operation of the Daguerre Point and Englebright dams by the Corps of Engineers.[2]

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[1] On June 21, 2013, the California Sportfishing Protection Alliance, Trout Unlimited, and American Rivers filed a motion for additional investigation and supplemental draft EIS to address project effects on anadromous fish habitat in the South and Middle Yuba Rivers and the feasibility of alternative measures to mitigate project effects on anadromous fish and their habitat once fish are reintroduced into project-affected waters. PCWA, NID, and PG&E filed reply comments on July 8, 2013. As discussed in this section, we believe the recommendations are premature.

[2] On February 29, 2012, NMFS issued its Biological Opinion for the Corps' operation and maintenance of both Englebright and Daguerre Point dams and Englebright reservoir on the Yuba River (NMFS, 2012). The Corps subsequently requested reinitiation of formal consultation on February 26, 2013. The 2012 Biological Opinion for was set aside on August 16, 2013 pending completion of consultation. Separate ESA consultations concerning operation of the Corps' Englebright dam and Daguerre Point dam were completed on May 12, 2014. NMFS concurred that operation and maintenance of Englebright dam would not adversely affect listed salmon populations (NMFS, 2014b) and issued a Biological Opinion regarding operation of Daguerre Point dam (NMFS, 2014b). Neither decision requires any specific measures related to upstream fish passage at Englebright dam. The Corps 2015 proposed budget, however, provides funds for a reconnaissance study to determine what more can be done to improve fish passage conditions in the Yuba River and a follow-up restoration feasibility study.

No specific schedule for the reintroduction of these species has been suggested. We note that there are considerable uncertainties regarding the viability and implementation program set forth in the recovery plan (NMFS, 2014) and the Central Valley Project and State Water Project biological opinion (NMFS, 2009). NMFS (2009) states that the concept of collection of outmigrating juveniles at facilities at the head of reservoirs to ensure safe and timely downstream passage of juvenile and post-spawn steelhead is untested, and multiple concepts may need to be tested simultaneously. To our knowledge, no federal funding or proposals for any or all of these tasks have been developed. Thus, the schedule for implementation of a long-term reintroduction program for either species, particularly in the upper Yuba River, is uncertain and NMFS recommendations are premature.

In the event that anadromous fish reintroduction becomes reasonably foreseeable in the future, the Commission has sufficient reserved authority under standard article 15 to reopener the license and require, as appropriate, measures to facilitate reintroduction of anadromous fish, ensure that project-related impacts are addressed, and complete consultation with NMFS under the ESA. The Forest Service (condition 46) and BLM (condition 8) provide for modifications of the section 4(e) conditions in the event of anadromous fish reintroduction.

*Paleontological Resources*

Reclamation 4(e) condition b.11 specifies and California Fish and Wildlife 10(a) recommendation 19 recommends that protection of paleontological resources should be included in the HPMP. Paleontological resources are not cultural resources and, thus, are not eligible for listing on the National Register and cannot be addressed in the HPMP pursuant to section 106. The Commission has no jurisdiction over PG&E to enforce these 4(e) conditions and 10(a) recommendations to protect paleontological resources. Paleontological resources are protected by California statute (e.g., Public Resources Code Section 5097.5 (a), Removal or Destruction; Prohibition), appendix G to the CEQA Guidelines that was revised in 2009 to include an assessment of project effects on paleontological resources, and the Paleontological Resources Preservation Act (P.L. 111-011) Omnibus Public Land Management Act of 2009 Subtitle D--Paleontological Resources Preservation. It is the responsibility of the federal land manager to carry out such protective measures. In the case of a new license for the project, PG&E would be responsible for consulting with the federal land manager under these circumstances.

*Inadvertent Discoveries*

Reclamation 4(e) condition b.11 and California Fish and Wildlife 10(a) recommendation 19 state that when inadvertent discoveries are found on Reclamation, Forest Service, BLM, or California Fish and Wildlife lands, PG&E would not resume work on ground-disturbing activities until written approval from Reclamation, the Forest Service, or BLM is received. PG&E has plans for handling inadvertent discoveries in the HPMP that do not require PG&E to receive written approval from Reclamation, the Forest Service, or BLM to proceed following a discovery. These plans have been reviewed and commented on by the Forest Service, BLM, and tribes. PG&E's alternative 4(e) condition for noticing, consulting, and documenting cultural resources involving inadvertent discoveries would adequately protect historic properties from project-related effects. Therefore, we conclude that the process PG&E has already provided in its HPMP is appropriate.

*Coordination of Projects Operations for Water Supply*

PCWA provides drinking water and water for irrigation to about 150,000 residents in Placer County. PCWA relies on up to 100,400 acre-feet of water purchased from PG&E annually, the water right holder, for delivery to its customers in Zone 1 service area (cities of Auburn, Rocklin, Loomis, Lincoln, and surrounding unincorporated areas). The delivery is facilitated by facilities and water storage

associated with the existing Drum-Spaulding Project. PCWA lacks water rights or control of any storage associated with the existing Drum-Spaulding Project.

PCWA is concerned that the Lower Drum Project would not be able to meet water supply obligations without a high level of coordination between the Upper Drum-Spaulding and Lower Drum Projects regardless of the licensee identity. PCWA recommended inclusion of five conditions in the Upper Drum-Spaulding license to mandate coordination with the licensee of the Lower Drum Project to protect the region's future consumptive water supply and assure the continued provision of reasonably priced water to customers in Placer County:

1. Creation of a Consumptive Water Management Advisory Group that would meet at least monthly to develop a collaborative plan for coordinated operation of the Lower Drum and Upper Drum-Spaulding Projects;

2. Development of coordinated operating plan for the Upper Drum-Spaulding and Lower Drum Projects for meeting current year water supply demands and a drought contingency;

3. A requirement that project facilities and Rollins reservoir storage (part of Yuba-Bear Project) be maintained and operated to support consumptive water deliveries, and a restriction on the licensee transferring away consumptive water or water rights needed within the areas historically served by the Drum-Spaulding Project;

4. Establishment of a priority of uses for water developed and conveyed by the project, consistent with historical practice and the consumptive water supply purposes for which the Drum-Spaulding system was constructed; and

5. A requirement that the licensee provide advance notice and a right of first refusal to PCWA in the event it seeks to sell, transfer, or surrender the project.

Many of the conditions recommended by PCWA address contractual issues, such as cost of deliveries, guarantee of deliveries, and right of first refusal. These issues are not subject to the relicensing process. Contractual rights that PG&E may have to store water in Rollins reservoir is also not subject to the relicensing process

PG&E has had an agreement with PCWA on the coordination of project operation and water supply that was not part of the existing Drum-Spaulding Project license. The current agreement is in place through 2014. PG&E and PCWA are in the process of negotiating the terms of a new long-term contract for the use of project facilities to deliver water to PCWA. PG&E indicates that the conditions of any negotiated agreement would be made binding on any transferee.

Many of the issues brought up by PCWA concerning coordination of operations will be resolved when ongoing negotiations conclude and result in a final agreement. Further, this issue can be revisited during development of any license orders in the event an agreement is not reached.

In addition, under standard article 10, the Commission, after notice and opportunity for hearing, can require licensees to coordinate the operation of a project hydraulically with other projects in the interest of beneficial public uses of water resources and can condition licenses concerning the equitable sharing of benefits by a licensee. Any specific issues associated with a different licensee are more properly addressed in a transfer proceeding where greater scrutiny can be given to the continuation of water supply.

PG&E also notes that PG&E and NID have a long standing water management committee to which PG&E indicates that PCWA is invited to participate. The committee meets weekly to address operational coordination of the existing Drum-Spaulding and Yuba-Bear Projects.

The ongoing negotiations concerning development of a long-term coordination agreement between PCWA and PG&E is the proper forum to address water deliveries issues in Placer County. Further, PCWA has not provided any specific issues concerning water deliveries. Potential issues associated with a license transfer are premature. Consequently, we do not believe that license conditions concerning water deliveries are needed.

NID relies significantly on facilities of the existing Drum-Spaulding Project to deliver water to its domestic and agricultural customers and to generate electricity. PG&E relies on the Yuba-Bear Project to augment water supply available to PG&E's power plants, for conveyance of PG&E's water to its customers and power plants, and for seasonal storage of PG&E's water.

Similar to PCWA, NID recommends that the Commission include in any license issued to PG&E a long-term agreement between PG&E and NID that would be binding on transferees assuring that the systems be operated in a coordinated fashion and that the water supply functions be fully protected beyond the term of any resulting licenses. NID believes that no licenses should be issued to PG&E until negotiations between PG&E and NID are completed.

PG&E and NID have an agreement in place and are involved in ongoing negotiations to develop a long-term agreement on coordination of the two systems. As discussed above, we believe that the existing negotiations are the proper forum to address these issues.

### 5.1.3 Unavoidable Adverse Impacts

The continued operation of the five developments (Spaulding No. 3, Spaulding No. 1 and No. 2, Alta, Drum No. 1 and No. 2, and Dutch Flats Developments) that make up the Upper Drum-Spaulding Project would result in some minor unavoidable adverse effects on geologic, soil, aquatic, terrestrial, and visual resources. The geologic and soil resource effects could include some minor continued erosion associated with project operation and renovation of recreational facilities and interruption of sediment transport at project reservoirs. Most of these effects would be reduced by the proposed resources enhancement measures, including: (1) implementation of the Erosion and Sediment Control Management Plan; and (2) development and implementation of an LWD management plan.

Aquatic communities have developed and adapted to the high level of natural flow variability in western Sierra streams. Reduced flow variability as a result of historical project operations could have resulted in shifts in community composition, diversity, and resilience. Proposed minimum flow and spill cessation measures would improve seasonal and inter-annual flow variability to better mimic natural flow variability in some project-affected reaches; however, inter-basin transfer of water via project facilities to meet water delivery commitments and contracts under legally established water rights would continue to reduce overall natural seasonal flow and variability in many project reaches.

Discharges from project canals augment natural flow in some project reaches (e.g., Bear River above Drum afterbay and below Drum canal spill gate). When canals are taken out of service for maintenance or in the event of an emergency and flow ceases, flow in these reaches returns to natural flow levels, which could be zero flow at some locations during some months. In other reaches, canal outages can result in spills of atypical magnitude through the reach. Proposed measures would reduce, but not eliminate the outage-associated flow shifts.

Some fish entrained into project conduits, canals, and flumes are subject to stress, injury, and mortality when flow ceases during outages. Proposed fish protection and rescue measures have been designed to reduce potential mortality during these periods. Some minor levels of mortality would still be likely to occur associated with capture, handling, and transport of fish collected in open canal structures or in closed conduits and tunnels where fish rescue protocols cannot be safely implemented.

For terrestrial resources, unavoidable adverse effects could include loss of vegetation and wildlife habitat from the construction of new or rehabilitated recreation facilities that require permanent removal of vegetation and from project maintenance. Effects to vegetation and wildlife habitat would be reduced by implementation of the Integrated Vegetation Management Plan.

Some mortality of target wildlife species would continue to occur in project-related components (e.g., canals and flumes). Wildlife protection measures have been proposed to monitor and reduce wildlife mortality due to these components. Wildlife crossing measures have been proposed in canals with relatively high levels of target wildlife species mortality to minimize adverse impacts. Some minor levels of target wildlife species mortality would continue to occur in project structures. Electrocution or collision associated with project transmission lines could impact raptors and other large avian species.

### 5.1.4 Summary of 10(j) Recommendations and 4(e) Conditions

#### 5.1.4.1 Fish and Wildlife Agency Recommendations

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. In response to our REA notice, the following fish and wildlife agencies submitted recommendations for the project: NMFS (letter filed July 31, 2012) and California Fish and Wildlife (letter filed July 30, 2012).

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. Table 5-2 lists the current federal and state recommendations filed pursuant to section 10(j), applicable for the Upper Drum-Spaulding Project, and indicates whether the recommendations are included under the staff alternative. Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document.

In the draft EIS, we evaluated 71 recommendations and associated subparts submitted by California Fish and Wildlife for the Drum-Spaulding Project, 30 of them were found to be within the scope of section 10(j). Of these 30 recommendations, we recommended adopting 21, modifying 7, and not including 2.

NMFS submitted seven recommendations concerning future reintroduction of spring-run Chinook salmon and/or Central Valley steelhead in the South Yuba River upstream of Englebright dam. These recommendations do not fall within the scope of section 10(j), and are evaluated under section 10(a),

because they depend upon a future action.[3] In any event, we do not recommend adoption of any of these seven recommendations. NMFS also filed two recommendations, outside the scope of 10(j), with regard to consistency with the biological opinion on Corps of Engineers actions and formal consultation under the ESA (recommendations 1 and 2) that we consider administrative and are not addressed as environmental measures in this final EIS.[4]

We sent letters to California Fish and Wildlife and NMFS on June 20, 2013, informing them of our preliminary determination of inconsistencies for their recommendations filed July 30, 2012 and requesting concurrence, comments, or alternative recommendations. By letter filed August 22, 2013, California Fish and Wildlife responded, identifying recommendations on which the resource agencies and PG&E had subsequently reached agreement through further negotiations which now represent the agency's recommendations under section 10(j). We understand California Fish and Wildlife's August 22, 2013 letter to mean that it was amending some of its July 30, 2012 10(j) recommendations. California Fish and Wildlife now recommends: (1) Forest Service condition 50, *Erosion and Sediment Control and Management* as it applies to all Public Trust Lands (instead of a Watershed Restoration Plan); (2) Forest Service condition 2, *Consultation Group for water temperature management* (instead of an Ecological Group), as it applies to all Public Trust lands; (3) Forest Service Condition 33, *Fish Protection and Management during Canal Outages Plan*; (4) Forest Service condition 34, *Gaging Plan*; (5) Forest Service condition 38, *Integrated Vegetation Management Plan*; (6) Forest Service condition 39, Monitor Animal Losses in Project Canals; (7) Forest Service condition 40, *Replacement of Wildlife Escape and Wildlife Crossing Facilities;* (8) Forest Service condition 41, *Wildlife Crossing—Drum, South Yuba, and Towle Canals*; (9) Forest Service condition 43, *Bald Eagle Management Plan*; (10) Forest Service condition 46, *Project Powerlines*; (11) Forest Service condition 47, *Raptor Collisions*; (12) Forest Service condition 48, *Bat Management*; (13) Forest Service recommendation 7, *Bear River Management Through Bear River Valley*, as it applies to all Public Trust Lands; (14) Forest Service condition 52, *Large Woody Debris Management*; and (15) Forest Service condition 53, *Recreation Plan*. The other 54 recommendations in California Fish and Wildlife's July 30, 2012, not modified by its letter of August 22, 2013, continue as the recommendations of California Fish and Wildlife.

In their letter, California Fish and Wildlife requested clarification of the Commission's analysis and recommendation related to Forest Service condition 26, Water Year Type, relative to back-to-back critically dry or extreme critically dry water years. California Fish and Wildlife also submitted additional clarification, data, and analysis for their recommendations for: (1) South Yuba River Block Flows below Spaulding dam; and (2) Fish Stocking in Project Reservoirs.

On November 12, 2013, we held a section 10(j) meeting with California Fish and Wildlife to attempt to resolve the inconsistencies. California Fish and Wildlife recommendations discussed at the meeting related to the Upper Drum-Spaulding Project included: (1) Reservoir Fish Stocking; and (2) Block Flows for water temperature management in South Yuba River below Lake Spaulding dam. During the meeting, we resolved some, but not all, of the inconsistencies. The specifics of each

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[3] NMFS' recommendations would not be instituted until some indeterminate time and the events upon which these measures are expressly conditioned might never occur. Actions contingent upon uncertain future actions are not specific measures to protect, mitigate, or enhance fish and wildlife. Therefore, we do not consider these measures under section 10(j) of the FPA.

[4] As discussed in Sections 5.1.2.3 and 5.5.2.3, the BO issued by NMFS was subsequently withdrawn.

recommendation's inconsistency and our determinations are discussed below. NMFS did not request, nor did they participate in the section 10(j) meeting.

*Reservoir Fish Stocking*

In the draft EIS, we did not recommend adopting California Fish and Wildlife's 10(j) recommendation that PG&E fund, on an annual basis, the stocking of fish in Blue, Carr, Culbertson, Feeley, Fordyce, Fuller, Lower Lindsey, Upper Lindsey, Meadow, Lower Rock, Upper Rock, White Rock, and Rock Creek Lakes; Lake Sterling; Lake Valley; Lake Spaulding; and Halsey forebay. California Fish and Wildlife also recommended that PG&E annually consult with California Fish and Wildlife to obtain fish stocking targets, fish species, discuss fish acquisition, and verify the completion of the previous year's stocking commitment. Instead of the funding,[5] we recommended that PG&E develop and implement a Fish Stocking Plan. However, our recommended plan would not require PG&E to annually stock all of the reservoirs recommended by California Fish and Wildlife. We recommended that PG&E review fish stocking for its project reservoirs to determine which reservoirs would be stocked in a given year based on changes in recreational use and angling pressure. In addition, we did not recommend aerial stocking of remote lakes because of the potential cost, current levels of angler use, and availability of excellent fishing opportunities in other project reservoirs. We concluded that the cost of the California Fish and Wildlife's recommendation ($77,000 annually) was not worth the benefits as compared to our recommendation ($38,000 annually). Therefore, we made a preliminary determination that California Fish and Wildlife's recommendation was inconsistent with the public interest standard of section 4(e) and the comprehensive standard of section 10(a) of the FPA.

California Fish and Wildlife provided additional information on fish stocking costs in its August 22, 2013 draft EIS comment letter. California Fish and Wildlife explained that the costs for aerial stocking in the high elevation mountain lakes are, in reality, relatively inexpensive and the price of fingerlings is cheap. California Fish and Wildlife estimated that their cost to stock fish, including aerial operations and hatchery rearing of fingerling fish, would be about $160 per lake annually. In contrast, PG&E estimated the average annual cost per reservoir for fish stocking as about $11,800 including purchase of fish and contracting for aerial stocking through private sources. At the 10(j) meeting, California Fish and Wildlife indicated it would be willing to contract with PG&E to provide fish and planes for stocking when available, which would reduce the cost of the aerial stocking. California Fish and Wildlife noted and under its recommendation, not all reservoirs would be stocked annually.

Based on the discussion at the 10(j) meeting, we now agree that aerial stocking of remote lakes should be considered as part of the Fish Stocking Plan that would be reviewed annually to determine which reservoirs should be stocked in a given year. Our recommendation, however, is based on the premise that California Fish and Wildlife provide airplanes to PG&E for aerial stocking. Our recommended Fish Stocking Plan would still not require that PG&E stock all of the project reservoirs

[5] As a general matter, it is the Commission's policy to require licensees to implement necessary license conditions and not to provide funding to other entities. The Commission has no authority to ensure that providing funding to California Fish and Wildlife would accomplish a project purpose or ameliorate a project effect. However, the Commission can enforce specific measurable actions by the licensee, such as the development and implementation of a fish stocking plan to ensure that fish stocking at project reservoirs would support current and anticipated future fishing pressure at the project reservoirs.

annually. Reservoirs recommended for stocking by California Fish and Wildlife would be reviewed annually as a part of the Fish Stocking Plan in order to determine which reservoirs would be stocked in a given year. During the section 10(j) meeting, California Fish and Wildlife agreed that this issue had been resolved. PG&E has not taken issue with our recommendation on fish stocking.

*Block Flows in the South Yuba River below Lake Spaulding Dam*

In the draft EIS, we did not recommend California Fish and Wildlife's recommendation for incremental annual releases of water above the specified minimum streamflow for South Yuba River below Lake Spaulding dam between June 15 and September 15 in critically dry, dry, below normal, above normal, and wet water years (Block Flow recommendation). California Fish and Wildlife's objective is to manage water temperatures immediately upstream of the Canyon Creek confluence to maintain water temperatures at less than 19ºC with a goal of enhancing habitat for resident rainbow trout farther downstream in South Yuba River below the Canyon Creek confluence. California Fish and Wildlife recommends that the "Block of Water" allocated for this purpose not exceed 2,500 acre-feet annually. During implementation of California Fish and Wildlife's Block Flow recommendation, frequent (weekly or daily) consultation between the agencies and PG&E would be required and potential flow adjustments could be required at 8-hour intervals, particularly during periods of hot weather.

We instead recommended Forest Service condition 32, *Supplemental Flows for the South Yuba River* (Supplemental Flow recommendation), which has a similar goal for management of water temperature, but with the objective of maintaining water temperatures below 20ºC above the confluence of Canyon Creek compared to 19°C under the Block Flow recommendation. Consultation and flow adjustments each year would be in 10 cfs increments as needed monthly between July 1 and September 15 compared to weekly or daily adjustments under the Block Flow recommendation. Although the Block Flow would increase angling opportunities downstream of the Canyon Creek confluence to a greater degree than our Supplemental flow recommendation, we determined that the Block Flow recommendation would: (1) negatively affect the foothill yellow-legged frog because water temperatures in Canyon Creek habitat utilized by the frogs would be reduced below optimum conditions for spawning, growth, and development of early lifestages; (2) have a greater adverse effect on water supply and power generation; (3) be more difficult to administer due to the frequency of consultation and flow manipulation; and (4) not be worth the additional cost of $20,000 annually for consultation, coordination, and implementation compared to implementation of the Supplemental Flow condition. Therefore, in the draft EIS, we made a preliminary determination that California Fish and Wildlife's Block Flow recommendation was inconsistent with the public interest standard of section 4(e) and the comprehensive standard of section 10(a) of the FPA.

California Fish and Wildlife responded requesting greater detail for the determination of inconsistency, clarifying its management objectives for water temperature in the South Yuba River below Lake Spaulding dam, and providing supplemental information to support the potential benefit of its Block Flow recommendation. Additional data and references for distribution and thermal requirements of foothill yellow-legged frog and hardhead were provided by California Fish and Wildlife. The agency also provided further critique of the thermal modeling and temperature data used by PG&E to compare its Block Flow recommendation and our Supplemental Flows recommendation for the South Yuba River. The data presented in these references and the additional analysis of the thermal modeling did not alter our finding that the Block Flow temperature objective has the potential to adversely affect existing foothill yellow-legged frog populations in the South Yuba River.

At the 10(j) meeting, California Fish and Wildlife also indicated that the Block Flow recommendation would help to address the listing of this reach of the South Yuba River as water temperature impaired under CWA section 303(d).

In the final EIS, we analyze the predicted changes and differences in water temperature in the South Yuba River between Lake Spaulding dam and Englebright reservoir associated with these two flow recommendations. We also consider the potential effect of these temperatures on other special-status species (e.g., foothill yellow-legged frog), reviewing recent information provided by the agencies on the thermal requirements and optimal thermal conditions for these species. Our analysis and recommendation seek to balance the potentially conflicting habitat requirements of resident rainbow trout and foothill yellow-legged frog in the South Yuba River.

Rainbow trout are ubiquitous in project-affected reaches and a quality recreational fishery exists in the South Yuba River below Lake Spaulding dam. Although both our recommended and California Fish and Wildlife's water temperature management approaches would enhance aquatic habitat for resident rainbow trout, the Block Flow recommendation would enhance and extend coldwater habitat for resident trout farther downstream. However, we maintain that habitat adequate for early development and growth of foothill yellow-legged frog is more limited and could be constrained by higher flows and associated decreased water temperatures associated with the Block Flow recommendation. California Fish and Wildlife has not provided any new information that would alter this conclusion.

Implementation of required minimum streamflows and the Forest Service Supplemental Flow conditions for the South Yuba River below Lake Spaulding dam would at least partially address thermal conditions associated with listing of this reach for temperature under CWA section 303(d). However, the differences between the Block Flow recommendation and our recommended supplemental flows are predicted to diminish with distance downstream, particularly below the Poorman Creek confluence. The slight difference in temperature between our recommended Supplemental Flow and the Block Flow recommendation below Poorman Creek would not significantly affect the conditions associated with listing of the reach under CWA section 303(d).

Implementation of our Supplemental Flow recommendation in conjunction with additional Forest Service conditions including the Consultation Group specific to the South Yuba River for water temperature management (Forest Service condition 2), and monitoring plans for fish populations, foothill yellow-legged frog, aquatic benthic macroinvertebrates, water temperature and stage, and channel morphology would provide data to continue to evaluate on an annual basis the effects of flow modifications (e.g., minimum streamflows, Supplemental Flows, spill cessation) in project-affected stream reaches and provide an opportunity for fine tuning of flows.

For the reasons noted above we continue to conclude that California Fish and Wildlife's Block Flow recommendation is inconsistent with the public interest standard of section 4(e) and the comprehensive standard of section 10(a) of the FPA.

In summary, of the 69 recommendations (July 30, 2012 filing) and amended recommendations (August 22, 2013 filing) and associated subparts submitted by California Fish and Wildlife that are applicable to the Upper Drum-Spaulding Project, we consider 24 to be within the scope of section 10(j). The General Measures include 1 subpart, Flow Measures include eight 8 subparts, and *Terrestrial Protection Measures* include seven 7 subparts. Of the 24 recommendations within the scope of section 10(j), we wholly include 22, modify 1 (recommendation 17, *Reservoir Fish Stocking*), and do not include 1 (recommendation 2.9, *Block Flows*). We discuss the reasons for not including those recommendations below and in section 5.1.2, Comprehensive Development and Recommended Alternative. Table 5-2 indicates the basis for our determinations concerning measures that we consider inconsistent with section 10(j). Of the 45 recommendations that are not within the scope of section 10(j), 29 are California Fish and Wildlife standard conditions, identical to some of the Forest Service's 4(e) standard conditions; the other 16 are considered 10(a) recommendations. Of the California Fish and Wildlife standard conditions, we only address the following recommendations in our final EIS: condition 1, *Consultation*; condition

12, Protection of Forest Service Special Status Species; condition 16, *Pesticide Use Restrictions on NFS Lands*; condition 23, Hazardous Substances Plan; condition 27, *Slope Stability and Facility Release Access Plan*; and condition 28, *Watershed Restoration Plan*. The remaining 23 California Fish and Wildlife standard conditions are not specific recommendations for protection, mitigation, or enhancement of fish and wildlife resources.

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 1 | Consultation. | California Fish and Wildlife (recommendation 1) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $24,000 | Yes |
| 2 | Annual employee training. | California Fish and Wildlife (recommendation 1.1) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $48,000 | Yes |
| 3 | Coordinated Operations Plan. | California Fish and Wildlife (recommendation 1.2) | Yes | $17,000 | Yes |
| 4 | Determine water year type in February, March, April, May, and October of each year based on unimpaired runoff in Yuba River at Smartsville as set in California DWR Bulletin 120. | California Fish and Wildlife (recommendation 2.1) | Yes | $8,000 | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 5 | Higher minimum streamflows in 11 project-affected reaches, new minimum streamflows in 13 project-affected reaches with no existing minimum flows, and the same minimum streamflows in 1 project-affected reaches. | California Fish and Wildlife (recommendation 2.2 and 2.4) | Yes | $3,080,000 | Yes |
| 6 | Canal Outage—Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Provide required minimum instream flow or inflow, whichever is less. For canal outages expected to extend past 30 days consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the outage period. Notify agencies within one business day in event of emergency outage. Do not take Drum canal out of service at same time as Lower Drum Project's Bear River canal. | California Fish and Wildlife (recommendation 2.5) | Yes | $5,000 | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 7 | Fordyce Lake Drawdown—Manage discharge from Fordyce Lake after spills cease at Fordyce Lake and Lake Spaulding. The high target flow (475-450 cfs) from Fordyce Lake should not cause additional spill from Lake Spaulding. End of year carryover storage at Fordyce Lake would be 7,500 to 10,000 acre-feet. Releases would be apportioned between 29,000 and 10,000 acre-feet. A flow of 50 cfs would be maintained for an OHV event during a 10-day period beginning in the third week of August. | California Fish and Wildlife (recommendation 2.6) | Yes | $5,000 | Yes |
| 8 | Flow Releases to Bear River below Drum canal at YB-137—Construct and operate two flow release devices near Drum canal spillway, releasing 1 cfs in extremely critically dry and critically dry water years and 2 cfs in all other water years. | California Fish and Wildlife (recommendation 2.7) | Yes | $15,000 | Yes |
| 9 | Spill Cessation and Minimization of Flow Fluctuations in South Yuba River—Implement a spill cessation schedule at Lake Spaulding dam to minimize rapid flow reduction and fluctuation in the South Yuba River downstream. | California Fish and Wildlife (recommendation 2.8) | Yes | $53,000 | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 10 | Block Flows for Management of Water Temperature in South Yuba River—Release up to an additional 2,500 acre-feet of water to the South Yuba River below Lake Spaulding dam between June 15 and September 15 in all water year types except extremely critically dry water years to maintain water temperatures below 19°C above the confluence of Canyon Creek. | California Fish and Wildlife (recommendation 2.9) | Yes | $0 | No, the objectives of this recommendation would be accomplished by the Forest Service Supplemental Flow condition (32) recommended by staff. |
| 11 | Establish an Ecological Group to assist with the implementation of license measures and the monitoring plan. | California Fish and Wildlife (recommendation 2.10) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes, except this group would only monitor the implementation of the adopted Supplemental Flow condition (Forest Service condition 32) for management of water temperature. The terms of this recommendation would be fulfilled through implementation of Forest Service condition 2 for a South Yuba River specific Consultation Group as accepted by California Fish and Wildlife. |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 12 | Develop Canal Outages Fish Rescue Plan. | California Fish and Wildlife (recommendation 3) | Yes | $314,000 | Yes |
| 13 | Gaging Plan—Develop a gaging plan to measure streamflow compliance for each of the reaches with a minimum streamflow requirement. | California Fish and Wildlife (recommendation 4) | Yes | $254,000 | Yes |
| 14 | Develop an aquatic invasive species management plan to address aquatic invasive species such as New Zealand mudsnail, Quagga mussels, and zebra mussels. | California Fish and Wildlife (recommendation 6) | Yes | $17,000 | Yes |
| 15 | Implement an integrated vegetation and non-native invasive species management plan. | California Fish and Wildlife (recommendation 7.1) | Yes | $84,000 | Yes |
| 16 | Monitor animal losses in all project canals, including recording details of each animal mortality occurrence. | California Fish and Wildlife (recommendation 7.2) | Yes | $10,000 | Yes |
| 17 | Develop a wildlife crossing plan for the Drum and South Yuba canals; build wildlife crossing structures in the canals according to minimum specifications. | California Fish and Wildlife (recommendation 7.3) | Yes | $193,000 | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 18 | Consult with California Fish and Wildlife when replacing wildlife escape and wildlife crossing facilities regarding specifications and design. | California Fish and Wildlife (recom-mendation 7.5) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $4,000 | Yes |
| 19 | Bear River management through Bear Valley including upper Bear River studies to evaluate geomorphic conditions. Monitor fixed transect cross-sections, substrate, vegetation, and erosion/bank instability sites. | California Fish and Wildlife (recom-mendation 7.6) | Yes | $365,000 | Yes |
| 20 | Bear River management through Bear Valley interim Bear River flow management, and Drum canal operations. Manage flow in the Bear River for winter and planned outage spills from Drum canal to reduce the magnitude of spill flows in the Bear Valley Meadow. | California Fish and Wildlife (recom-mendation 7.6) | Yes | $365,000 | Yes |
| 21 | Implement Bald Eagle Management Plan. | California Fish and Wildlife (recom-mendation 7.7) | Yes | $10,000 | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 22 | Submit a biological evaluation, for approval by appropriate agencies, prior to construction activities on Forest Service or BLM lands that may affect special-status species or critical habitat. | California Fish and Wildlife (recommendation 7.8 and 12) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | No. Special-status species are adequately handled through implementation of PG&E's proposed Integrated Vegetation Management Plan. Biological evaluation is already required prior to new construction. |
| 23 | Annually review current lists of special-status species that might occur in project area and that may be affected by project operations, and suggested procedure to follow if special-status species is detected. | California Fish and Wildlife (recommendation 7.9) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes |
| 24 | Use raptor-safe powerline design and configurations for new powerlines or when replacing existing structures. Replace or retrofit powerlines with substantial raptor-powerline interaction issues. | California Fish and Wildlife (recommendation 7.10) | Yes | $66,000 | Yes |
| 25 | Annually record all incidental observations and details of bird collision/electrocutions at project transmission lines. | California Fish and Wildlife (recommendation 7.11) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $9,000 | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 26 | Document all bat roosts within project buildings, dams, or other structure that may be used as roosting structure; place humane exclusion devices in structure with bats present; perform annual inspection of exclusion devices and structures. | California Fish and Wildlife (recom-mendation 7.12) | Yes | $4,000 | Yes |
| 27 | Develop and implement a monitoring program that would assess the response of large stream, riverine, and upper elevation species to changes in streamflow and temperature. Establish a monitoring program for aquatic species, non-native invasive species, sensitive species, recreation, bear management, and sensitive raptor species. | California Fish and Wildlife (recom-mendation 8) | Yes | $955,000 | Yes |
| 28 | Develop and implement an LWD management plan. | California Fish and Wildlife (recom-mendation 9) | Yes | $58,000 | Yes |
| 29 | Schedule and facilitate a review meeting when the maintenance schedule, water year forecast, and reservoir level forecasts are finalized to discuss the implementation of streamflow and reservoir related conditions, results of monitoring, and other issues related to preserving and protection ecological values. | California Fish and Wildlife (recom-mendation 10) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $15,000 | Yes, however, we suggest that this consultation would be accomplished during the annual consultation meeting under Forest Service condition 1. |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 30 | Develop and implement a plan to evaluate the penstock and other drainage structure emergency and maintenance release points to determine if improvements can be made to minimize potential adverse resource impacts when release points are used. | California Fish and Wildlife (recommendation 11) | Yes | $51,000 | Yes |
| 31 | Recreation Survey, Monitoring, and Future Development Triggers | California Fish and Wildlife (recommendation 12) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife measure 16) | Yes |
| 32 | Review of Recreation Developments | California Fish and Wildlife (recommendation 14) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife measure 16) | Yes |
| 33 | Annual Recreation Coordination Meeting: Each year during the term of the license, arrange to meet with interested agencies for an annual coordination meeting to discuss the measures needed to ensure public safety, and protection and use of recreation facilities. | California Fish and Wildlife (recommendation 15) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife measure 16) | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 34 | Upon issuance of the license, implement the Recreation Plan as approved by the Commission. Recommendation includes site-specific recommendations for recreation facility modifications and improvements. | California Fish and Wildlife (recommendation 16) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $1,906,500 | Yes |
| 35 | Restrict pesticide use on federal lands without prior written approval of appropriate agencies; includes details and restriction on allowed pesticides. | California Fish and Wildlife (recommendation 16) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 36 | Recreation fish stocking: recommends numbers of fingerlings and catchable fish to be stocked; recommends stocking in 16 reservoirs in addition to Lake Spaulding; includes annual consultation with California Fish and Wildlife to obtain fish stocking targets, fish species, discuss fish acquisition, and verify the completion of the previous year's stocking commitment. At PG&E's discretion, either: (1) acquire the fish directly from fish hatcheries approved by California Fish and Wildlife, or (2) reimburse California Fish and Wildlife, to the extent California Fish and Wildlife has fish available, for the cost of the stocking program at the reservoirs listed above. | California Fish and Wildlife (recom-mendation 17) | Yes | $71,000 | Yes, but modified to develop a Fish Stocking Plan that includes annual stocking in Lake Spaulding, Halsey forebay, Lake Valley reservoir, Fuller Lake, and Lower Lindsey Lake, fish stocking every other until the first Form 80 reporting year in Fordyce and Meadow lakes; and would also include provisions for stocking fish in additional project reservoirs based on changes in recreational use and angling pressure over the term of the new license. PG&E would be responsible for ensuring that stocking is carried out under the Fish Stocking Plan. |
| 37 | Develop and implement an Erosion and Sediment Control and Management Plan. | California Fish and Wildlife (recom-mendation 22) | Yes | $149,000 | Yes |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 38 | Develop and implement Hazardous Substances Plan. | California Fish and Wildlife (recommendation 23) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $9,000 | Yes |
| 39 | Develop and implement a Slope Stability Plan. | California Fish and Wildlife (recommendation 27) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $149,000 | Yes |
| 40 | Develop and implement a Watershed Restoration Plan. | California Fish and Wildlife (recommendation 28) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $149,000 | Yes |
| 41 | Implement minimum flows below Bowman Lake (15-75 cfs) and Lake Spaulding (25-75 cfs) to maintain 19°C 7-day mean water temperature at the Poorman Creek confluence with the South Yuba River to support reintroduction of anadromous salmonids above Englebright dam. | NMFS (recommendation 4.1) | No, because it depends upon a future action. | Undetermined | No, recommendation is premature because it depends upon future reintroduction of anadromous fish that has an uncertain schedule. |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 42 | Install additional streamflow and temperature gaging instruments in the South Yuba River at the confluence of Poorman Creek. | NMFS (recom-mendation 4.1) | No, because it depends upon a future action. | Undetermined | No, recommendation is premature because it depends upon future reintroduction of anadromous fish that has an uncertain schedule. Implementation of Water Temperature and Stage Monitoring Plan filed April 11, 2014 would provide some of the recommended information. |
| 43 | Develop and implement an LWD Management Plan for South Yuba River at Lake Spaulding dam for implementation when anadromous species are reintroduced above Englebright dam. | NMFS (recom-mendation 4.2.1) | No, because it depends upon a future action. | Undetermined | No, recommendation is premature because it depends upon future reintroduction of anadromous fish that has an uncertain schedule. |
| 44 | Develop and implement an interim LWD measure for anadromous fish to allow passage/ placement of LWD trapped in Lake Spaulding to South Yuba River below Lake Spaulding dam. Deliver 30 cubic meters of LWD per year to the South Yuba River below Canyon Creek. | NMFS (recom-mendation 4.2.2) | No, because it depends upon a future action. | Undetermined | No, recommendation is premature because it depends upon future reintroduction of anadromous fish that has an uncertain schedule. Forest Service condition 52 includes survey of LWD conditions and would addresses movement of LWD downstream of Lake Spaulding through development and implementation of a plan to manage LWD, as necessary. |

Table 5-2. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 45 | Develop and implement a coarse substrate management plan for the South Yuba River. The plan should quantify the volume of sediment and grain size behind dams and in anadromous reaches, the percent of sediment available for spawning, and an inflow-outflow sediment budget. | NMFS (recom-mendation 4.3) | No, because it depends upon a future action. | Undetermined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish that has an uncertain schedule. |
| 46 | Develop and implement an adaptive management plan for the prospective reintroduction of Chinook and steelhead salmon. | NMFS (recom-mendation 4.4) | No, because it depends upon a future action. | Undetermined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish that has an uncertain schedule. |
| 47 | Implement minimum flows below Bowman Lake (25-50 cfs) and Lake Spaulding (15-30 cfs) for central valley steelhead in the absence of Chinook salmon reintroduction. Maintain 20°C 7-day mean water temperature at the Poorman Creek confluence with the South Yuba River. | NMFS (recom-mendation 6.1) | No, because it depends upon a future action. | Undetermined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish that has an uncertain schedule. |

#### 5.1.4.2 Land Management 4(e) Conditions

In section 2.2.4.1, *Modifications to Applicants' Proposals—Mandatory Conditions, Upper Drum-Spaulding Project*, we list the 4(e) conditions submitted by the Forest Service. There are no BLM or Reclamation lands within the project boundary of the Upper Drum-Spaulding Project. We note that section 4(e) of the FPA provides that any license issued by the Commission "for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation." Thus, any 4(e) condition that meets the requirements of the law must be included in any license issued by the Commission, regardless of whether we include the condition in our staff alternative.

Of the Forest Service's 59 final section 4(e) conditions, we consider 58 conditions to be applicable to the Upper Drum-Spaulding Project, and of those 58 conditions, we consider 23 of the conditions (conditions 3 through 20, 23, 24, 35, 36 and 59) to be administrative or legal in nature and not specific environmental measures. Table 5-3 summarizes our conclusions with respect to the 35 final 4(e) conditions that we consider to be environmental measures. We include wholly in the staff alternative 32 Forest Service conditions as specified by the agencies. We modify two conditions from the Forest Service (condition 53, *Recreation Plan* and condition 54, *Recreation Streamflow Information*). We do not recommend one Forest Service condition (condition 44, *Special Status Species*) and; the measures not adopted in total are discussed in more detail in section 5.1.2, *Comprehensive Development and Recommended Alternative.*

Table 5-3. Forest Service 4(e) Conditions for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 1 | Consultation | Forest Service | $24,000 | Yes |
| 2 | Consultation group | Forest Service | $61,000 | Yes |
| 21 | Hazardous Substances Plan | Forest Service | $9,000 | Yes |
| 22 | Pesticide-use restrictions on national forest system lands | Forest Service | $0 | Yes |
| 25 | Annual employee training | Forest Service | $48,000 | Yes |
| 25 | Coordinated Operations Plan | Forest Service | $17,000 | Yes |
| 26 | Water year type | Forest Service | $8,000 | Yes |
| 27 | Minimum streamflows for 6 project-affected stream reaches | Forest Service | $2,778,000 | Yes |
| 28 | Flow setting for 16 remote access dam outlet works | Forest Service | $302,000 | Yes |
| 29 | Canal outages affecting 2 stream reaches | Forest Service | $5,000 | Yes |
| 30 | Fordyce Lake drawdown | Forest Service | $5,000 | Yes |
| 31 | Spill cessation and minimization of flow fluctuation at the South Yuba River below Lake Spaulding dam | Forest Service | $53,000 | Yes |
| 32 | South Yuba River Supplemental Flows | Forest Service | $149,000 | Yes |
| 33 | Canal Outages Fish Rescue Plan | Forest Service | $314,000 | Yes |
| 34 | Gaging Plan | Forest Service | $254,000 | Yes |
| 37 | Aquatic Invasive Species Management And Monitoring Plan | Forest Service | $17,000 | Yes |

Table 5-3. Forest Service 4(e) Conditions for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 38 | Vegetation and Non-native Invasive Plant Management Plan | Forest Service | $84,000 | Yes |
| 39 | Monitor animal losses in project canals | Forest Service | $10,000 | Yes |
| 40 | Replacement of wildlife escape and wildlife crossing facilities | Forest Service | $4,000 | Yes |
| 41 | Wildlife Crossings — Drum and South Yuba Canals | Forest Service | $193,000 | Yes |
| 43 | Bald Eagle Management Plan | Forest Service | $10,000 | Yes |
| 44 | Special-status species | Forest Service | $0 | No, special-status species are addressed in the proposed Integrated Vegetation Management Plan and a biological evaluation would be considered during any project construction activity. No additional condition is necessary. |
| 45 | Annual review of special-status species lists and assessment of new species on federal land | Forest Service | $0 | Yes |
| 46 | Project powerlines | Forest Service | $66,000 | Yes |
| 47 | Raptor collisions | Forest Service | $9,000 | Yes |
| 48 | Bat management | Forest Service | $4,000 | Yes |
| 49 | Facility Release Plan | Forest Service | $149,000 | Yes |
| 50 | Erosion and sediment control and management | Forest Service | $149,000 | Yes |
| 51 | Monitoring Program—Fish Populations | Forest Service | $273,000 | Yes |
| 51 | Monitoring Program—Foothill Yellow-legged Frog | Forest Service | $62,000 | Yes |

Table 5-3. Forest Service 4(e) Conditions for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 51 | Monitoring Program—Western Pond Turtle | Forest Service | $2,000 | Yes |
| 51 | Monitoring Program—Channel Morphology | Forest Service | $42,000 | Yes |
| 51 | Monitoring Program—Water Temperature and Stage | Forest Service | $76,000 | Yes |
| 51 | Monitoring Program—Aquatic Benthic Macroinvertebrates | Forest Service | $39,000 | Yes |
| 51 | Monitoring Program—Riparian Vegetation | Forest Service | $5,000 | Yes |
| 52 | Large Woody Debris Management Plan | Forest Service | $58,000 | Yes |
| 53 | Recreation Plan | Forest Service | $2,010,500 | Yes, we recommend implementation of the September 2013 Recreation Plan filed with Forest Service final conditions on November 21, 2013, as modified by staff (See section 5.1.2.1 and 5.1.2.2 for a discussion of the modifications.). |

Table 5-3. Forest Service 4(e) Conditions for the Drum-Spaulding Project Applicable to the Upper Drum-Spaulding Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 54 | Recreation streamflow information | Forest Service | $8,800 | Yes, but modified to include 15-minute interval reporting of streamflow information for the four reaches (Fordyce Creek below Fordyce dam, South Yuba River below Kidd Lake and Lower Peak Lake dam [at Cisco Grove], South Yuba River below Lake Spaulding at Lang's Crossing, and the Bear River at Highway 20) where it is currently provided in 15-minute intervals and also require submittal of streamflow information plan to the Commission for approval. |
| 55 | Visual Resource Management Plan | Forest Service | $3,000 | Yes |
| 56 | Historic Properties Management Plan | Forest Service | $771,000 | Yes |
| 57 | Transportation Management Plan | Forest Service | $726,000 | Yes |
| 58 | Fire Management and Response Plan | Forest Service | $2,000 | Yes |

## 5.2 LOWER DRUM PROJECT

### 5.2.1 Comparison of Proposed Project and Alternatives

In this section, we compare the developmental and non-developmental effects of PG&E's proposal, PG&E's proposal as modified by staff (staff alternative), and the no-action alternative.

We estimate the annual generation of the project (Halsey, Wise, Wise No. 2, and Newcastle Developments) under the three alternatives identified above. Our analysis shows that the generation would be 142,100 MWh for the proposed action; 142,100 MWh for the staff alternative; and 155,500 MWh for the no-action alternative.

We summarize the environmental effects of the different alternatives in table 5-4.

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Generation** | 155.5 GWh | 142.1 GWh | 142.1 GWh |
| **Geology and Soils** | Project-related erosion and sedimentation occurring on project lands or waters resulting from project operation would continue to occur. | Implementation of Erosion and Sediment Control and Management and Canal Release Point Plans would minimize short- and long-term erosion and sedimentation resulting from project operation and proposed project construction. | Same as proposed action. |
| **Aquatic Resources** | Existing minimum streamflows do not vary with type of water year, creating restricted seasonal and interannual flow variability typical of regulated streams with limited aquatic habitat and fish production. | Water Year Type -- To provide interannual flow variation minimum instream flow requirements would be dependent on six different water year types: extremely critically dry; critically dry; dry; below normal; above normal; and wet. | Same as proposed action. |

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Provide existing minimum streamflows in one stream reach; two project-affected stream reaches would continue to have no required minimum streamflow providing no aquatic habitat. | Minimum Streamflows -- Provide same or higher minimum streamflows depending on water year in one project-affected reach and new minimum streamflows in two project-affected reaches with no existing minimum streamflows. The higher streamflows would increase fish habitat for all resident fish species. | Same as proposed action. |
| | Fish would continue to be lost due to canal dewatering and reduction of minimum flows would adversely affect downstream aquatic habitat. | Canal Outages -- To facilitate planning for resources protection, notify licensing participants of all annual planned and non-routine planned canal outages; provide required minimum instream flow or inflow whichever is less. For canal outages expected to extend past 30 days consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the outage period; notify agencies within one business day in event of emergency outage. Bear River canal would not be taken out of service at the same time as the Upper Drum-Spaulding Project's Drum canal. | Same as proposed action. |

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Diversion of water released from Rollins dam at Bear River canal diversion dam has potential to result in non-compliance with Bear River minimum flow requirement at downstream gage YB-196, with the potential for reducing aquatic habitat. | Coordinate Operations of Lower Drum (Halsey Development) and Yuba-Bear (Rollins Development) Projects to maintain compliance with minimum streamflows in the Bear River below Rollins dam; if flows at YB-196 are not in compliance with specified minimum streamflow, water would not be diverted by PG&E to the Bear River canal until compliance is achieved. | Same as proposed action. |
| | Some fish residing in canals may be lost when canals are drained during an outage. | Implementation of Fish Protection and Management During Canal Outages Plan, filed November 21, 2013, would minimize loss of fish. | Same as proposed action. |
| | Existing stream gages would continue to operate as designed. Unable to monitor compliance with minimum flows for stream reaches without gages. | Implement Forest Service/BLM Gaging Plan, filed April 11, 2014-- Measure streamflow in each project-affected reach to demonstrate compliance minimum streamflow requirement. Modify existing gages or install new streamflow gages in some of the reaches with a higher or new minimum instream flow requirement. | Same as proposed action. |
| | No active plan to limit or prevent spread and growth of aquatic invasive species. | Development and implementation of an Aquatic Invasive Species Management and Monitoring Plan would minimize the spread of aquatic invasive species. | Same as proposed action. |

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | No ongoing fish population monitoring, so effectiveness of existing measures unknown. | Implement Fish Population Monitoring Plan in Dry Creek below Halsey afterbay, Auburn Ravine and Mormon Ravine filed November 21, 2013. | Same as proposed action. |
| | No collection of information on occurrence of western pond turtle in project-affected areas. | Document and report incidental observations of western pond turtle in conjunction with other monitoring and operations. | Same as proposed action. |
| | No ongoing water temperature and stage monitoring, so effectiveness of existing measures unknown. | Water temperature would be monitoring in conjunction with fish surveys. | Develop and implement Water Temperature and Stage Monitoring Plan for Lower Drum Project-affected stream reaches consistent with Forest Service recommendation 2 to provide data to evaluate effects of flow and operational changes on aquatic habitat. |
| | No ongoing aquatic benthic macroinvertebrate monitoring, so effectiveness of existing measures unknown. | No sampling of Lower Drum project reaches proposed. | Development and implementation of Aquatic Benthic Macroinvertebrate Monitoring Plan consistent with Forest Service recommendation 3 for Lower Drum Project-affected stream reaches would provide data to evaluate the effects of flow and operational changes on aquatic resources. |

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Terrestrial** | The spread of non-native invasive plants can impact wildlife habitat. | Implement the March 2013 Integrated Vegetation Management Plan to control the spread of non-native invasive plants and protect wildlife habitat. | Same as proposed action, but modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance. |
| | Special-status species plants may be affected by operation and maintenance activities at the project. | Special status-species would be managed as part of PG&E's proposed March 2013 Integrated Vegetation Management Plan. Special-status plant species would be surveyed, and their status would be reviewed at an annual consultation meeting with federal and state resource agencies. Consistent review and updating of the special-status species list would ensure that project managers are aware of species and their habitats, and what measures may be necessary to protect those species from O&M activities. | Same as proposed action but modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands. |
| | Potential destruction of culturally significant plants. | Same as no-action. | Consult with tribes to identify culturally significant plants and modify the March 2013 Integrated Vegetation Management Plan to identify and protect culturally important species. |

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | No restrictions on use of pesticides or herbicides on federal land that could result in harm to environmental resources. | Implement PG&E's proposed March 2013 Integrated Vegetation Management Plan that includes provisions and guidelines for pesticide use on project lands. This measure would help protect sensitive species and their habitats. | Same as proposed action. |
| | Mortality of deer and other target species would continue to occur and wildlife movement would be restricted. | Consult with appropriate agencies prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings. Monitor animal losses in project canals, including details of mortality.<br>Implement proposed wildlife crossing program to upgrade wildlife crossings for the Bear River Canal and the South Canal. Combined these measures would help to minimize impacts to wildlife and improve wildlife crossings at the project. | Same as proposed action, but recommend inclusion of the proposed wildlife protection and crossing measures in a Wildlife Crossing Management Plan for the project. |
| | Project operation, maintenance, recreational use, and disturbance could affect nesting bald eagles. No project-wide plan for the protection of bald eagles or bald eagle nests. | Implementation of PG&E's proposed July 2013 Bald Eagle Management Plan, filed November 21, 2013, at the project would minimize impacts from operation and maintenance and recreational use. | Same as proposed action. |

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Bats that use project buildings may be affected by project operation and maintenance activities and other human activity. | Document all known bat roosts within project buildings. If bats or signs of roosting are present where staff have routine presence, place human exclusion devices to prevent occupation by bats, and annually inspect exclusion devices. These measures would minimize any impacts to bats. | Same as proposed action, but include proposed measures for bat documentation and protection in a Bat Management Plan for the project. |
| **Threatened and Endangered Species** | VELB may be affected by the loss of its critical habitat, elderberry plants, as a result of project operation and maintenance. | Implement the VELB management provisions of the Integrated Vegetation Management Plan, which include compliance with the March 2003 VELB Conservation Program, consistent with FWS' Biological Opinion. | Same as proposed action. |
| **Recreation Resources** | Existing project recreation facilities would continue to serve the public but may not meet current demand or expectations. | The September 2013 Recreation Plan (filed November 21, 2013) would provide for several modifications and enhancements to project recreation facilities that would increase public recreation opportunities: develop and maintain parking area at Wise forebay and improve and maintain Halsey forebay picnic area. | Same as proposed action |

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Project recreation facilities would continue to be maintained on an as needed basis. | Recreation facility operation and maintenance proposed in the September 2013 Recreation Plan would ensure recreation facility maintenance is done on an appropriate schedule and would enhance the condition, usability, and safety of project recreation facilities. | Same as proposed action. |
| | Monitoring of recreational use at the project would continue to occur on a 6-year cycle, as needed to fulfill the Commission's Form 80 requirements. | Recreation use monitoring proposed in the September 2013 Recreation Plan would enhance the level of information gathered on recreational use beyond the Form 80 requirements at the project facilities, as well as on facility condition. | Same as proposed action. |
| **Cultural** | Significant cultural resources (i.e., historic properties) would be adversely affected by project-related activities. | Implementation of the HPMP, filed September 23, 2013, upon license issuance would protect cultural resources and resolve project-related adverse effects to historic properties. | Same as proposed action. |
| **Land Use** | Continue to comply with existing regulations for hazardous materials. | Develop and implement a Hazardous Substances Plan to identify acceptable prevention and mitigation measures and to ensure that hazardous substances are promptly contained or cleaned up. | Same as proposed action, but apply plan to all project lands. |

Table 5-4. Comparison of Alternatives for the Lower Drum Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Continue to maintain all project roads and facilities. | Implement the Transportation Management Plan, filed August 29, 2012, to improve road management and to ensure public access to project lands and waters and the adequate protection of natural and environmental resources. | Same as proposed action. |
| | The project boundary would include facilities not necessary for the continued operation of the project and would not include all primary project roads and recreation facilities. | Revise the project boundary to separate the existing Drum-Spaulding project into three, separate projects: Upper Drum-Spaulding, Lower Drum, and Deer Creek. | Same as proposed action. |
| | Continue to follow State of California and local rules and regulations. Continue to implement emergency response preparedness requirements. | Implement the Fire Prevention and Response Plan, filed November 21, 2013, for federal project lands to reduce the occurrence of wildfires in the project area, and to minimize damage to natural resources. | Revise the Fire Prevention and Response Plan to include all project lands and a periodic review and update of the plan. |
| **Aesthetic Resources** | Visual quality would be impacted by project facilities. | Implement the Visual Resource Management Plan, filed June 18, 2012, to reduce project visual effects and improve visual quality in the project area. | Same as proposed action. |

### 5.2.2 Comprehensive Development and Recommended Alternative

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreation opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary

of, our recommendations for relicensing the Lower Drum Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the staff alternative as the preferred alternative for the Lower Drum Project. This alternative includes elements of the applicant's proposal, section 4(e) conditions, resource agency recommendations, alternative conditions under EPAct, and some additional measures. We recommend this alternative because: (1) issuance of a new hydropower license by the Commission would allow PG&E to operate the project as an economically beneficial and dependable source of water and electrical energy for its customers; (2) the 39.7 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended measures would protect and enhance fish and wildlife resources and would provide improved recreation opportunities at the protect.

Finally, for the reasons outlined in section 5.2.2.3, we recommend that certain 4(e) conditions specified by Reclamation, in whole or in part, not be included in the staff alternative. We recognize, however, that the Commission is required to include valid 4(e) conditions in any license issued for the project. As such, each of the measures that staff recommend be modified in the staff alternative would not be included in any license issued by the Commission. Instead, those staff-modified conditions would be replaced with agencies' corresponding final conditions, as filed with the Commission.

Of the four Reclamation section 4(e) conditions we consider to be environmental measures, we wholly include three in the staff alternative as specified by Reclamation and recommend that one condition be modified: *Discovery of Cultural Resources* (condition b.11).

In the following section, we make recommendations as to which environmental measures proposed by PG&E or recommended by agencies or other entities should be included in any license issued for the project. In addition to PG&E's proposed environmental measures, we recommend additional staff-recommended environmental measures to be included in any license issued for the project, and we describe these requirements in the draft license articles in appendix F.

#### 5.2.2.1 Measures Proposed by PG&E

Based on our environmental analysis of PG&E's proposal in section 3, and the costs presented in section 4, we conclude that the following environmental measures proposed by PG&E would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project. Our recommended modifications to PG&E's proposed measures are shown in *italic* text.

**General Measures**

- Consult annually with Reclamation to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize staff with special-status species, noxious weeds, and sensitive areas known to occur within the project boundary on Reclamation land, and the procedures for reporting to Reclamation.

- Prepare and implement a Coordinated Operations Plan for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

**Geology and Soils**

- Implement an Erosion and Sediment Control and Management and Canal Release Point Plans to minimize and control project-related erosion; the plan would provide for project-wide implementation of best management practices (BMPs) to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and implementation of repair and restoration plans, as necessary.

**Aquatic Resources**

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98.

- To enhance aquatic habitat and protect resident aquatic species, provide the same or increased minimum streamflows to one project-affected reach and provide new minimum streamflows to two project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 of this EIS as listed below. During canal outages, minimum streamflows in Auburn Ravine would equal natural inflow from upstream of the PG&E's point from South canal.

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Dry Creek – below Halsey afterbay dam | 3-142 |
| Rock creek – below Rock Creek diversion dam | 3-143 |
| Mormon Ravine | 3-146 |

- Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Implement modified minimum streamflows in project canal-affected stream reaches during the first 30 days of canal outages, as shown in appendix A-2, table 3-181. For canal outages anticipated to extend past 30 days, consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage. Bear River canal would not be taken out of service at the same time as the Upper Drum-Spaulding Project's Drum canal.

- Coordinate operations with the Yuba-Bear Project at Rollins dam and Bear River canal diversion dam to ensure maintenance of minimum streamflows at downstream compliance point in the lower Bear River. Consistent with Forest Service 10(a) recommendation 4 and California Fish and Wildlife recommendation 2 (Part 3) water would not be diverted by PG&E to Bear River canal (Lower Drum Project), if minimum streamflows are not being met at the compliance point, YB-196, below the Bear River diversion dam.

- Implement Forest Service/BLM Gaging Plan (filed April 11, 2014) to demonstrate compliance with minimum streamflow conditions in new license including modification or installation of gages, as necessary.

- Implement the Fish Protection and Management during Canal Outages Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Implement Fish Population Monitoring Plan (filed November 21, 2013) to assess the effects of flow modifications on fish populations in project-affected reaches.

- Implement procedures to document and report incidental observation of the western pond turtle in conjunction with other monitoring and operations.

- Develop and implement an Aquatic Invasive Species Management and Monitoring Plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

**Terrestrial Resources**

- Implement the March 2013 Integrated Vegetation Management Plan (filed November 21, 2013) on federal lands that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and includes control of non-native invasive species, provisions for special-status species, provisions for pesticide use, and annual review and training, consultation, and reporting, *as modified to apply to all accessible project lands (particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance), require consultation with tribes to identify culturally significant plants, and protect culturally important species.*

- Monitor animal losses from drowning in project canals.

- Consult with California Fish and Wildlife and appropriate federal agencies when replacing wildlife escape and crossing facilities.

- Retrofit existing structures or construct new wildlife crossings at the Bear and South canals to minimize wildlife injury and mortality associated with movement across these project canals, *and prepare a Wildlife Crossing Management Plan for the project that includes provisions for replacement/addition of wildlife crossing, consultation, monitoring, and reporting.*

- Record annually all incidental observations of bird collision/electrocutions along the Bowman-Spaulding transmission line and replace or retrofit problem power poles as appropriate. Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality. *Include these measures in an Avian Management Plan for the project including provisions for raptor monitoring and protection.*

- Implement a Bald Eagle Management Plan (filed November 21, 2013) to protect eagle nesting from disturbance during project operations and maintenance, and project-related recreation activities.

**Threatened and Endangered Species**

- Implement the VELB provisions of the March 2013 Integrated Vegetation Management Plan, consistent with VELB conservation measures to avoid or minimize the loss of elderberry shrubs.

**Recreation Resources**

- Implement the September 2013 Recreation Plan (November 18, 2013) to develop and maintain parking area at Wise forebay and improve and maintain Halsey forebay picnic area.

**Cultural Resources**

- Implement the HPMP (filed September 23, 2013) upon license issuance to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register.

**Land Use and Aesthetic Resources**

- Revise project boundaries to reflect separation of proposed Lower Drum Project from the existing Drum-Spaulding Project.

- Implement the Transportation Management Plan (filed August 29, 2012) to ensure that project roads are adequately maintained.

- Implement the Fire Prevention and Response Plan (filed November 21, 2013) on federal project lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project, *as revised to include all project lands and to include a period of review and revision.*

- Develop and implement a Hazardous Substances Plan for Oil and Hazardous Substances Storage and Spill Prevention and Cleanup, *as revised to include all project lands*.

- Implement a Visual Resource Management Plan (filed June 18, 2012) on federal land to protect visual and aesthetic resources on and adjacent to project lands.

#### 5.2.2.2 Additional Measures Recommended by Staff

In addition to PG&E's proposed measures listed above (and modified as indicated), we recommend the following staff-recommended measures in any license that may be issued for the proposed Lower Drum Project:

- Develop and implement an aquatic benthic macroinvertebrate monitoring plan consistent with Forest Service recommendation 3 to monitor effects of flow and operational changes on aquatic benthic community.

- Develop and implement water temperature and stage monitoring plan consistent with Forest Service recommendation 2 to monitor effects of flow and operational changes on aquatic habitat.

- Develop and implement a Fish Stocking Plan that addresses annual stocking in Halsey forebay, and includes provisions for stocking fish in additional project reservoirs, including Rock Creek, based on monitoring of recreational use and angling pressure over the term of the new license.

Below, we discuss our rationale for some of the key proposed and additional staff-recommended measures.

*Minimum Streamflows*

To protect and enhance aquatic resources, PG&E, the Forest Service, BLM, Reclamation, and California Fish and Wildlife have agreed on minimum streamflows for all project-affected reaches. These flows would generally be the same or higher than under the existing license and, in some cases, higher than estimated unregulated streamflows during the dry summer period. Many of these project-affected stream reaches have no minimum streamflow requirement under the existing license.

The proposed minimum streamflows vary depending on six water year types from extreme critical dry to wet based on California DWR Bulletin 120. These flows, particularly in larger stream reaches with higher base flows, would create seasonal and interannual flow variability more typical of natural unregulated streams. Extensive analysis by PG&E of the relationship of habitat and flow in these reaches supports the finding that the proposed higher minimum streamflows and increased flow variability would protect and enhance aquatic habitat for resident species by increasing habitat, maintaining stream channel geometry, vegetative structure, and gravel, initiating spawning or upstream and downstream fish migration. We estimate that the annualized cost to deliver the proposed minimum streamflows would be $193,000 with an additional $2,000 annual cost to determine and implement flows based on water year types. We recommend adopting these flow measures, because the substantial benefits to fish habitat are worth the cost.

The compliance point (gage YB-196) for minimum streamflows released to the Bear River from Rollins dam (Yuba-Bear Project) is located downstream of proposed Lower Drum's Bear River canal diversion dam. PG&E proposed to implement the measures recommended by Forest Service and BLM under section 10(a), and California Fish and Wildlife under section 10(j), to coordinate operations with NID, such that releases from the Rollins Development and diversions to the Bear River canal are adequately balanced to ensure compliance with minimum streamflows downstream in the Bear River. We estimate that the annualized cost to implement this coordination plan would be $4,000. We recommend adopting this measure as an effective way to ensure continuous compliance with proposed minimum streamflows in the lower Bear River below the Rollins Development and Bear River canal diversion dam at a reasonable cost.

PG&E also proposed to measure compliance by the continuous, instantaneous record from designated existing, modified, or new stream gages maintained and operated consistent with USGS protocols. We conclude that this is a reasonable approach for determining compliance with minimum flow requirements. We estimate that the annualized cost to implement Gaging Plan to demonstrate compliance with minimum streamflow measures would be $32,000. We recommend these proposed compliance measures, because they would be an effective mechanism to demonstrate compliance with proposed minimum streamflows at a reasonable cost.

*Minimum Streamflows in Auburn Ravine*

NMFS (recommendation 7) recommends year-round minimum flows of 6 cfs in Auburn Ravine at the South canal release point to support anadromous salmonids in stream reaches downstream of the South canal release point. NMFS does not provide a habitat analysis or other basis for their minimum flow recommendation. PG&E's proposed minimum streamflows for Auburn Ravine range from 2 cfs to 18 cfs and are supported by their habitat-flow analysis. These proposed minimum streamflows are also recommended by BLM, Forest Service, and California Fish and Wildlife and are the same or higher than minimum streamflows recommended by NMFS in March and April of dry to wet water years, but are less than the NMFS recommendation in other months and years.

Numerous non-project consumptive water withdrawals and deliveries cumulatively affect flows in designated critical habitat in Auburn Ravine in the 2.6-mile-long stream reach between Auburn tunnel

and non-project Auburn Ravine 1 diversion dam, the upstream barrier to adult steelhead migration. With regard to the project, operations at Wise and Wise no. 2 powerhouses directly affect flow and aquatic habitat in Auburn Ravine between PG&E's release from South canal (RM 27.5) and PCWA's Auburn tunnel (RM 26.4). The upstream extent of designated critical habitat for Central Valley steelhead in Auburn Ravine is Ophir cataract (RM 26.6), 0.2 mile above Auburn tunnel. This 0.2-mile-long reach of Auburn Ravine is the only designated critical habitat directly affected by project operations, but the downstream barriers to adult steelhead migration noted above, make it unlikely that steelhead are found in this stream reach.

Flows proposed by PG&E and recommended by BLM, Forest Service, and California Fish and Wildlife vary by water year and month, and would support resident rainbow trout in the upper stream reach of Auburn Ravine. The 6-cfs flow recommended by NMFS in all months and water years would support steelhead in the middle and lower stream reaches of Auburn Ravine. In all months during extreme critically dry and critically dry water years, PG&E proposes minimum streamflows of 2 to 4 cfs. From May through February during dry to wet water years, PG&E proposes minimum streamflows of 4 cfs. During March and April, PG&E proposes minimum streamflows of 2 to 18 cfs, depending on water year (table 3-144, appendix A-1). Between April and November PG&E releases flows from South canal to meet contractual water delivery obligations for consumptive use by NID and PCWA. These flows to meet contractual obligation are unlikely to decrease in the foreseeable future and are typically an order of magnitude higher than the specified minimum streamflows.

The minimum streamflows proposed by PG&E to benefit resident species are more appropriate in the upper stream reach of Auburn Ravine than are the NMFS recommended flows targeting anadromous salmonids that are unable to access this stream reach due to natural and man-made barriers. Based on PG&E's habitat-flow analysis, the 2-cfs difference between PG&E's proposed four flows and NMFS' recommended flows would result in only about a 1 percent increase in habitat for resident rainbow trout adults, juveniles, and spawning and about a 6 percent decrease in fry habitat. In the unlikely event that steelhead gain access to the 0.2 mile of designated critical habitat above Auburn tunnel during a rare but extreme hydrological event, we believe the higher than normal flows would provide sufficient habitat for steelhead spawning, and PG&E's flows for resident trout would provide adequate habitat for steelhead fry and juveniles. Given the numerous non-project discharges and consumptive withdrawals that occur throughout Auburn Ravine, it is unlikely that the difference between the PG&E proposal and NMFS recommendation during drier years could generate any meaningful additional enhancement in habitat for anadromous salmonids in the upper and middle stream reaches of Auburn Ravine and, in particular, in lower Auburn Ravine below Auburn Ravine 1 diversion dam.

We recommend minimum streamflows in Auburn Ravine proposed by PG&E and recommended by BLM, Forest Service, and California Fish and Wildlife. Habitat modeling indicates that PG&E's proposed minimum streamflows are adequate to protect resident aquatic resources in the project-affected reach upstream of Auburn Tunnel. We do not recommend NMFS' proposed minimum streamflows that would provide minimal improvement in available aquatic habitat relative to implementation of PG&E's proposed minimum streamflows. We estimate that the annualized cost for PG&E's proposed plan would be $193,000 related to annualized capital costs and operation and maintenance costs; the annualized cost to implement the NMFS flow would be an additional $105,000. Additional replacement costs for lost power generation associated with implementing minimum streamflows would be about $170,000 annually. We recommend adopting these minimum streamflows for Auburn Ravine that would benefit aquatic habitat for resident rainbow trout and aquatic resources at a reasonable cost.

*Minimum Streamflows in Other Project-affected Western Placer County Streams*

NMFS recommends year-round minimum flows in two western Placer County stream reaches affected by the Wise and Wise No. 2 Developments for Central Valley steelhead and fall-run Chinook salmon in downstream reaches. NMFS' minimum streamflow (recommendation 7) includes 1 cfs in Rock Creek (a tributary to Dry Creek) below Rock Creek reservoir dam and 1 cfs in Dry Creek below Halsey afterbay. PG&E proposed minimum streamflows range between 1 and 3 cfs in Rock Creek below Rock Creek reservoir dam depending on month and water year type. These flows were also recommended by Forest Service and California Fish and Wildlife. PG&E's minimum flows would be higher than NMFS' flow during March of all years and in all months during above normal and wet years. PG&E's proposed and NMFS' recommended minimum streamflows are the same for Dry Creek.

We recommend PG&E's minimum flows proposed for Rock Creek and Dry Creek to support resident fish. PG&E's flows are equal to or greater than NMFS' recommended flows for anadromous fish. However, there are no anadromous fish in the project-affected reaches of Rock Creek below Rock Creek reservoir or Dry Creek below Halsey afterbay dam. Because of natural barriers, the upstream limit of steelhead migration is at Lower Falls (RM 34) on Coon Creek, about 7 to 8 miles below Dry Creek at Halsey afterbay and about 5 to 6 miles below Rock Creek reservoir with numerous intervening non-project discharges and diversions that cumulatively affect streamflows and aquatic resources. Habitat modeling indicates that PG&E's proposed minimum streamflows are adequate to protect resident aquatic resources in the project-affected reach on Dry Creek below Halsey afterbay and Rock Creek below Rock Creek reservoir. We recommend the minimum streamflows proposed by PG&E, and recommended by Forest Service and California Fish and Wildlife, that benefit resident aquatic resources. We note that PG&E's flows would not benefit anadromous salmonids as they are unable to access these reaches. The cost for implementing the proposed minimum streamflows for Dry Creek below Halsey afterbay dam Rock Creek below Rock Creek reservoir dam is included in the estimated cost for implementation of project-wide minimum streamflows. We again conclude that the cost of these flows is worth the benefits to aquatic habitat.

*Canal Outages*

In certain situations, flows released from project canals to stream reaches provide minimum instream flows for protection of aquatic resources. When these canals are taken out of service during planned maintenance or during unplanned emergencies, the canals drain and become dry. In these instances, flow releases from the canals to the stream reaches are interrupted and flow in the stream reaches downstream of the canal are maintained only by natural inflow, which at some locations could be reduced to no flow during some months.

PG&E identified project-affected stream reaches where its ability to deliver minimum streamflows could be affected during maintenance and emergency outages of project canals, conduits, and flumes. During canal outages, PG&E proposes to meet the required minimum flow for that month and water year, or the natural inflow, whichever is less. NMFS did not address flows during canal outages. PG&E proposes to notify all licensing participants at the annual consultation meeting of the past year unplanned and future year planned canal outages, and also propose to notify and consult with licensing participants if a canal outage is anticipated to extend beyond 30 days. The resource agencies recommend these same procedural measures for canal outages.

BLM and California Fish and Wildlife recommend that during a canal outage affecting the South canal release point, the minimum streamflow in Auburn Ravine would be the specified minimum streamflow for that month and water year or 5 cfs, whichever is less. However, the canals themselves are the only source of water available to PG&E that can be used to augment natural flows to comply with higher specified any minimum streamflows. Therefore, during outages of the upstream canal system that

delivers Bear River water through the Wise and Wise No. 2 Development to the South canal, no source of water controlled by PG&E is available to augment flows in Auburn Ravine. Although other non-project sources of water exist, the Commission does not have the regulatory authority to require their use to augment flows in Auburn Ravine. We, therefore, cannot recommend the BLM and California Fish and Wildlife minimum streamflow during canal outages that affect this reach.

PG&E proposes and BLM, Forest Service, and California Fish and Wildlife recommend implementation of a plan to protect fish residing in project canals when a canal is drained during a planned, unplanned, or emergency outage. PG&E filed (August 30 2012) a Fish Protection and Management during Canal Outages Plan that identifies the canals, locations and procedures for fish collection and rescue, and procedures for notifying the resource agencies. The plan would be implemented within the first year following issuance of the license for the Upper Drum-Spaulding Project. We estimate that the annualized cost of this plan would be $30,000. We recommend adopting this measure because it would reduce fish mortality associated with canal outages during planned maintenance and during unplanned emergencies at a reasonable cost.

*Aquatic Invasive Species Monitoring and Management Plan*

The Forest Service (condition 37) and California Fish and Wildlife (recommendation 6) recommend that PG&E prepare and implement an aquatic invasive species management and monitoring plan. These agencies identify the types of information that should be included in the plan. PG&E concurs with the Forest Service condition. In general, the condition includes prevention and educational measures, monitoring, contingency measures if invasive species are found in project waters, and provisions for modification of the plan if more-effective control measures are developed in the future. We recommend that PG&E develop an aquatic invasive species management and monitoring plan consistent with Forest Service condition 37. PG&E would submit the plan to the Commission within 1 year of license issuance and implement the plan upon Commission approval. The estimated annualized cost for implementation of this plan is about $3,000. This would be a reasonable cost to the project and would provide protection from aquatic invasive species within the project boundary.

*Monitoring Program*

As discussed in section 3.3.2.2, proposed increases in minimum streamflows could affect habitat for resident fish species resulting from changes in habitat suitability, water temperature, aquatic and riparian vegetation, and channel morphology. Forest Service (condition 51) recommends implementation of Fish Population Monitoring and Western Pond Turtle Incidental Observations that would apply to Lower Drum Project-affected stream reaches that was submitted (November 21, 2013) by the agency. Forest Service also recommends (recommendation 2) that PG&E develop and implement a water temperature and stage monitoring plan for Lower Drum Project-affected reaches similar to that filed for the Upper Drum-Spaulding Project on April 11, 2014.

The Forest Service condition also describes the elements of monitoring plans for aquatic benthic macroinvertebrates that would be developed after consultation with the agencies within 1 year of license issuance and implemented upon Commission approval. The proposed monitoring plan would assess the effects of new license conditions on the distribution, abundance, and conditions of aquatic resources in selected stream reaches that are most likely to be affected by those new license conditions.

California Fish and Wildlife (recommendation 8) recommends a more comprehensive monitoring program covering multiple project-affected resources including monitoring of aquatic species, non-native invasive species, sensitive plants, recreation resources, cultural resources, wildlife crossing placement and effectiveness, and sensitive raptors. Monitoring for recreation resources, cultural resources, wildlife

crossing placement and effectiveness, and sensitive raptors are included within the analysis of the specific resources.

**Fish Population Monitoring Plan**

The Fish Population Monitoring Plan filed with the Commission November 21, 2013 identifies the specific sampling methods (electrofishing and snorkel observation), frequency, and stream reaches that would be sampled. The plan describes qualitative and quantitative levels (Level I and Level II, respectively) of sampling intensity depending on the stream reach. The purpose of Level I would be for presence/absence and individual fish length and weight; Level II would provide data for fish population estimates. Rock Creek below Rock Creek reservoir would be sampled using Level I during summer or fall in year 4, 10, 15, 20, and 25 after license issuance. Dry Creek below Halsey afterbay would be sampled during years 5 and 10 after license issuance; Auburn Ravine would be sampled in Year 3, 4, 9, 10, 14, 15, 19, 20, 24, and 25, and Mormon Ravine would be sampled in year 5 or the first critically dry or dry year before year 5 and again in year 10. Level II sampling methods would be used for these three stream reaches. Sampling in Auburn Ravine after year 25 would be part of the next relicensing process.

The plan provides specific direction for types of habitat to sample, data recording, and data analyses including age structure, population size and biomass, and fish size and condition. PG&E would provide a draft monitoring report to the Forest Service, BLM, California Fish and Wildlife and California Water Board and other parties who submit a written request for a copy of the draft report for a 45-day written comment period. PG&E would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If PG&E does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. PG&E would file the final monitoring report with the Commission.

PG&E agreed (May 12, 3014) to implement the Fish Population Monitoring Plan. We recommend implementation of the plan because the data generated from implementation of this plan would be used to assess the effects of flow modifications under the new license on resident fish populations in Lower Drum Project-affected reaches and would be worth the estimated average annual cost to implement of about $23,000.

**Western Pond Turtle Incidental Observations**

Forest Service (condition 51) recommends PG&E record and report incidental observations for western pond turtles during all monitoring work. An annual written report would be compiled annually and provided at the Annual Consultation meeting.

Specific surveys for western pond turtle are not appropriate because it is unlikely that this species would be affected by project O&M activities. Nesting and hatching success, key factors affecting the success of populations of western pond turtle that occur in terrestrial habitat, are not affected by changes in project flows and riparian habitat. In addition, effective survey methods for identification of nesting sites have not been developed and focused surveys for western pond turtle in the project boundary are not likely to provide any more detailed data than PG&E's recording of incidental observations. We recommend implementation of the incidental observation and recording of western pond turtle described in Forest Service condition 51. That would provide information on the occurrence of this sensitive species within the project-affected area at a minimal coast of about $1,000 per year.

**Aquatic Benthic Macroinvertebrate Monitoring Plan**

PG&E did not propose to monitor benthic macroinvertebrates in any projected-affected reaches of the Lower Drum Project. Forest Service recommended development and implementation of an aquatic

benthic macroinvertebrate monitoring plan to include one site, co-located with fish population monitoring sites in Dry Creek below Halsey afterbay dam, Rock Creek below Rock Creek reservoir dam, and Auburn Ravine below PG&E's release point from South canal. Monitoring would be performed using the same methods as used for relicensing studies, consistent with the Surface Water Ambient Monitoring Program. Monitoring would be performed annually for the first 10 year then in conjunction with the fish population monitoring schedule.

The plan would describe sampling locations, methods, and schedule. The plan would also describe data handling and analysis, and reporting requirements. A draft annual report would be submitted for agency review and agency comments would be addressed in the final report. A final report would be available at least 30 day prior to the Annual Consultation meeting and would be filed with the Commission.

The Aquatic Benthic Macroinvertebrate Plan would be filed with the Commission within 1 year of license issuance. The plan would be implemented by PG&E upon Commission approval. The estimated annualized cost for the recommended Lower Drum Project Aquatic Benthic Macroinvertebrate Monitoring Plan is about $7,500 per year. This would be a moderate cost to the project and would provide information valuable for assessing the effects of recommended flow and operational changes to the project under the new license.

**Water Temperature and Stage Monitoring Plan**

PG&E did not propose to monitor water temperature, except in conjunction with fish survey events, in any projected-affected reaches of the Lower Drum Project. Forest Service recommended development and implementation of a water temperature and stage monitoring plan to include one site, co-located with fish population monitoring sites in Dry Creek below Halsey afterbay dam, Rock Creek below Rock Creek reservoir dam, and Auburn Ravine below PG&E's release point from South canal, and in Mormon Ravine below Newcastle powerhouse. Monitoring would be performed during the first 2 years following implementation of new minimum streamflows; monitoring would occur between April 1 and November 1.

The plan would describe sampling locations, methods, and schedule. The plan would also describe data handling and analysis, and reporting requirements. A draft annual report would be submitted for agency review and agency comments would be addressed in the final report. A final report would be available at least 30 day prior to the Annual Consultation Meeting and would be filed with the Commission.

The Water Temperature and Stage Monitoring Plan would be filed with the Commission within 1 year of license issuance. The plan would be implemented by PG&E upon Commission approval. The estimated annualized cost for the recommended Lower Drum Project Water Temperature and Stage Monitoring Plan is about $7,500 per year. This would be a moderate cost to the project and would provide information valuable for assessing the effects on aquatic habitat of recommended flow and operational changes to the project under the new license.

*Integrated Vegetation Management Plan*

PG&E's proposed March 2013 Integrated Vegetation Management Plan provides guidance for the management of vegetation on federally owned project lands, as well as vegetation management related to PG&E's operation and maintenance activities within the project boundary. The proposed Integrated Vegetation Management Plan includes provisions for the management of non-native invasive plants, vegetation management related to O&M activities, sensitive area protections, including provisions for special-status plants and wildlife, VELB management, as well as provisions for training, consultation

and reporting. The Integrated Vegetation Management Plan does not apply to all project lands (e.g., invasive species control only applies to federal lands) and does not contain any provisions for the recognition of culturally significant plants and their protection. Invasive weed populations are known to occur outside federal lands and are subjected to similar project-related effects within PG&E's project boundary. Therefore, we recommend that PG&E modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and to include a list of culturally significant plant species that occur in the project area, developed after consultation with tribes. The Integrated Vegetation Management Plan should also include provisions for appropriate monitoring and protection of culturally significant plants species. The estimated annualized cost for the recommended modified Integrated Vegetation Management Plan is about $25,000 per year and the benefits would be worth the cost. Modifying and expanding the plan to apply to all project lands and to incorporate measures for culturally significant plants, would negligibly increase the annualized cost. This would be a reasonable cost to the project and would ensure implementation of protective vegetation management practices would occur on all project lands and would provide adequate protection to culturally significant plants within the project boundary.

*Project Powerlines and Raptor Collisions/Electrocutions*

PG&E proposes to record annually all incidental observations of bird collisions/electrocutions along project powerlines. PG&E also proposes to utilize raptor-safe powerline configurations consistent with APLIC's "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006, the most current version of this document for new powerlines and when replacing existing structures. If raptor monitoring indicates a substantial raptor-project transmission line interaction issue, the poles where the interaction issue occurs on federal land would be replaced or retrofitted. Implementation of these measures would reduce project impacts to avian resources and would minimize risk of avian mortality. If bird collision or electrocution issues are detected, recording incidents and retrofitting structures using the same guidelines would benefit avian resources. These proposed measures are consistent with measures recommended by Forest Service, BLM, and California Fish and Wildlife. However, the benefits derived from these proposed measures would be further enhanced by the development of an Avian Management Plan for the project, that incorporates the proposed provisions, and provides consistent specifications for monitoring and report avian/powerline interactions, and for the implementation of powerline modifications or retrofits through the use of raptor-safe powerline configurations. The estimated cost of PG&E's proposal regarding avian powerline interactions is $40,000 annually. The estimated additional cost associated with incorporation of the proposed provisions into an Avian Management Plan is negligible and would be worth the benefits.

*Wildlife Crossings for the Bear River and South Canals*

PG&E proposes to retrofit existing footbridges or construct new wildlife crossings on Drum and South Yuba canals (Upper Drum-Spaulding and Deer Creek Projects), at specified locations. Specifications for wildlife crossing facilities (slope, width, fence height, etc.) are also specified in the proposal. PG&E also proposes to monitor animal losses from drowning in project canals, and to consult with agencies when replacing escape and crossing facilities. PG&E's proposals are consistent with Forest Service conditions 39, 40, and 41. Implementation of these measures would minimize wildlife entrapment points, create and/or maintain wildlife passage opportunities, and would prevent wildlife mortalities at the project.

We recommend that all of PG&E's proposals relative to wildlife crossing of canals, be incorporated into a single Wildlife Crossing Management Plan for the project. Consolidation of these activities into a single management plan would benefit wildlife by ensuring consistency in managing and

modifying wildlife crossings, as necessary, over the term of the new license. The plan would also ensure consistency in consulting with appropriate agencies regarding canal mortalities and potential changes to wildlife crossings or escape facilities. The wildlife crossing measures proposed by PG&E for the Lower Drum project canals are estimated to cost $49,000 annually. The development and implementation of a Wildlife Crossing Management Plan is estimated to negligibly increase the annualized cost. We believe that the benefits to wildlife would be worth the cost.

As discussed in section 3.3.3.2.2 *Wildlife Movements and Mortality*, mortalities at the Bear and South canals have been relatively high, and improved passage would reduce distances between crossings and minimize barriers to wildlife movement in the Bear and South canals, benefiting the local wildlife populations. Additional and improved crossings would benefit local wildlife populations.

*Valley Elderberry Longhorn Beetle Protection*

Clearing vegetation that may threaten project facilities during the life of the project may result in a loss of elderberry shrubs that provide potential habitat for the VELB, a federally listed threatened species. PG&E has in a place a system-wide VELB Conservation Program that includes the project area. The program provides for pre-construction surveys, educational training, implementation of minimization, avoidance, and protective measures, and monitoring. PG&E also proposes to implement the March 2013 Integrated Vegetation Management Plan, which contains specific provisions and guidance for internal coordination of programmatic protections for VELB and VELB habitat.

Continued implementation of the VELB Conservation Program, consistent with FWS' biological opinion, and the March 2013 Integrated Vegetation Management Plan at the project would ensure that impacts on elderberry habitat would be avoided or minimized, and if impacts do occur, appropriate mitigation would be implemented. Therefore, we recommend that PG&E implement the program and plan in relation to continued operation and maintenance of the project.

*Recreation Plan*

The proposed Lower Drum Project currently provides limited public recreation opportunities. PG&E proposes several specific improvements at Wise forebay and Halsey forebay that would be located in the proposed Lower Drum Project. The general recreation site measures and recreation monitoring measures contained in the September 2013 Recreation Plan would also be applicable to the proposed Lower Drum Project.

At Wise forebay, PG&E proposes the development of a parking area with an information board with resource protection and safety information. Development of a parking area would benefit recreation users by providing a formal parking area at this location where only informal parking currently exists. Installation of an information board at Wise forebay would provide resource protection and safety information and serve as the only information board at the Lower Drum project. At the Halsey forebay picnic area, PG&E proposes to provide accessibility improvements, including upgrading a picnic site adjacent to the accessible restroom to accessible standards with parking and an accessible fishing station. Providing accessible facilities, where feasible, and improving access for all populations would provide additional access to the project and would help address growing recreation demand at the project. We recommend that PG&E implement the proposed improvements at Wise and Halsey forebay in addition to the recreation improvements and general measures proposed in the September 2013 Recreation Plan. In total, the recommended recreation plan for the Lower Drum Project would have an estimated levelized annual cost of about $99,000. We conclude that the benefits of the recommended plan would be worth the cost.

*Fish Stocking Plan*

Angling is one of the primary recreational activities associated with the Upper Drum-Spaulding and Lower Drum projects. Although natural reproduction occurs in some of the project waters, stocking is necessary to sustain populations of game fish in waters with high angler usage. California Fish and Wildlife recommendation 17 and the Forest Service's 10(a) recommendation 8 recommend a fish stocking program that includes 16 lakes, including Halsey forebay and Rock Creek Lake at the proposed Lower Drum Project.

Halsey forebay receives high recreational use while Rock Creek Lake receives low recreational use. About half or more of the visitors to Halsey forebay participated in angling. Because of the high level of recreational angling that occurs at Halsey reservoir this reservoir would most benefit from annual fish stocking.

We recommend that PG&E prepare and implement a Fish Stocking Plan that would be developed after consultation with California Fish and Wildlife, the Forest Service, and FWS, and filed for Commission approval for the Upper Drum-Spaulding and Lower Drum Projects. The plan should address annual stocking at project reservoirs, including Halsey forebay, and include provisions for stocking fish in additional reservoirs, including Rock Creek, based on changes in recreational use and angling pressure over the term of the new license. The plan would provide the means for a coordinated fish stocking program with the flexibility to increase or decrease stocking numbers, change fish stocking sizes, and change the frequency of stocking a particular reservoir over the term of a new license. A Fish Stocking Plan that also includes annual consultation would help address any changes in California Fish and Wildlife fish stocking management targets and the availability of hatchery fish. A Fish Stocking Plan would benefit project visitors and would be worth the estimated levelized annual cost of $23,000.

*Historic Properties Management Plan*

Through implementation of PG&E's final HPMP, project-related adverse effects would be resolved on historic properties. Benefits for the protection and preservation of historic properties would be worth the cost of $771,000 annually.

#### 5.2.2.3 Measures Not Recommended by Staff

Some of the measures recommended or specified by relicensing stakeholders would not contribute to the best comprehensive use of the Yuba River and Bear River water resources, do not exhibit sufficient nexus to the project's environmental effects, or would not result in benefits to non-power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend such measures.

*Bullfrog Eradication*

FWS recommended that PG&E develop a bullfrog eradication plan for all project lakes, reservoirs, and impoundment areas to enhance populations of CRLFs, FYLFs, and other frog species. FWS has not provided any specific evidence of how the project contributes to the presence of in the project area.

As discussed in section 3.3.3.2.2, *Wildlife*, development of a bullfrog eradication program for the project would be impracticable and ineffective. Bullfrogs would likely continue to recolonize the project area from adjacent suitable habitats. Further, bullfrog control has generally been restricted to small ponds that can be drained; control of large reservoirs and rivers has not been shown to be practical (Adams and Pearl, 2007).

Although it is difficult to determine the cost of an eradication program, it is likely to exceed $50,000 per year. We do not believe the benefits would be worth the cost.

*Carnivore Management Plan*

FWS recommended that PG&E develop a Wolverine and Fisher Management Plan to protect these species within designated carnivore management area.

There are no designated wolverine carnivore management area that overlaps the project area. Although Pacific fisher designated carnivore management areas overlap with some of the project areas, the existing populations of Pacific fisher do not overlap with the project boundary. FWS has not provided any evidence of potential project effects to these species. The development of a management plan, as recommended by FWS, would add limited protection to this species due to its lack of use of the available habitat within the project boundary. If issues arise concerning potential project impacts, they can be addressed through the annual consultation meetings. Therefore, we do not recommend development of a Carnivore Management Plan.

*Watershed Restoration Plan*

California Fish and Wildlife recommends that PG&E develop a Watershed Restoration Plan that describes the slopes below open canals and project facilities by existing erosion condition; describes the methods to resolve slopes that have been and would be damaged by past and future breaches of the open canal system; provides an inspection schedule to identify potential failures that would cause releases of water and subsequent damage to watershed resources; and provides a plan to notify California Fish and Wildlife if damage to watershed resources occurs and to describe the actions that would be taken to repair and restore the damaged site. California Fish and Wildlife also recommends a plan for maintenance of release points from penstocks and other project drainage structures

Forest Service and PG&E propose an Erosion and Sediment Control and Management Plan and Canal Release Point Plan (filed April 11, 2014) that include similar provisions to those recommended by California Fish and Wildlife. These plans addresses both project-wide erosion control and sedimentation management needs and measures and specific issues related to steep slopes at project facilities and drainage structures at project canals.

Implementation of a watershed restoration measures recommended by California Fish and Wildlife would alleviate existing erosion damage caused by historical canal operations and spills and minimize any future damage resulting from operations under the new license. We conclude, however, that PG&E's Erosion and Sediment Control and Management Plan and Canal Release Point Plan contain similar provisions that are adequate to provide slope protection and restoration and minimize project-related erosion. The estimated annualized cost to implement PG&E's Erosion and Sediment Control and Management Plan and Canal Release Point Plan is $299,000 which is comparable to the cost to implement California Fish and Wildlife's recommended plans, but the plans filed by PG&E are more complete and effectively provides similar protection to project-affected resources.

*Mormon Ravine Minimum Streamflows and Water Year Type*

Reclamation recommends minimum releases to Mormon Ravine at the Newcastle Development between January and May of extreme critically dry, critically dry, and dry water years for maintenance of the cold water pool in Folsom Lake, which is used to meet Reclamation's water temperature compliance limits in the downstream American River. The recommended flows range from 50 to 200 cfs depending on month and water year. Reclamation also recommends a metric for determination of water year type that differs from PG&E's proposal. Reclamation's proposal is based on Sacramento River flows rather

than the California DWR Bulletin 120 forecast for the Yuba River applied at all other project minimum flow release locations.

Water released to Mormon Ravine at the Newcastle Development is transferred from the upper Yuba River and Bear River basins; therefore, we fail to see the logic in Reclamation's proposal to use Sacramento River flows to determine water year type and recommend that the California DWR bulletin 120 forecast for the Yuba River be used for determination of water year type, consistent with all other project-affected reaches. December through May is typically the period of peak power generation at the Newcastle Development. Historical median monthly flows generally exceed 200 cfs during this period except during canal outages. We do not recommend Reclamation's minimum flow proposal because no source of water would be available to meet Reclamation's minimum flows during outages of the upstream canal system that transfer water from the Yuba and Bear Rivers to the Newcastle powerhouse in the American River basin. The cost for implementing the proposed minimum streamflows for Mormon Ravine below the Newcastle Development is included in the estimated cost for implementation of project-wide minimum streamflows.

*Paleontological Resources*

Reclamation 4(e) condition b.11 and California Fish and Wildlife 10(a) recommendation 19 specify that protection of paleontological resources should be included in the HPMP. Paleontological resources are not cultural resources and, thus, are not eligible for listing on the National Register and cannot be addressed in the HPMP pursuant to section 106**.** The Commission has no jurisdiction over PG&E to enforce these 4(e) conditions and 10(a) recommendations to protect paleontological resources. Paleontological resources are protected by California statute (e.g., Public Resources Code Section 5097.5 (a), Removal or Destruction; Prohibition), appendix G to the CEQA Guidelines that was revised in 2009 to include an assessment of project effects on paleontological resources, and the Paleontological Resources Preservation Act (P.L. 111-011) Omnibus Public Land Management Act of 2009 Subtitle D--Paleontological Resources Preservation. It is the responsibility of the federal land manager to carry out such protective measures. In the case of a new license for the project, PG&E would be responsible for consulting with the federal land manager under these circumstances.

*Inadvertent Discoveries*

Reclamation 4(e) condition b.11 and California Fish and Wildlife 10(a) recommendation 19 state that when inadvertent discoveries are found on Reclamation Forest Service, BLM, or California Fish and Wildlife lands, PG&E would not resume work on ground-disturbing activities until written approval from Reclamation, the Forest Service or BLM is received. PG&E has plans for handling inadvertent discoveries in the HPMP that do not require PG&E to receive written approval from Reclamation, the Forest Service, or BLM to proceed following a discovery. These plans have been reviewed and commented on by the Forest Service, BLM, and tribes. PG&E's alternative 4(e) condition for noticing, consulting, and documenting cultural resources involving inadvertent discoveries would adequately protect historic properties from project-related effects. Therefore, we conclude that the process PG&E has already provided in its HPMP is appropriate.

*Coordination of Projects Operations for Water Supply*

PCWA provides drinking water and water for irrigation to about 150,000 residents in Placer County. PCWA relies on up to 100,400 acre-feet of water purchased from PG&E annually, the water right holder, for delivery to its customers in Zone 1 service area (cities of Auburn, Rocklin, Loomis, Lincoln, and surrounding unincorporated areas). The delivery is facilitated by facilities and water storage associated with the existing Drum-Spaulding Project. PCWA lacks water rights or control of any storage associated with the existing Drum-Spaulding Project.

PCWA is concerned that the Lower Drum Project would not be able to meet water supply obligations without a high level of coordination between the Upper Drum-Spaulding and Lower Drum Projects regardless of the licensee identity. The Lower Drum Project would be wholly dependent on the Yuba-Bear and Drum-Spaulding Projects for the diversion, storage, and release of the water needed to maintain minimum instream flows, consumptive water deliveries, and water for hydroelectric generation. PCWA recommended inclusion of six conditions in the Lower Drum license to mandate coordination with the licensee of the Upper Drum-Spaulding Project to protect the region's future consumptive water supply and assure the continued provision of reasonably priced water to customers in Placer County:

1. Creation of a Consumptive Water Management Advisory Group that would meet at least monthly to develop a collaborative plan for coordinated operation of the Lower Drum and Upper Drum-Spaulding Projects;

2. Development of coordinated operating plan for the Upper Drum-Spaulding and Lower Drum Projects for meeting current year water supply demands and a drought contingency;

3. A requirement that project facilities and Rollins reservoir storage (part of Yuba-Bear Project) be maintained and operated to support consumptive water deliveries, and a restriction on the licensee transferring away consumptive water or water rights needed within the areas historically served by the Drum-Spaulding Project;

4. A requirement that the licensee of the Lower Drum Project enter into an agreement allowing PCWA to withdraw water up to 100,400 acre-feet per year for consumptive use by the public, consistent with long-standing historical use and the minimum instream flows proposed by PG&E in its June 2012 Amended License Application and by other stakeholders in their recommended terms and conditions;

5. Establishment of a priority of uses for water developed and conveyed by the project, consistent with historical practice and the consumptive water supply purposes for which the Drum-Spaulding system was constructed; and

6. A requirement that the licensee provide advance notice and a right of first refusal to PCWA in the event it seeks to sell, transfer, or surrender the project.

Many of the conditions recommended by PCWA address contractual issues, such as cost of deliveries, guarantee of deliveries, and right of first refusal. These issues are not subject to the relicensing process. Further, Rollins reservoir is part of the Yuba-Bear Project, not the Lower Drum Project. Contractual rights that PG&E may have to store water in Rollins reservoir is also not subject to the relicensing process

PG&E has had an agreement with PCWA on the coordination of project operation and water supply that was not part of the existing Drum-Spaulding Project license. The current agreement is in place through 2014. PG&E and PCWA are in the process of negotiating the terms of a new long-term contract for the use of project facilities to deliver water to PCWA. PG&E indicates that the conditions of any negotiated agreement would be made binding on any transferee.

Many of the issues brought up by PCWA concerning coordination of operations will be resolved when ongoing negotiations conclude and result in a final agreement. Further, this issue can be revisited during development of any license orders in the event an agreement is not reached.

In addition, under standard article 10, the Commission, after notice and opportunity for hearing, can require licensees to coordinate the operation of a project hydraulically with other projects in the

interest of beneficial public uses of water resources and can condition licenses concerning the equitable sharing of benefits by a licensee. Any specific issues associated with a different licensee are more properly addressed in a transfer proceeding where greater scrutiny can be given to the continuation of water supply.

PG&E also notes that PG&E and NID have a long standing water management committee to which PG&E indicates that PCWA is invited to participate. The committee meets weekly to address operational coordination of the existing Drum-Spaulding and Yuba-Bear Projects.

The ongoing negotiations concerning development of a long-term coordination agreement between PCWA and PG&E is the proper forum to address water deliveries issues in Placer County. Further, PCWA has not provided any specific issues concerning water deliveries. Potential issues associated with a license transfer are premature. Consequently, we do not believe that license conditions concerning water deliveries are needed.

NID relies significantly on facilities of the existing Drum-Spaulding Project to deliver water to its domestic and agricultural customers and to generate electricity. PG&E relies on the Yuba-Bear Project to augment water supply available to PG&E's power plants, for conveyance of PG&E's water to its customers and power plants, and for seasonal storage of PG&E's water.

Similar to PCWA, NID recommends that the Commission include in any license issued to PG&E a long-term agreement between PG&E and NID that would be binding on transferees assuring that the systems be operated in a coordinated fashion and that the water supply functions be fully protected beyond the term of any resulting licenses. NID believes that no licenses should be issued to PG&E until negotiations between PG&E and NID are completed.

PG&E and NID have an agreement in place and are involved in ongoing negotiations to develop a long-term agreement on coordination of the two systems. As discussed above, we believe that the existing negotiations are the proper forum to address these issues.

### 5.2.3 Unavoidable Adverse Impacts

The continued operation of the four developments (Halsey, Wise, Wise No. 2, and Newcastle Developments) that make up the Lower Drum Project would result in some minor unavoidable adverse effects on geologic, soil, aquatic, terrestrial, and visual resources. The geologic and soil resource effects could include some minor continued erosion associated with project operation and renovation of recreational facilities. Most of these effects would be reduced by the proposed resources enhancement measures, including implementation of the Erosion and Sediment Control Management Plan.

Aquatic communities have developed and adapted to the high level of natural flow variability in western Sierra streams. Reduced flow variability as a result of historical project operations could have resulted in shifts in community composition, diversity, and resilience. Proposed minimum measures would improve seasonal and inter-annual flow variability to better mimic natural flow variability in some project-affected reaches; however, inter-basin transfer of water via project facilities to meet water delivery commitments and contracts under legally established water rights would continue to reduce overall natural flow and variability in many project reaches.

Discharges from project canals augment natural flow in some project reaches (e.g., Auburn Ravine and Mormon Ravine). When these canals are taken out of service for maintenance or in the event of an emergency and flow ceases, flow in these reaches returns to natural flow levels, which could be zero flow at some locations during some months. In other reaches, canal outages can result in spills of atypical magnitude through the reach. Proposed measures would not reduce the outage-associated flow shifts.

Some fish entrained into project conduits, canals, and flumes are subject to stress, injury, and mortality when flow ceases during outages. Proposed fish protection and rescue measures have been designed to reduce potential mortality during these periods. Some minor levels of mortality would still be likely to occur associated with capture, handling, and transport of fish collected in open canal structures or in closed conduits and tunnels where fish rescue protocols cannot be safely implemented.

For terrestrial resources, unavoidable adverse effects could include loss of vegetation and wildlife habitat from the construction of new or rehabilitated recreation facilities that require permanent removal of vegetation and from project maintenance. Effects to vegetation and wildlife habitat would be reduced by implementation of the Integrated Vegetation Management Plan.

Some mortality of target wildlife species would continue to occur in project related components (e.g., canals and flumes). Wildlife protection measures have been proposed to monitor and reduce wildlife mortality due to these components. Wildlife crossing measures have been proposed in canals with relatively high levels of target wildlife species mortality to minimize adverse impacts. Some minor levels of target wildlife species mortality would continue to occur in project structures. Electrocution or collision associated with project transmission lines could impact raptors and other large avian species.

### 5.2.4 Summary of 10(j) Recommendations and 4(e) Conditions

#### 5.2.4.1 Fish and Wildlife Agency Recommendations

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. In response to our REA notice, the following fish and wildlife agencies submitted recommendations for the project: NMFS (letter filed July 31, 2012) and California Fish and Wildlife (letter filed July 30, 2012).

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. Table 5-5 lists the federal and state recommendations filed pursuant to section 10(j), applicable to the Lower Drum Project, and indicates whether the recommendations are included under the staff alternative. Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document.

In the draft EIS, we evaluated 71 recommendations and associated subparts submitted by California Fish and Wildlife for the Drum-Spaulding Project, 30 of them were found to be within the scope of section 10(j). Of these 30 recommendations, we recommended adopting 21, modifying 7, and not including 2.

NMFS submitted one recommendation that is within the scope of section 10(j) to support anadromous salmonids present in three western Placer County streams. We do not recommend adoption of this recommendation. NMFS also filed two recommendations with regard to consistency with the

biological opinion on Corps of Engineers actions and formal consultation under the ESA (recommendations 1 and 2) that we consider administrative and are not addressed in our draft EIS.[6]

We sent letters to California Fish and Wildlife and NMFS on June 20, 2013, informing them of our preliminary determination of inconsistencies for their recommendation filed July 30, 2012 and requesting concurrence, comments, or alternative recommendations. By letter filed August 22, 2013, California Fish and Wildlife responded, identifying recommendations on which the resource agencies and PG&E had subsequently reached agreement through further negotiations which now represent the agency's recommendations under section 10(j). We understand California Fish and Wildlife's August 22, 2013 letter to mean that it was amending some of its July 30, 2012 10(j) recommendations. California Fish and Wildlife now recommends: (1) instead of their recommendation for a Watershed Restoration Plan Forest Service condition 50, Erosion and Sediment Control and Management (instead of a Watershed Restoration Plan) as long as it applies to all Public Trust Lands, not just Forest Service lands; (2) Forest Service condition 33, Fish Protection and Management during Canal Outages Plan; (3) Forest Service condition 34, Gaging Plan; (4) Forest Service condition 38, Integrated Vegetation Management Plan; (5) Forest Service condition 39, Monitor Animal Losses in Project Canals; (6) Forest Service condition 40, Replacement of Wildlife Escape and Wildlife Crossing Facilities; (7) Forest Service condition 42, Wildlife Crossing—Bear River and South Canals; (8) Forest Service condition 43, Bald Eagle Management Plan; (9) Forest Service condition 46, Project Powerlines; (10) Forest Service condition 47, Raptor Collisions; (11) Forest Service condition 48, Bat Management; and (12) Forest Service condition 53, Recreation Plan.

In its August 22, 2013 letter, California Fish and Wildlife requested clarification of the Commission's recommendation related to coordination between NID's Yuba Bear Project and PG&E's Lower Drum Project to ensure compliance with minimum streamflows in the Bear River at gage YB-196 below Rollins dam. California Fish and Wildlife also submitted additional clarification, data, and analysis for their recommendation for: (1) Fish Stocking in Project Reservoirs; (2) canal outage as they affect flows in Auburn Ravine; and (3) gaging for compliance with minimum streamflows in Auburn Ravine.

On November 12, 2013, we held a section 10(j) meeting with California Fish and Wildlife to attempt to resolve the inconsistencies. California Fish and Wildlife recommendations discussed at the meeting related to the Lower Drum Project included: (1) Reservoir Fish Stocking; (2) canal outages affecting Auburn Ravine; and (3) compliance with minimum streamflows in the Bear River at gage YB-196 below Rollins dam. During the meeting, we resolved some but not all of the inconsistencies. The specifics of each recommendation's inconsistency and our determinations are discussed below. NMFS did not request, nor did they participate in this section 10(j) meeting.

*Reservoir Fish Stocking*

Halsey forebay is the only Lower Drum Project reservoir affected by this recommendation. Fish stocking in Halsey forebay is discussed in section 5.1.4.1, *Reservoir Fish Stocking*.

[6] As discussed in sections 5.1.2.3 and 5.5.2.3, the BO issued by NMFS was subsequently withdrawn.

*Canal Outage—Auburn Ravine*

In the draft EIS, we did not recommend adoption of California Fish and Wildlife's recommendation that during an outage of the Bear River canal, Upper Wise canal, Lower Wise canal, or South canal, the minimum streamflow in Auburn Ravine be the specified minimum streamflow for the appropriate month and water year or 5 cfs, whichever is less. Although we acknowledge that reduced flows in Auburn Ravine for the 2- to 3-week period during the canal outage in October-November would affect available habitat for aquatic resources, we did not recommend a minimum flow requirement greater than natural flows for Auburn Ravine during these canal outages because there is no source of water controlled by PG&E from which to release water to upper Auburn Ravine during an outage of these canals. Therefore, we made a preliminary determination that California Fish and Wildlife's recommendation was inconsistent with the public interest standard of section 4(e) and the comprehensive standard of section 10(a) of the FPA.

California Fish and Wildlife responded that both PCWA and NID have the means to add water to South canal or directly to Auburn Ravine with existing non-project infrastructure and suggested that PG&E could purchase contract water from other entities during the maintenance outages to ensure compliance with minimum streamflows. The Commission does not have jurisdiction to require PG&E to purchase non-project water and would not be able to require that PG&E reach an agreement or contract with another entity for delivery of such non-project water or enforce such an arrangement. California Fish and Wildlife did note that there had been discussions with PG&E and other entities relative to such an agreement and that they would continue to pursue such a measure through the California Water Board. PG&E stated that it is willing to discuss this issue further and indicated this could be resolved contractually in a forum led by the California Water Board.

California Fish and Wildlife also suggested that PG&E could schedule the outage for the Bear River canal at a different time of year when sufficient flows would exist in Auburn Ravine to protect aquatic habitat. PG&E indicated that a change in schedule is not feasible or practical given contractual water delivery schedules and project maintenance requirements. PG&E stated that the outage is scheduled to maintain project infrastructure and that it is unlikely that another time of year would be better for an outage due to the complexity of project operations.

Resolution of this issue was not reached during the section 10(j) meeting; however, we believe that this issue should be resolved outside the licensing process.

*Compliance with Minimum Streamflows in Bear River at Gage YB-196 below Rollins Dam*

In the draft EIS, we recommended adoption of California Fish and Wildlife recommendations that PG&E not divert water to the Bear River canal that NID releases from Rollins reservoir to meet the Yuba-Bear Project's minimum streamflow in the Bear River below the Rollins reservoir as measured at NID's YB-196 gage (USGS 11422500); and, if the flow measures are not being met at the YB-196 gage, PG&E not divert water to the Bear River canal until the flow measures at the YB-196 gage are met.

During the 10(j) meeting, California Fish and Wildlife requested clarification on what Commission staff was recommending for this measure. Commission clarified that it was recommending BLM condition 3, which prohibits PG&E from diverting water into the Bear River canal that is needed to meet the minimum streamflow requirement in the Bear River below Rollins dam. California Fish and Wildlife noted that it was unclear whether Commission staff is supporting the preliminary BLM condition 3 (dated July 31, 2012) or revised BLM condition 3 (dated August 27, 2012). The final EIS recommends implementation of preliminary BLM condition 3, which includes the language requested by California Fish and Wildlife to ensure the minimum flows in the Bear River below Rollins dam are met. The BLM

license condition would prohibit PG&E from diverting water into the Bear River canal if minimum flows in the Bear River below Rollins dam (gage YB-196) are not being met.

In summary, of the 63 recommendations and associated subparts (July 30, 2012 filing) and amended recommendations (August 22, 2013 filing) submitted by California Fish and Wildlife that are applicable to the Lower Drum Project, we consider 18 to be within the scope of section 10(j). The General Measures include 1 subpart, *Flow Measures* include 4 subparts, and *Terrestrial Protection Measures* include 6 subparts. Of the 18 recommendations within the scope of section 10(j), we wholly include 17 and modify 1 (recommendation 17, Reservoir Fish Stocking). Table 5-5 indicates the basis for our determinations concerning measures that we consider inconsistent with section 10(j). Of the 45 recommendations that are not within the scope of section 10(j), 29 are California Fish and Wildlife's standard recommendations, identical to some of the Forest Service's 4(e) standard conditions; the other 16 are considered 10(a) recommendations. Of the California Fish and Wildlife standard conditions, we only address the following recommendations in our final EIS: condition 1, *Consultation*; condition 12, *Protection of Forest Service Special Status Species*; condition 16, *Pesticide Use Restrictions on NFS Lands*; condition 23, Hazardous Substances Plan; condition 27, *Slope Stability and Facility Release Access Plan*; and condition 28, *Watershed Restoration Plan*. The remaining 23 California Fish and Wildlife standard conditions are not specific recommendations for protection, mitigation, or enhancement of fish and wildlife resources.

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 1 | Consultation | California Fish and Wildlife (recom-mendation 1) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $5,000 | Yes |
| 2 | Annual employee training | California Fish and Wildlife (recom-mendation 1.1) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $8,000 | Yes |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 3 | Coordinated Operations Plan | California Fish and Wildlife (recom-mendation 1.2) | Yes | $4,000 | Yes |
| 4 | Determine water year type in February, March, April, may, and October of each year based on unimpaired runoff in Yuba River at smarts Ville as set in California DWR Bulletin 120. | California Fish and Wildlife (recom-mendation 2.1) | Yes | $2,000 | Yes |
| 5 | New minimum streamflows in 2 project-affected reaches with no existing minimum flows, and the same minimum streamflows in one project-affected reach. | California Fish and Wildlife (recommen dation 2.2) | Yes | $193,000 | Yes |
| 6 | Lower Drum compliance with minimum streamflow requirements in Bear River below Bear River canal diversion dam at gage YB-196. | California Fish and Wildlife (recom-mendation 2.3) | Yes | $5,000 | Yes |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 7 | Canal Outage—Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Provide required minimum instream flow or inflow, whichever is less. For canal outages expected to extend past 30 days consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the outage period. Notify agencies within one business day in event of emergency outage. Do not take Drum and Bear River canals out at the same time. | California Fish and Wildlife (recom-mendation 2.5) | Yes | $5,000 | Yes |
| 8 | Develop Canal Outages Fish Rescue Plan. | California Fish and Wildlife (recom-mendation 3) | Yes | $30,000 | Yes |
| 9 | Gaging Plan—Develop a gaging plan to measure streamflow compliance for each of the reaches with a minimum streamflow requirement. | California Fish and Wildlife (recom-mendation 4) | Yes | $32,000 | Yes |
| 10 | Develop an aquatic invasive species management plan to address aquatic invasive species such as New Zealand mudsnail, Quagga mussels, and zebra mussels. | California Fish and Wildlife (recom-mendation 6) | Yes | $3,000 | Yes |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 11 | Implement an integrated vegetation and non-native invasive species management plan. | California Fish and Wildlife (recom-mendation 7.1) | Yes | $25,000 | Yes |
| 12 | Monitor animal losses in all project canals, including recording details of each animal mortality occurrence. | California Fish and Wildlife (recom-mendation 7.2) | Yes | $10,000 | Yes |
| 13 | Develop a wildlife crossing plan for the Bear and South canals; build wildlife crossing structures in the canals according to minimum specifications. | California Fish and Wildlife (recom-mendation 7.4) | Yes | $49,000 | Yes |
| 14 | Consult with California Fish and Wildlife when replacing wildlife escape and wildlife crossing facilities regarding specifications and design. | California Fish and Wildlife (recom-mendation 7.5) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $4,000 | Yes |
| 15 | Implement Bald Eagle Management Plan. | California Fish and Wildlife (recom-mendation 7.7) | Yes | $4,000 | Yes |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 16 | Submit a biological evaluation, for approval by appropriate agencies, prior to construction activities on Forest Service or BLM lands that may affect special-status species or critical habitat. | California Fish and Wildlife (recom-mendation 7.8 and 12) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | No. Biological evaluation is already required prior to new construction. |
| 17 | Annually review current lists of special-status species that might occur in project area and that may be affected by project operations, and suggested procedure to follow if special-status species is detected. | California Fish and Wildlife (recom-mendation 7.9) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes |
| 18 | Use raptor-safe powerline design and configurations for new powerlines or when replacing existing structures. Replace or retrofit powerlines with substantial raptor-powerline interaction issues. | California Fish and Wildlife (recom-mendation 7.10) | Yes | $40,000 | Yes |
| 19 | Annually record all incidental observations and details of bird collision/electrocutions at project transmission lines. | California Fish and Wildlife (recom-mendation 7.11) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $6,000 | Yes |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 20 | Document all bat roosts within project buildings, dams, or other structure that may be used as roosting structure; place humane exclusion devices in structure with bats present; perform annual inspection of exclusion devices and structures. | California Fish and Wildlife (recom-mendation 7.12) | Yes | $4,000 | Yes |
| 21 | Develop and implement a monitoring program that would assess the response of large stream, riverine, and upper elevation species to changes in streamflow and temperature. Establish a monitoring program for aquatic species, non-native invasive species, sensitive species, recreation, bear management, and sensitive raptor species. | California Fish and Wildlife (recom-mendation 8) | Yes | $41,500 | Yes |
| 22 | Schedule and facilitate a review meeting when the maintenance schedule, water year forecast, and reservoir level forecasts are finalized to discuss the implementation of streamflow and reservoir related conditions, results of monitoring, and other issues related to preserving and protection ecological values. | California Fish and Wildlife (recom-mendation 10) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $15,000 | Yes, however, we recommend that this consultation would be accomplished during the annual consultation meeting. |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 23 | Develop and implement a plan to evaluate the penstock and other drainage structure emergency and maintenance release points to determine if improvements can be made to minimize potential adverse resource impacts when release points are used. | California Fish and Wildlife (recom-mendation 11) | Yes | $5,000 | Yes |
| 24 | Recreation survey, monitoring, and future development triggers | California Fish and Wildlife (recom-mendation 12) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife measure 16) | Yes |
| 25 | Annual Recreation Coordination Meeting: Each year during the term of the license, arrange to meet with interested agencies for an annual coordination meeting to discuss the measures needed to ensure public safety, and protection and use of recreation facilities. | California Fish and Wildlife (recom-mendation 15) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife measure 16) | Yes |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 26 | Upon issuance of the license, implement the Recreation Plan as approved by the Commission. Recommendation includes site-specific recommendations for recreation facility modifications and improvements. | California Fish and Wildlife (recommendation 16) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $1,000 | Yes |
| 27 | Restrict pesticide use on federal lands without prior written approval of appropriate agencies; includes details and restriction on allowed pesticides. | California Fish and Wildlife (recommendation 16) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 28 | Recreation fish stocking: recommends numbers of fingerlings and catchable fish to be stocked; recommends stocking in 16 reservoirs in addition to Lake Spaulding; includes annual consultation with California Fish and Wildlife to obtain fish stocking targets, fish species, discuss fish acquisition, and verify the completion of the previous year's stocking commitment. At PG&E's discretion, either: (1) acquire the fish directly from fish hatcheries approved by California Fish and Wildlife, or (2) reimburse California Fish and Wildlife, to the extent California Fish and Wildlife has fish available, for the cost of the stocking program at the reservoirs listed above. | California Fish and Wildlife (recom-mendation 17) | Yes | $23,000 | Yes, but modified to develop a Fish Stocking Plan that includes annual stocking in Halsey forebay (in addition to annual stocking at the Upper Drum-Spaulding Project reservoirs, Lake Spaulding, Lake Valley reservoir, Fuller Lake, and Lower Lindsey Lake; and fish stocking every other until the first Form 80 reporting year in Fordyce and Meadow lakes); and would also include provisions for stocking fish in additional project reservoirs based on changes in recreational use and angling pressure over the term of the new license. PG&E would be responsible for ensuring that stocking is carried out under the Fish Stocking Plan. |
| 29 | Develop and implement an Erosion and Sediment Control and Management Plan | California Fish and Wildlife (recom-mendation 22) | Yes | $299,000 | Yes |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 30 | Hazardous Substances Plan | California Fish and Wildlife (recom-mendation 23) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $1,000 | Yes |
| 31 | Develop and implement a Slope Stability Plan. | California Fish and Wildlife (recom-mendation 27) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $299,000 | Yes |
| 32 | Develop and implement a Watershed Restoration Plan | California Fish and Wildlife (recom-mendation 28) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $299,000 | No, but Forest Service's Erosion and Sediment Control and Management Plan and Canal Release Point Plan filed April 11, 2014 addresses major issues. |

Table 5-5. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 33 | Implement minimum flows of 6 cfs in Auburn Ravine, 1 cfs in Rock Creek, and 1 cfs in Dry Creek. | NMFS (recom-mendation 7.1) | Yes | Undetermined | No, direct effects of project operations on flows and aquatic habitat in Dry Creek and Rock Creek extend a short distance downstream. Designated critical habitat for Central Valley steelhead is located about 6-8 miles farther downstream in Coon Creek below Lower Falls. In Auburn Ravine, the upstream extent of designated critical habitat for steelhead is RM 26.6. Steelhead do not access the upper 2.8 miles of designated critical habitat above non-project Auburn Ravine 1 diversion dam, a barrier to migration at RM 23.8. |

#### 5.2.4.2 Land Management 4(e) Conditions

In section 2.2.4.2, *Modifications to Applicants' Proposals—Mandatory Conditions, Lower Drum Project*, we list the 4(e) conditions submitted by Reclamation. As there are no Forest Service or BLM lands within the proposed project boundary for the Lower Drum Project or that are affected by that project, none of the section 4(e) conditions filed by the Forest Service and BLM for the Drum-Spaulding Project apply to the Lower Drum Project.

Of Reclamation's 15 section 4(e) conditions, we consider 11 (conditions A, b.2 through b.8, and b.12, b.13, and b.14) to be administrative or legal in nature and not specific environmental measures. We do not analyze these administrative conditions in this final EIS. Table 5-6 summarizes our conclusions with respect to the 4 final 4(e) conditions that we consider to be environmental measures. There are four Reclamation conditions as specified for the Lower Drum Project. We do not recommend one Reclamation condition, as discussed in more detail in section 5.2.2, *Comprehensive Development and Recommended Alternative.*

Table 5-6. Reclamation 4(e) Conditions for the Drum-Spaulding Project Applicable to the Lower Drum Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| b.1 | Consultation | Reclamation | $5,000 | Yes |
| b.9 | Pesticide-use restrictions on reclamation lands | Reclamation | $0 | Yes |
| b.10 | Hazardous Materials | Reclamation | $1,000 | Yes |
| b.11 | Discovery of cultural resources | Reclamation | $771,000 | Yes, but without protection of paleontological resources. |

## 5.3 DEER CREEK PROJECT

### 5.3.1 Comparison of Proposed Project and Alternatives

In this section, we compare the developmental and non-developmental effects of PG&E's proposal, PG&E's proposal as modified by staff (staff alternative), and the no-action alternative.

We estimate the annual generation of the Deer Creek Project (Deer Creek Development) under the three alternatives identified above. Our analysis shows that the generation would be 22,400 MWh for the proposed action; 22,400 MWh for the staff alternative; and 22,600 MWh for the no-action alternative.

We summarize the environmental effects of the different alternatives in table 5-7.

Table 5-7. Comparison of Alternatives for the Deer Creek Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Generation** | 22.6 GWh | 22.4 GWh | 22.4 GWh |
| **Geology and Soils** | Project-related erosion and sedimentation occurring on project lands or waters resulting from project operation would continue to occur. | Implementation of an Erosion and Sediment Control and Management Plan and Canal Release Point Plan (filed April 11, 2014) would minimize short- and long-term erosion and sedimentation resulting from project operation and proposed project construction. | Same as proposed action. |

Table 5-7. Comparison of Alternatives for the Deer Creek Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Aquatic Resources** | Existing project does not require minimum streamflow providing no aquatic habitat. | Minimum Streamflows − Provide new minimum streamflows in one project-affected reach with no existing minimum streamflows. The higher streamflow would increase fish habitat for all resident fish species. | Same as proposed action. |
| | No determination of compliance with minimum streamflows | Implement Forest Service/BLM Gaging Plan (filed April 11, 2014) to demonstrate compliance with minimum streamflows. | Same as proposed action. |
| | Fish would continue to be lost due to canal dewatering and reduction of minimum flows would adversely affect downstream aquatic habitat. | Canal Outages - Notify licensing participants of all annual planned and non-routine planned canal outages; provide required minimum instream flow or inflow whichever is less. For canal outages expected to extend past 30 days consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the outage period; notify agencies within one business day in event of emergency outage: | Same as proposed action. |
| | Some fish residing in the South Yuba and Chalk Cliff canals may be lost when canals are drained during an outage. | Implementation of Fish Protection and Management During Canal Outages Plan (filed November 21, 2013) would minimize loss of fish. | Same as proposed action. |

Table 5-7. Comparison of Alternatives for the Deer Creek Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | No active plan to limit or prevent spread and growth of aquatic invasive species. | Development and implementation of an Aquatic Invasive Species Management and Monitoring Plan would minimize the spread of aquatic invasive species. | Same as proposed action. |
| **Terrestrial** | The spread of non-native invasive plans can impact wildlife habitat. | Implementation of PG&E's proposed March 2013 (filed November 21, 2013) Integrated Vegetation Management Plan would control the spread of non-native invasive plants and protect wildlife habitat. | Same as proposed action but modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance. |
| | Special-status species plants may be affected by operation and maintenance activities at the project. | As part of PG&E's proposed March 2013 Integrated Vegetation Management Plan, special-status species at the project would be reviewed at an annual consultation meeting with resource agencies. Review and updating of the special-status species list would ensure that project managers are aware of species and their habitats, and what measures may be necessary to protect these species from O&M activities. | Same as proposed action. |

Table 5-7. Comparison of Alternatives for the Deer Creek Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Potential impacts to culturally significant plants. | Consult with the tribes to identify culturally significant plant species within 60 days of license issuance and to include the protection of culturally significant plants in the Integrated Vegetation Management Plan. | Consult with tribes to identify culturally significant plants and modify the March 2013 Integrated Vegetation Management Plan to identify and protect culturally significant plant species. |
| | No restrictions on use of pesticides or herbicides on federal land that could result in harm to environmental resources. | Implement March 2013 Integrated Vegetation Management Plan that contains provisions for the use of pesticides and herbicides on federal lands. These provisions would help protect sensitive species and their habitats. | Same as proposed action. |
| | Mortality of deer and other target species would continue to occur and wildlife movement would be restricted. | Consult with appropriate agencies prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings; monitor animal losses in project canals, including details of mortality. These measures would help identify ongoing issues and determine need for protection measures. | Same as proposed action, but include proposed wildlife protection and monitoring measures in a Wildlife Crossing Management Plan for the project. |

Table 5-7. Comparison of Alternatives for the Deer Creek Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Project transmission lines could result in mortality of raptors and other birds from electrocution and collision. Continued implementation of system-wide Avian Protection Plan for protection of birds from power lines would minimize effects. | Record observations of bird collisions/electrocutions and mortality along project powerlines. Utilize raptor-safe powerline configurations consistent with Avian Protection on Power Lines guidelines for new power lines and when replacing existing structures. Replace or retrofit existing powerline facilities as needed if substantial bird collision or electrocution issues are recorded. Implementation of these measures would reduce avian interactions with powerlines and would benefit avian resources. | Same as proposed action, but include all proposed avian protection measures in an Avian Management Plan for the project. |
| | Bats that use project buildings may be affected by human activity. | Document all known bat roosts within project buildings. If bats or signs of roosting are present where staff have routine presence, place human exclusion devices to prevent occupation by bats, and annually inspect exclusion devices. These measures would minimize any impacts to bats. | Same as proposed action but include proposed measures for bat documentation and protection in a Bat Management Plan for the project. |

Table 5-7. Comparison of Alternatives for the Deer Creek Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Threatened and Endangered Species** | No federally listed threatened or endangered species or designated critical habitat would be affected. | Implement the VELB management provisions of the March 2013 Integrated Vegetation Management Plan, which include compliance with the March 2003 VELB Conservation Program, consistent with FWS' Biological Opinion. This measure would ensure that the VELB would be protected if elderberry plants are identified in the project area in the future. | Same as proposed action. |
| **Recreation Resources** | Existing project recreation facilities would continue to serve the public but may not meet current demand or expectations. | The September 2013 Recreation Plan filed November 18, 2013) would provide for several modifications and enhancements to project recreation facilities that would increase public recreation opportunities: improve and maintain Deer Creek forebay access and parking area. | Same as proposed action. |
| | Project recreation facilities would continue to be maintained on an as needed basis. | Recreation facility operation and maintenance proposed in the September 2013 Recreation Plan would ensure recreation facility maintenance is done on an appropriate schedule and would enhance the condition, usability, and safety of project recreation facilities. | Same as proposed action. |

Table 5-7. Comparison of Alternatives for the Deer Creek Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Monitoring of recreational use at the project would continue to occur on a 6-year cycle, as needed to fulfill the Commission's Form 80 requirements. | Recreation use monitoring proposed in the September 2013 Recreation Plan would enhance the level of information gathered on recreational use beyond the Form 80 requirements at the project facilities, as well as on facility condition. | Same as proposed action. |
| | No funding would be required by the FERC license to BLM for BLM's management of BLM lands within the project boundary or BLM's management of public river access, lands, and river-related recreation in the Upper Drum-Spaulding Project along the South Yuba River downstream of Lake Spaulding. | Providing $30,000 annually to BLM would partially fund the annual operation, maintenance, and administrative costs for BLM's management of BLM lands within the project boundary and BLM's management of public river access, lands, and river-related recreation in the Upper Drum-Spaulding Project along the South Yuba River downstream of Lake Spaulding. | Not included in staff alternative because PG&E is ultimately responsible for those facilities within the FERC boundary. |
| | No formal contact would be provided for BLM whenever planning or constructing recreation facilities and routine maintenance activities are taking place on BLM lands | Providing a contact for BLM whenever planning or constructing recreation facilities and routine maintenance activities are taking place on BLM lands would inform BLM of these activities and facilitate coordination between PG&E and BLM. | Same as proposed action. |
| **Cultural** | Significant cultural resources (i.e., historic properties) would be adversely affected by project-related activities and effects. | Implementation of the HPMP (filed September 23, 2013) upon license issuance would protect cultural resources and resolve project-related adverse effects to historic properties. | Same as proposed action. |

Table 5-7. Comparison of Alternatives for the Deer Creek Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Land Use** | Continue to maintain all project roads and facilities. | Implement the Transportation Management Plan (filed August 29, 2012) to improve road management and to ensure public access to project lands and waters and the adequate protection of natural and environmental resources. | Same as proposed action. |
| | Continue to follow State of California and local rules and regulations. Continue to implement emergency response preparedness requirements. | Implement the Fire Prevention and Response Plan (filed November 21, 2013) for federal project lands to reduce the occurrence of wildfires in the project area, and to minimize damage to natural resources. | Revise the Fire Prevention and Response Plan to include all project lands and a periodic review and update of the plan. |
| | The project boundary would include facilities not necessary for the continued operation of the project and would not include all primary project roads and recreation facilities. | Revise the project boundary to separate the existing Drum-Spaulding project into three, separate projects: Upper Drum-Spaulding, Lower Drum, and Deer Creek. | Same as proposed action. |
| | Continue to comply with existing regulations for hazardous materials. | Develop and implement a Hazardous Substances Plan to identify acceptable prevention and mitigation measures and to ensure that hazardous substances are promptly contained or cleaned up. | Same as proposed action, but apply plan to all project lands. |
| **Aesthetic Resources** | Visual quality would be impacted by project facilities. | Implement the Visual Resource Management Plan filed June 18, 2012) to reduce project visual effects and improve visual quality in the project area. | Same as proposed action. |

### 5.3.2 Comprehensive Development and Recommended Alternative

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreation opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations the licensing of the Deer Creek Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the staff alternative as the preferred alternative for the Deer Creek Project. This alternative includes elements of the applicant's proposal, section 4(e) conditions, resource agency recommendations, alternative conditions under EPAct, and some additional measures. We recommend this alternative because: (1) issuance of a new hydropower license by the Commission would allow PG&E to operate the project as an economically beneficial and dependable source of water and electrical energy for its customers; (2) the 5.7 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended measures would protect and enhance fish and wildlife resources and would provide improved recreation opportunities at the protect.

Finally, for the reasons outlined in section 5.1.2.3, we recommend that certain 4(e) conditions specified by the Forest Service or BLM, in whole or in part, not be included in the staff alternative. We recognize, however, that the Commission is required to include valid 4(e) conditions in any license issued for the project. As such, each of the measures that staff recommend be modified in the staff alternative would not be included in any license issued by the Commission. Instead, those staff-modified conditions would be replaced with agencies' corresponding conditions, as filed with the Commission.

Of the 28 Forest Service section 4(e) conditions we consider to be environmental measures, we include 27 of these conditions in the staff alternative as specified by the Forest Service. We do not recommend preparation of a biological evaluation for construction of project-related facilities not addressed in the Commission's EIS (condition 44).

Of the 23 BLM section 4(e) conditions we consider to be environmental measures, we include 21 of these conditions in the staff alternative as specified by BLM. We do not recommend preparation of a biological evaluation for construction of project-related facilities not addressed in the Commission's EIS (conditions 13) or providing annual funding to partially fund BLM's management of BLM lands within the project boundary (condition 6).

In the following section, we make recommendations as to which environmental measures proposed by PG&E or recommended by agencies or other entities should be included in any license issued for the project. In addition to PG&E's proposed environmental measures, we recommend additional staff-recommended environmental measures to be included in any license issued for the project, and we describe these requirements in the draft license articles in appendix F.

#### 5.3.2.1 Measures Proposed by PG&E

Based on our environmental analysis of PG&E's proposal in section 3, and the costs presented in section 4, we conclude that the following environmental measures proposed by PG&E would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project. Our recommended modifications to PG&E's proposed measures are shown in *italic* text.

**General Measures**

- Consult annually with the Forest Service and BLM to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize staff with special-status species, noxious weeds, and sensitive areas known to occur within the project boundary on Forest Service and BLM land, and the procedures for reporting to each agency.

- Prepare and implement a Coordinated Operations Plan for the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects regarding implementation of flow-related measures in each project's license.

**Geology and Soils**

- Implement an Erosion and Sediment Control and Management Plan and Canal Release Point Plan (filed April 11, 2014) to minimize and control project-related erosion; the plan would provide for project-wide implementation of best management practices (BMPs) to control erosion and sedimentation and more specifically include an inventory and prioritization of erosion sites on steep slopes below open project canals and spill structures and implementation of repair and restoration plans, as necessary.

**Aquatic Resources**

- To enhance aquatic habitat and protect resident aquatic species, provide new minimum streamflows to one project-affected reach, as described in section 3.3.2.2.2, Instream Flows, and shown in the tables of appendix A-2 of this EIS as listed below (Measure DC-AQR1, Part 1).

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| South Fork Deer Creek – below Deer Creek powerhouse | 3-125 |

- Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Notify agencies within one business day in event of emergency outage.

- Implement the Fish Protection and Management during Canal Outages Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Develop and implement an Aquatic Invasive Species Management and Monitoring Plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

**Terrestrial Resources**

- Implement the March 2013 Integrated Vegetation Management Plan (filed November 21, 2013) on federal lands that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and includes control of non-native invasive species, provisions for special-status species, provisions for pesticide use, and annual training, consultation and reporting, *as modified to apply to all accessible project lands (particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance), require consultation with tribes to identify culturally significant plants, and protect culturally important species.*

- Retrofit existing footbridges or construct new wildlife crossings on the South Yuba canal, at specified locations, to minimize wildlife injury and mortality associated with the movement across project canals and *prepare a Wildlife Crossing Management Plan for the project that includes provisions for replacement/addition of wildlife crossings, consultation, monitoring, and reporting.*

- Consult with California Fish and Wildlife, the Forest Service, and BLM when replacing wildlife escape and crossing facilities.

- Record annually all incidental observations of bird collision/electrocutions along project powerlines and replace or retrofit problem power poles as appropriate. Use raptor-safe powerline design for new power lines or when replacing existing structures to reduce raptor injury and mortality. *Include all proposed avian protection measures in an Avian Management Plan for the project.*

- Implement bat management measures, including installing exclusion devices to minimize disturbance during project operation and maintenance, and *include the proposed measures in a Bat Management Plan for the project.*

- Implement the July 2013 Bald Eagle Management Plan (filed November 21, 2013).

**Threatened and Endangered Species**

- Implement the VELB provisions of the March 2013 Integrated Vegetation Management Plan, consistent with conservation measures to avoid or minimize the loss of elderberry shrubs.

**Recreation Resources**

- Implement the September 2013 Recreation Plan (filed November 18 2013) to improve and maintain Deer Creek forebay access and parking area, and install directional signs to and from the Highway 20 junction to the Deer Creek forebay.

- Provide a contact for BLM whenever planning or constructing recreation facilities and routine maintenance activities are taking place on BLM lands.

**Cultural Resources**

- Implement the HPMP (filed September 23, 2013) to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register.

**Land Use and Aesthetic Resources**

- Revise project boundaries to reflect separation of proposed Deer Creek Project from the existing Drum-Spaulding Project.

- Implement the Transportation Management Plan (filed August 29, 2012)to ensure that project roads are adequately maintained.

- Implement the Fire Prevention and Response Plan (filed November 21, 2013) on federal lands to provide fire prevention procedures, reporting, and safe fire practices for PG&E personnel and contractors responsible for operating and maintaining the project, *as revised to apply to all project lands and to include a period of review and revision.*

- Implement the Visual Resource Management Plan (filed June 18, 2012) on federal lands to protect visual and aesthetic resources on and adjacent to project lands.

- Develop and implement a Hazardous Substances Plan for Oil and Hazardous Substances Storage and Spill Prevention and Cleanup, *as revised to include all project lands*.

#### 5.3.2.2 Additional Measures Recommended by Staff

We do not recommend any measures in addition to PG&E's proposed measures listed above (and modified by staff).

Below, we discuss our rationale for some of the key proposed and additional staff-recommended measures.

*Minimum Streamflows*

To protect and enhance aquatic resources, PG&E, the Forest Service, BLM, and California Fish and Wildlife have agreed on minimum streamflows for all project-affected reaches. The flows in the South Fork Deer Creek below the Deer Creek powerhouse would be the same as under the existing license and, higher than estimated unregulated streamflows during the dry summer period. Analysis by PG&E of the relationship of habitat and flow in this reach indicates that the proposed minimum streamflow would protect and enhance aquatic habitat for resident species. We estimate that the annualized cost to deliver the proposed minimum streamflows would be $10,000 with an additional $1,000 annual cost to determine and implement flows based on water year types. We recommend adopting these flow measures, because the substantial benefits to fish habitat are worth the cost.

PG&E proposed that compliance would be measured by the continuous, instantaneous record from designated existing stream gages maintained and operated consistent with USGS protocols. We estimate that the annualized cost to implement this streamflow compliance measure would be $2,000. We recommend this proposed compliance measure because it would be an effective mechanism to demonstrate compliance with proposed minimum streamflows at a reasonable cost.

*Canal Outages*

In certain situations, flows released from project canals to stream reaches provide minimum instream flows for protection of aquatic resources. When these canals are taken out of service during planned maintenance or during unplanned emergencies, the canals drain and become dry. In these instances, flow releases from the canals to the stream reaches are interrupted and flow in the stream

reaches downstream of the canal are maintained only by natural inflow from upstream, which at some locations could be no flow during some months, particularly during critically dry or drier years.

In South Fork Deer Creek, PG&E's ability to deliver minimum streamflows could be affected during maintenance and emergency outages of the South Yuba or Chalk Bluff canals. During canal outages, PG&E proposes to meet the required minimum flow for that month and water year, or the natural inflow, whichever is less. The Forest Service, BLM, and California Fish and Wildlife recommend PG&E's proposal. PG&E proposes to notify all licensing participants at the annual consultation meeting of the past year unplanned and future year planned canal outages, and also propose to notify and consult with licensing participants if a canal outage is anticipated to extend beyond 30 days. The resource agencies recommend these same procedural measures for canal outages.

PG&E proposes and BLM, Forest Service, and California Fish and Wildlife recommend implementation of a plan to protect fish residing in project canals when a canal is drained during a planned, unplanned, or emergency outage. PG&E filed (November 21, 2013) a Canal Outages Fish Rescue Plan that identifies the canals, locations and procedures for fish collection and rescue, and procedures for notifying the resource agencies. The plan would be implemented within the first year following issuance of the license for the Deer Creek Project. We estimate that the annualized cost of this plan would be $14,000. We recommend adopting this measure because it would reduce fish mortality associated with canal outages during planned maintenance and during unplanned emergencies at a reasonable cost.

*Aquatic Invasive Species Management Plan*

The Forest Service (condition 37) specifies and California Fish and Wildlife (recommendation 6) recommends that PG&E develop and implement an Aquatic Invasive Species Management and Monitoring Plan. These agencies identify the types of information that should be included in the plan. In general, the plan would include prevention and educational measures, incidental monitoring, contingency measures if invasive species are found in project waters, and provisions for modification of the plan if more-effective control measures are developed in the future. We recommend that PG&E develop an Aquatic Invasive Species Management and Monitoring Plan after consultation with the agencies and implement the plan upon Commission approval. The estimated annualized cost for implementation of PG&E's plan is about $2,000. This would be a reasonable cost to the project and would provide protection from aquatic invasive species within the project boundary.

*Integrated Vegetation Management Plan*

PG&E's proposed March 2013 Integrated Vegetation Management Plan provides guidance for the management of vegetation on federally owned project lands, as well as vegetation management related to PG&E's operation and maintenance activities within the project boundary. The proposed Integrated Vegetation Management Plan includes provisions for the management of non-native invasive plants on federal lands, vegetation management related to O&M activities, sensitive area protections, including provisions for special-status plants and wildlife, VELB management, as well as provisions for training, consultation and reporting. The Integrated Vegetation Management Plan does not apply to all project lands (e.g., invasive species control only applies to federal lands), and does not contain any provisions for the recognition of culturally significant plants and their protection. Invasive weed populations are known to occur outside federal lands and are subjected to similar project-related effects within PG&E's boundary. Therefore, we recommend that PG&E modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and to include a list of culturally significant plant species that occur in the project area, developed after consultation with tribes. The Integrated Vegetation Management Plan should also include provisions for

appropriate monitoring and protection of culturally significant plants species. The estimated annualized cost for the recommended modified Integrated Vegetation Management Plan is about $25,000 per year and is worth the benefits to plant and wildlife species. Modifying and expanding the plan to apply to all project lands and to incorporate measures for culturally significant plants, would negligibly increase the annualized cost. This would be a reasonable cost to the project and would ensure implementation of protective vegetation management practices would occur on all project lands and would provide adequate protection to culturally significant plants within the project boundary.

*Wildlife Crossings for Project Canals*

PG&E proposes to retrofit existing footbridges or construct new wildlife crossings on project canals, at specified locations. Specifications for wildlife crossing facilities (slope, width, fence height, etc.) are also specified in the proposal. PG&E also proposes to monitor animal losses from drowning in project canals, and to consult with agencies when replacing escape and crossing facilities. PG&E's proposals are consistent with Forest Service conditions 39, 40, and 41 and BLM conditions 11 and 12. Implementation of these measures would minimize wildlife entrapment points, create and/or maintain wildlife passage opportunities, and would prevent wildlife mortalities at the project.

We recommend that all of PG&E's proposals relative to wildlife crossing of canals, be incorporated into a single Wildlife Crossing Management Plan for the project. Consolidation of these activities into a single management plan would benefit wildlife by ensuring consistency in managing and modifying wildlife crossings, as necessary, over the term of the new license. The plan would also ensure consistency in consulting with appropriate agencies regarding canal mortalities and potential changes to wildlife crossings or escape facilities. The wildlife crossing measures proposed by PG&E for the proposed Deer Creek project canals are estimated to cost $49,000, annually. The development and implementation of a Wildlife Crossing Management Plan is estimated to negligibly increase the annualized cost. We believe that the benefits to wildlife would be worth the cost.

*Project Powerlines and Raptor Collisions/Electrocutions*

PG&E proposes to record annually all incidental observations of bird collisions/electrocutions along project powerlines. PG&E also proposes to utilize raptor-safe powerline configurations consistent with APLIC's "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006," the most current version of this document for new powerlines and when replacing existing structures. If raptor monitoring indicates a substantial raptor-project transmission line interaction issue, the poles where the interaction issue occurs on federal land would be replaced or retrofitted. Implementation of these measures would reduce project impacts to avian resources and would minimize risk of avian mortality. If bird collision or electrocution issues are detected, recording incidents and retrofitting structures using the same guidelines would benefit avian resources. However, the benefits derived from these proposed measures would be further enhanced by the development of an Avian Management Plan for the project, that incorporates the proposed provisions, and provides consistent specifications for monitoring and report avian/powerline interactions, and for the implementation of powerline modifications or retrofits through the use of raptor-safe powerline configurations. The estimated cost of PG&E's proposal regarding avian powerline interactions is $26,000 annually. The estimated additional cost associated with incorporation of the proposed provisions into an Avian Management Plan is negligible.

*Recreation Plan*

The proposed Deer Creek Project currently provides an access and parking area at the Deer Creek forebay that would be located in the proposed Deer Creek Project. At Deer Creek forebay, PG&E proposes to install directional signs to and from Highway 20 to the forebay. The proposed signage would help the public locate the access area at the project. The general recreation site measures and recreation

monitoring measures contained in the September 2013 Recreation Plan would also be applicable to the proposed Deer Creek Project. We recommend that PG&E implement the proposed signage at Deer Creek forebay.

In total, our recommended recreation plan for the Deer Creek Project would have an estimated levelized annual cost of about $5,000. We conclude that the benefits of our recommended plan would be worth the cost because it would: (1) address project effects and provide for project visitor use such as modifying recreation facilities; (2) provide a comprehensive recreation management plan that the Commission can use to determine compliance; (3) protect natural resources at recreation developments; and (4) enhance recreation enjoyment for project visitors.

*Historic Properties Management Plan*

Through implementation of PG&E's final HPMP, project-related adverse effects would be resolved on historic properties. Benefits for the protection and preservation of historic properties would be worth the cost of $13,000 dollars.

#### 5.3.2.3 Measures Not Recommended by Staff

Some of the measures recommended or specified by relicensing stakeholders would not contribute to the best comprehensive use of the Yuba River and Bear River water resources, do not exhibit sufficient nexus to the project's environmental effects, or would not result in benefits to non-power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend such measures.

*Bullfrog Eradication*

FWS recommended that PG&E develop a bullfrog eradication plan for all project lakes, reservoirs, and impoundment areas to enhance populations of CRLFs, FYLFs, and other frog species. FWS has not provided any specific evidence of how the project contributes to the presence of in the project area.

As discussed in section 3.3.3.2.2, *Wildlife*, development of a bullfrog eradication program for the project would be impracticable and ineffective. Bullfrogs would likely continue to recolonize the project area from adjacent suitable habitats. Further, bullfrog control has generally been restricted to small ponds that can be drained; control of large reservoirs and rivers has not been shown to be practical (Adams and Pearl, 2007).

Although it is difficult to determine the cost of an eradication program, it is likely to exceed $50,000 per year. We do not believe the benefits would be worth the cost.

*Carnivore Management Plan*

FWS recommended that PG&E develop a Wolverine and Fisher Management Plan to protect these species within designated carnivore management area.

There are no designated wolverine carnivore management area that overlaps the project area. Although Pacific fisher designated carnivore management areas overlap with some of the project areas, the existing populations of Pacific fisher do not overlap with the project boundary. FWS has not provided any evidence of potential project effects to these species. The development of a management plan, as recommended by FWS, would add limited protection to this species due to its lack of use of the available habitat within the project boundary. If issues arise concerning potential project impacts, they can be

addressed through the annual consultation meetings. Therefore, we do not recommend development of a Carnivore Management Plan.

*Protection of Special-status Species*

The construction of proposed or future project facilities has the potential to affect special-status species and critical habitat. Forest Service condition 44 and BLM condition 13 specify that PG&E submit a biological evaluation prior to construction activities that may affect special-status species or critical habitat. California Fish and Wildlife makes a similar recommendation. However, before construction of any new project feature not addressed in this final EIS could occur, PG&E would first need to file with the Commission an application to amend its license. If appropriate, a biological evaluation or, if federally listed species could be involved, a biological assessment for special-status species, would be developed as part of the license amendment proceeding. Consequently, although the intent of this measure would be addressed through the amendment process, we find that there is no need to include this measure as a condition of a new license for this project.

*Paleontological Resources*

Reclamation 4(e) condition b.11 and California Fish and Wildlife 10(a) recommendation 19 specify that protection of paleontological resources should be included in the HPMP. Paleontological resources are not cultural resources and, thus, are not eligible for listing on the National Register and cannot be addressed in the HPMP pursuant to section 106**.** The Commission has no jurisdiction over PG&E to enforce these 4(e) conditions and 10(a) recommendations to protect paleontological resources. Paleontological resources are protected by California statute (e.g., Public Resources Code Section 5097.5 (a), Removal or Destruction; Prohibition), appendix G to the CEQA Guidelines that was revised in 2009 to include an assessment of project effects on paleontological resources, and the Paleontological Resources Preservation Act (P.L. 111-011) Omnibus Public Land Management Act of 2009 Subtitle D--Paleontological Resources Preservation. It is the responsibility of the federal land manager to carry out such protective measures. In the case of a new license for the project, PG&E would be responsible for consulting with the federal land manager under these circumstances.

*Inadvertent Discoveries*

Reclamation 4(e) condition b.11 and California Fish and Wildlife 10(a) recommendation 19 state that when inadvertent discoveries are found on Reclamation Forest Service, BLM, or California Fish and Wildlife lands, PG&E would not resume work on ground-disturbing activities until written approval from Reclamation, the Forest Service or BLM is received. PG&E has plans for handling inadvertent discoveries in the HPMP that do not require it to receive written approval from Reclamation, the Forest Service, or BLM to proceed following a discovery. These plans have been reviewed and commented on by the Forest Service, BLM, and tribes. PG&E's alternative 4(e) condition for noticing, consulting, and documenting cultural resources involving inadvertent discoveries would adequately protect historic properties from project-related effects. Therefore, we conclude that the process PG&E has already provided in its HPMP is appropriate.

### 5.3.3 Unavoidable Adverse Impacts

The continued operation of the Deer Creek Project would result in some minor unavoidable adverse effects on geologic, soil, aquatic, terrestrial, and visual resources. The geologic and soil resource effects could include some minor continued erosion associated with project operation and renovation of recreational facilities. Most of these effects would be reduced by the proposed resources enhancement measures, including implementation of the Erosion and Sediment Control Management Plan.

Aquatic communities have developed and adapted to the high level of natural flow variability in western Sierra streams. Reduced flow variability as a result of historical project operations could have resulted in shifts in community composition, diversity, and resilience. Proposed minimum flow measures for South Fork Deer Creek are consistent across water years and seasons and would improve seasonal and inter-annual flow variability., Inter-basin transfer of water via project facilities to meet water delivery commitments and contracts under legally established water rights would continue to reduce overall natural flow and variability in project–affected reaches.

Discharges from project canals augment natural flow in project-affected reaches (e.g., Bear River, South Fork Deer Creek). When these canals are taken out of service for maintenance or in the event of an emergency and flow ceases, flow in these reaches returns to natural flow levels, which could be zero flow at some locations during some months. Proposed measures would reduce, but not eliminate the outage-associated flow shifts.

Some fish entrained into project canals are subject to stress, injury, and mortality when flow ceases during outages. Proposed fish protection and rescue measures have been designed to reduce potential mortality during these periods. Some minor levels of mortality would still be likely to occur associated with capture, handling, and transport of fish collected in open canal structures where fish rescue protocols cannot be safely implemented.

For terrestrial resources, unavoidable adverse effects could include loss of vegetation and wildlife habitat from improvements to recreation facilities (Deer Creek forebay access and forebay parking area) that require permanent removal of vegetation and from project maintenance. Effects to vegetation and wildlife habitat would be reduced by implementation of the Integrated Vegetation Management Plan.

Some mortality of target wildlife species would continue to occur in project related components (e.g., canals and flumes). Wildlife protection measures have been proposed to monitor and reduce wildlife mortality due to these components. Wildlife crossing measures have been proposed in canals with relatively high levels of target wildlife species mortality to minimize adverse impacts. Some minor levels of target wildlife species mortality would continue to occur in project structures. Electrocution or collision associated with project transmission lines could impact raptors and other large avian species.

### 5.3.4 Summary of 10(j) Recommendations and 4(e) Conditions

#### 5.3.4.1 Fish and Wildlife Agency Recommendations

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. In response to our REA notice, the following fish and wildlife agencies submitted recommendations for the project: NMFS (letter filed July 31, 2012) and California Fish and Wildlife (letter filed July 30, 2012).

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. Table 5-8 lists the federal and state recommendations filed pursuant to section 10(j), applicable to the Deer Creek Project, and indicates whether the recommendations are included under the staff alternative. Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document.

In the draft EIS, we evaluated 71 recommendations and associated subparts submitted by California Fish and Wildlife for the Drum-Spaulding Project, 30 of them were found to be within the scope of section 10(j). Of these 30 recommendations, we recommended adopting 21, modifying 7, and not including 2.

We sent letters to California Fish and Wildlife and NMFS on June 20, 2013, informing them of our preliminary determination of inconsistencies for their recommendations filed July 30, 2012 and requesting concurrence, comments, or alternative recommendations. By letter filed August 22, 2013, California Fish and Wildlife responded, identifying recommendations on which the resource agencies and PG&E had subsequently reached agreement through further negotiations which now represent the agency's recommendations under section 10(j). We understand California Fish and Wildlife's August 22, 2013 letter to mean that it was amending some of its July 30, 2012 10(j) recommendations. California Fish and Wildlife now recommends: (1) Forest Service condition 50, *Erosion and Sediment Control and Management* as it applies to all Public Trust Lands (instead of a Watershed Restoration Plan); (2) Forest Service Condition 33, *Fish Protection and Management during Canal Outages Plan*; (3) Forest Service condition 34, *Gaging Plan*; (4) Forest Service condition 38, *Integrated Vegetation Management Plan*; (5) Forest Service condition 39, *Monitor Animal Losses in Project Canals*; (6) Forest Service condition 40, *Replacement of Wildlife Escape and Wildlife Crossing Facilities*; (7) Forest Service condition 41, *Wildlife Crossing—Drum and South Yuba Canals*; (8) Forest Service condition 43, *Bald Eagle Management Plan*; (9) Forest Service condition 46, *Project Powerlines*; (10) Forest Service condition 47, *Raptor Collisions*; (11) Forest Service condition 48, *Bat Management*; and (12) Forest Service condition 53, *Recreation Plan*. The other 46 recommendations in California Fish and Wildlife's July 30, 2012 not modified by its letter of August 22, 2013, continue as the recommendations of California Fish and Wildlife.

In summary, of the 58 recommendations and associated subparts (July 30, 2012) and amended recommendations (August 22, 2013 filing) submitted by California Fish and Wildlife that are applicable to the Deer Creek Project, we consider 13 to be within the scope of section 10(j). The General Measures include 1 subpart, *Flow Measures* include 3 subparts, and *Terrestrial Protection Measures* include 6 subparts. We wholly include the 13 recommendations within the scope of section 10(j). Table 5-8 indicates the basis for our determinations concerning measures that we consider inconsistent with section 10(j). Of the 45 recommendations that are not within the scope of section 10(j), 29 are California Fish and Wildlife's standard recommendations, identical to some of the Forest Service's 4(e) standard conditions; the other 16 are considered 10(a) recommendations. Of California Fish and Wildlife's standard conditions, we only address the following recommendations in our final EIS: condition 1, *Consultation*; condition 12, *Protection of Forest Service Special Status Species*; condition 16, *Pesticide Use Restrictions on NFS Lands*; condition 23, *Hazardous Substances Plan*; condition 27, *Slope Stability and Facility Release Access Plan*; and condition 28, *Watershed Restoration Plan*. The remaining 10 California Fish and Wildlife standard conditions are not specific recommendations for protection, mitigation, or enhancement of fish and wildlife resources.

Table 5-8. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 1 | Consultation. | California Fish and Wildlife (recom-mendation 1) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $5,000 | Yes |
| 2 | Annual employee training. | California Fish and Wildlife (recom-mendation 1.1) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $4,000 | Yes |
| 3 | Coordinated Operations Plan. | California Fish and Wildlife (recom-mendation 1.2) | Yes | $4,000 | Yes |
| 4 | New minimum streamflows in one project-affected reach with no existing minimum flows. | California Fish and Wildlife (recommen dation 2.2) | Yes | $10,000 | Yes |

Table 5-8. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 5 | Canal Outage—Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Provide required minimum instream flow or inflow, whichever is less. For canal outages expected to extend past 30 days consult with agencies and notify the Commission of any modifications to minimum streamflows agreed on for the outage period. Notify agencies within one business day in event of emergency outage. | California Fish and Wildlife (recom-mendation 2.5) | Yes | $5,000 | Yes |
| 6 | Develop Canal Outages Fish Rescue Plan. | California Fish and Wildlife (recom-mendation 3) | Yes | $14,000 | Yes |
| 7 | Gaging Plan—Develop a Gaging Plan to measure streamflow compliance for each of the reaches with a minimum streamflow requirement. | California Fish and Wildlife (recom-mendation 4) | Yes | $2,000 | Yes |
| 8 | Develop an Aquatic Invasive Species Management Plan to address aquatic invasive species such as New Zealand mudsnail, Quagga mussels, and zebra mussels. | California Fish and Wildlife (recom-mendation 6) | Yes | $2,000 | Yes |

Table 5-8. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 9 | Implement an Integrated Vegetation and Non-native Invasive Species Management Plan. | California Fish and Wildlife (recommendation 7.1) | Yes | $25,000 | Yes |
| 10 | Monitor animal losses in all project canals, including recording details of each animal mortality occurrence. | California Fish and Wildlife (recommendation 7.2) | Yes | $1,000 | Yes |
| 10 | Develop a Wildlife Crossing Plan for the Drum and South Yuba canals; build wildlife crossing structures in the canals according to minimum specifications. | California Fish and Wildlife (recommendation 7.3) | Yes | $49,000 | Yes |
| 11 | Consult with California Fish and Wildlife when replacing wildlife escape and wildlife crossing facilities regarding specifications and design. | California Fish and Wildlife (recommendation 7.5) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $2,000 | Yes |
| 12 | Implement Bald Eagle Management Plan. | California Fish and Wildlife (recommendation 7.7) | Yes | $3,000 | Yes |

Table 5-8. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 13 | Submit a biological evaluation, for approval by appropriate agencies, prior to construction activities on Forest Service or BLM lands that may affect special-status species or critical habitat. | California Fish and Wildlife (recommendation 7.8 and 12) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | No. Biological evaluation is already required prior to new construction. |
| 14 | Annually review current lists of special-status species that might occur in project area and that may be affected by project operations, and suggested procedure to follow if special-status species is detected. | California Fish and Wildlife (recommendation 7.9) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes |
| 15 | Use raptor-safe powerline design and configurations for new powerlines or when replacing existing structures. Replace or retrofit powerlines with substantial raptor-powerline interaction issues. | California Fish and Wildlife (recommendation 7.10) | Yes | $20,000 | Yes |
| 16 | Annually record all incidental observations and details of bird collision/electrocutions at project transmission lines. | California Fish and Wildlife (recommendation 7.11) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $6,000 | Yes |

Table 5-8. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 17 | Document all bat roosts within project buildings, dams, or other structure that may be used as roosting structure; place humane exclusion devices in structure with bats present; perform annual inspection of exclusion devices and structures. | California Fish and Wildlife (recom-mendation 7.12) | Yes | $1,000 | Yes |
| 18 | Schedule and facilitate a review meeting when the maintenance schedule, water year forecast, and reservoir level forecasts are finalized to discuss the implementation of streamflow and reservoir related conditions, results of monitoring, and other issues related to preserving and protection ecological values. | California Fish and Wildlife (recom-mendation 10) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes, however, we suggest that this consultation would be accomplished during the annual consultation meeting. |
| 19 | Develop and implement a plan to evaluate the penstock and other drainage structure emergency and maintenance release points to determine if improvements can be made to minimize potential adverse resource impacts when release points are used. | California Fish and Wildlife (recom-mendation 11) | Yes | $0 | Yes |

Table 5-8. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 20 | Recreation survey, monitoring, and future development triggers | California Fish and Wildlife (recom-mendation 12) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife measure 16) | Yes |
| 21 | Annual Recreation Coordination Meeting: Each year during the term of the license, arrange to meet with interested agencies for an annual coordination meeting to discuss the measures needed to ensure public safety, and protection and use of recreation facilities. | California Fish and Wildlife (recom-mendation 15) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife measure 16) | Yes |
| 22 | Upon issuance of the license, implement the Recreation Plan as approved by the Commission. Recommenda tion includes site-specific recommendations for recreation facility modifications and improvements. | California Fish and Wildlife (recom-mendation 16) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $5,000 | Yes |
| 23 | Restrict pesticide use on federal lands without prior written approval of appropriate agencies; includes details and restriction on allowed pesticides. | California Fish and Wildlife (recom-mendation 16) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes |

Table 5-8. Fish and Wildlife Agency Recommendations for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 24 | Develop and implement an Erosion and Sediment Control and Management Plan | California Fish and Wildlife (recom-mendation 22) | Yes | $149,000 | Yes |
| 25 | Hazardous Substances Plan | California Fish and Wildlife (recom-mendation 23) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $1,000 | Yes |
| 26 | Develop and implement a Slope Stability Plan. | California Fish and Wildlife (recom-mendation 27) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $149,000 | Yes |

#### 5.3.4.2 Land Management 4(e) Conditions

In section 2.2.4.3, *Modifications to Applicants' Proposals—Mandatory Conditions, Deer Creek Project*, we list the 4(e) conditions submitted by the Forest Service and BLM. There are no Reclamation lands within the project boundary proposed for the Deer Creek Project. We note that section 4(e) of the FPA provides that any license issued by the Commission "for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation." Thus, any 4(e) condition that meets the requirements of the law must be included in any license issued by the Commission, regardless of whether we include the condition in our staff alternative.

Of the Forest Service's 59 final section 4(e) conditions, we consider 52 conditions to be applicable to the Deer Creek Project, and of those 52 conditions, we consider 23 of the conditions (conditions 3 through 20, 23, 24, 35, 36 and 59) to be administrative or legal in nature and not specific

environmental measures. Of BLM's 50 section 4(e) conditions, we consider 46 conditions to be applicable to the Deer Creek Project, and of those 46 conditions, we consider 23 (conditions 8, 25 through 36, and 38 through 47) to be administrative or legal in nature and not specific environmental measures. We do not analyze these administrative conditions in this final EIS. Table 5-9 summarizes our conclusions with respect to the 53 final 4(e) conditions that we consider to be environmental measures. We include wholly in the staff alternative 27 Forest Service conditions and 21 BLM conditions as specified by the agencies. We do not recommend one Forest Service condition (condition 44, *Special Status Species*) and two BLM conditions (condition 6, *Recreation Agreement* and condition 13, *Special Status Species*); the measures not adopted in total are discussed in more detail in section 5.3.2, *Comprehensive Development and Recommended Alternative.*

Table 5-9. Forest Service and BLM 4(e) Conditions for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 1 | Consultation | Forest Service | $5,000 | Yes |
| 21 | Hazardous Substances Plan | Forest Service | $1,000 | Yes |
| 22 | Pesticide-use restrictions on national forest system lands | Forest Service | $0 | Yes |
| 25 | Annual employee training | Forest Service | $4,000 | Yes |
| 25 | Coordinated Operations Plan | Forest Service | $4,000 | Yes |
| 27 | Minimum streamflows for one project-affected stream reaches | Forest Service | $10,000 | Yes |
| 29 | Canal outages affecting 2 stream reaches | Forest Service | $5,000 | Yes |
| 33 | Canal outages fish rescue plan | Forest Service | $14,000 | Yes |
| 34 | Gaging Plan | Forest Service | $2,000 | Yes |
| 37 | Aquatic Invasive Species Management and Monitoring Plan | Forest Service | $2,000 | Yes |
| 38 | Vegetation and Non-native Invasive Plant Management Plan | Forest Service | $25,000 | Yes |
| 39 | Monitor animal losses in project canals | Forest Service | $1,000 | Yes |
| 40 | Replacement of wildlife escape and wildlife crossing facilities | Forest Service | $2,000 | Yes |
| 41 | Wildlife Crossings – Drum and South Yuba Canals | Forest Service | $49,000 | Yes |
| 43 | Bald Eagle Management Plan | Forest Service | $3,000 | Yes |

Table 5-9. Forest Service and BLM 4(e) Conditions for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 44 | Special-status species | Forest Service | $0 | No, a biological evaluation would be considered during any project construction activity. No additional condition is necessary. |
| 45 | Annual review of special-status species lists and assessment of new species on federal land | Forest Service | $0 | Yes |
| 46 | Project powerlines | Forest Service | $20,000 | Yes |
| 47 | Raptor collisions | Forest Service | $6,000 | Yes |
| 48 | Bat management | Forest Service | $1,000 | Yes |
| 49 | Facility Release Plan | Forest Service | $149,000 | Yes |
| 50 | Erosion and sediment control and management | Forest Service | $149,000 | Yes |
| 51 | Monitoring Program—Western Pond Turtle Incidental Observations | Forest Service | $1,000 | Yes |
| 53 | Recreation Plan | Forest Service | $5,000 | Yes |

Table 5-9. Forest Service and BLM 4(e) Conditions for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 55 | Visual Resource Management Plan | Forest Service | $3,000 | Yes |
| 56 | Historic Properties Management Plan | Forest Service | $13,000 | Yes |
| 57 | Transportation Management Plan | Forest Service | $244,000 | Yes |
| 58 | Fire Management and Response Plan | Forest Service | $1,000 | Yes |
| 1 | Annual employee training | BLM | $4,000 | Yes |
| 2 | Coordinated Operations Plan | BLM | $4,000 | Yes |
| 4 | Canal outages | BLM | $5,000 | Yes |
| 5 | Canal Outages Fish Rescue Plan | BLM | $14,000 | Yes |
| 6 | Recreation agreement | BLM | $15,000 | No, for BLM lands located inside the proposed project boundary, PG&E would ultimately be responsible for the operation and maintenance of any recreation facilities. |
| 9 | Gaging Plan | BLM | $2,000 | Yes |
| 11 | Replacement of wildlife escape and wildlife crossing facilities | BLM | $2,000 | Yes |
| 12 | Monitor animal losses in project canals | BLM | $1,000 | Yes |
| 13 | Special-status species | BLM | $0 | No, a biological evaluation would be considered during any project construction activity. No additional condition is necessary. |
| 14 | Annual-review of special-status species lists and assessment of new species on federal land | BLM | $0 | Yes |

Table 5-9. Forest Service and BLM 4(e) Conditions for the Drum-Spaulding Project Applicable to the Deer Creek Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 15 | Project powerlines and raptor collisions | BLM | $26,000 | Yes |
| 16 | Bald Eagle Management Plan | BLM | $3,000 | Yes |
| 17 | Terrestrial Protective Measure: Vegetation and Non-native Invasive Plant Management Plan | BLM | $25,000 | Yes |
| 18 | Fire Management and Response Plan | BLM | $1,000 | Yes |
| 19 | Slope Assessment and Facility Release Point Plan | BLM | $149,000 | Yes |
| 20 | Visual Resource Management Plan | BLM | $3,000 | Yes |
| 21 | Historic Properties Management Plan | BLM | $13,000 | Yes |
| 22 | Transportation Management Plan | BLM | $244,000 | Yes |
| 23 | Consultation | BLM | $5,000 | Yes |
| 37 | Pesticide-use restrictions on BLM lands | BLM | $0 | Yes |
| 48 | Licensee contact | BLM | Included in the cost for the Recreation Plan (Forest Service condition 53) | Yes |
| 49 | Hazardous Substances Plan | BLM | $1,000 | Yes |
| 50 | Erosion and sediment control and management | BLM | $149,000 | Yes |

## 5.4 CONCLUSIONS REGARDING THE PROPOSED SEPARATION OF DEER CREEK AND LOWER DRUM DEVELOPMENTS

As explained in PG&E's April 2011 Final License Application, PG&E and NID have evaluated the feasibility of PG&E transferring the Drum-Spaulding Project's Deer Creek facilities to NID and are in the process of negotiating the transfer. On June 18, 2012, PG&E filed an amendment to its Final License Application (June 2012 amended application) and asked the Commission to separate the majority of the Deer Creek Development from the existing Drum-Spaulding Project and to issue a new, separate license for the proposed Deer Creek Project. PG&E explained that the issuance of two, separate licenses for the Deer Creek Project and the remaining Drum-Spaulding Project would greatly facilitate the contemplated transfer.

The June 2012 amended application also acknowledged the possibility of further dividing the existing Drum-Spaulding Project into multiple projects by separating the lower Drum-Spaulding facilities, which include the Halsey, Wise, Wise No. 2, and Newcastle Developments from the remaining Drum-Spaulding Project. Shortly after the issuance of the DEIS on May 17, 2013, PG&E filed a second amendment to its April 2011 Final License Application on May 31, 2013. In this second application amendment, PG&E requested that the existing Drum-Spaulding Project be further divided and that the Commission also issue a separate license for the proposed Lower Drum Project. Unlike its proposed Deer Creek separation, PG&E did not provide a reason for this request.

PG&E's overall separation proposal, as evaluated in this final EIS, is to separate the existing Drum-Spaulding Project into three individually licensed projects, the Upper Drum-Spaulding Project, the Lower Drum Project, and the Deer Creek Project. The proposed Upper Drum-Spaulding Project would encompass the Spaulding No. 3, Spaulding No. 1 and No. 2, Alta, Drum No. 1 and No. 2, and Dutch Flat No. 1 Developments. The proposed Lower Drum Project would encompass the Halsey, Wise, Wise No. 2, and Newcastle Developments. The proposed Deer Creek Project would include only the Deer Creek Development.

We received comments on PG&E's proposed project separation from a number of stakeholders, including, the Forest Service, BLM, BOR, NMFS, California Fish and Wildlife, PCWA, and SWRCB. Generally, the comments expressed concerns about unnecessary complication of the relicensing process, the potential for existing, negotiated agreements for the Drum-Spaulding Project to unravel, and the potential for costs associated with the implementation of agreed upon PM&E measures to be declared too high for the individual projects to implement.

The proposed project separation would not affect the entirety of PG&E's proposed measures. PG&E's May 2013 amendment filing does not separate PG&E's proposed PM&E measures and plans by project. We have, to the extent practicable, separated the proposed measures and assigned them accordingly to each proposed separated project.

PG&E is proposing a number of PM&E measures that would affect all of the proposed separated projects, including the creation of a Coordinated Operations Plan for the Upper Drum-Spaulding, Lower Drum, and Deer Creek Projects, the implementation of selected monitoring plans at each project, as well as the development of aquatic invasive species management and monitoring plans. Other PM&E measures proposed for each of the proposed separated projects include annual employee training on special-status species, noxious weeds, and sensitive areas on Forest Service, BLM, or Reclamation land; notification of licensing participants of all annual planned and non-routine planned canal outages; implementation of various resource management plans.

Other proposed PM&E measures are project-specific and would be implemented on a resource dependent basis and are discussed in more detail within Section 3 of this final EIS. In some instances we were required to make assumptions about the applicability of the various proposed measures to each project. In those instances our goal was to ensure that the protections offered by the proposed PG&E measures extended to each of the three projects as applicable and contributed to the overall protection of each resource area.

The separation of the existing Drum-Spaulding Project into three separately licensed individual projects changes only the description of the project boundary; it does not change the environmental impacts of the project. Overall, we conclude that the protections offered by the PM&E measures proposed by PG&E, and recommended by us, are not lessened by the separation of the Drum-Spaulding Project into three separate individually licensed projects. Therefore, the separation of the projects has no environmental impact beyond the impacts already identified in section 3 of this final EIS.

With regard to project economics, we conclude that overall costs associated with the implementation of the PM&E measures as proposed by PG&E would remain unchanged by the separation of the existing Drum-Spaulding Project into three separately licensed individual projects. In addition, we conclude that power generation in the aggregate for the three separate projects would not change from the installed capacity stated in the original April 2011 Final License Application. Therefore, the economic impact of the separation of the existing Drum-Spaulding Project into three separately licensed individual projects would not differ from that originally contemplated when proposing relicensing of the Drum-Spaulding Project as a single project.

We will provide an opportunity for comment on our conclusions regarding PG&E's proposed separation of the Drum-Spaulding Project.

## 5.5 YUBA-BEAR PROJECT

### 5.5.1 Comparison of Proposed Project and Alternatives

In this section, we compare the developmental and non-developmental effects of NID's proposal, NID's proposal as modified by staff (staff alternative), and the no-action alternative.

We estimate the annual generation of the project under the three alternatives identified above. Our analysis shows that the generation would be 236,000 MWh for the proposed action; 236,000 MWh for the staff alternative; and 266,000 MWh for the no-action alternative.

We summarize the environmental effects of the different alternatives in table 5-10.

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Generation** | 266.0 GWh | 236.0 GWh | 236.0 GWh |
| **Geology and Soils** | Rollins upgrade would not be implemented. | Development and implementation of a Rollins upgrade construction erosion control and restoration plan would minimize erosion and sedimentation from construction activities. | Same as proposed action. |
| | Standard construction BMPs would be implemented on a site-by-site basis and would minimize ongoing erosion and sedimentation. | Development and implementation of a recreation facilities construction erosion control and restoration plan would minimize erosion and sedimentation from construction activities. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Eroded condition of Clear and Trap Creeks would continue to deteriorate. | Implementation of Clear and Trap Creeks Channel Stabilization Plan, filed June 18, 2012, would restore and protect eroded banks. | Same as proposed action, but finalize plan to include other potential sites where project operations have affected channel conditions and post-restoration monitoring consistent with Forest Service condition 48. |
| | Eroded spill channels below project structures would remain in current condition. | Implementation of Erosion and Sediment Control and Management Plan and Canal Release Point Plan, filed April 11, 2014, would minimize ongoing erosion at spill channels. | Same as proposed action. |
| | Potential for impacts to riparian habitat. | Monitor riparian vegetation in accordance with the specified Riparian Vegetation Monitoring Plan (November 2013). Monitoring of riparian vegetation would allow a continued assessment of the effects to riparian vegetation in areas affected by project operations. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Aquatic Resources** | Existing minimum streamflows vary with normal and dry water year types providing less streamflow variability and flexibility typical of regulated streams with limited aquatic habitat and fish production. | Water Year Type − Minimum streamflow requirements dependent on six different water year types: extremely critically dry; critically dry; dry; below normal; above normal; and wet. Extreme critically dry water year type minimum streamflows be implemented for Bear River below Rollins dam, Middle Yuba River below Milton diversion dam, and Canyon Creek below Bowman dam in a critically dry year that follows a critically dry or extreme critically dry year. | Same as proposed action. |
| | Provide existing minimum streamflows in 7 stream reaches. No minimum streamflows required in 10 project-affected stream reaches, providing no aquatic habitat. | Minimum Streamflows − Provide same or higher minimum streamflows in 6 project-affected reaches, new minimum streamflows and 9 project-affected reaches that do not have existing minimum streamflows. Two stream reaches would have no specific minimum streamflow requirement. The higher streamflows would increase fish habitat for all resident fish species. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | No seasonal adjustment to flows in these reaches to enhance storage when late summer and fall weather conditions are indicative of a period of dry weather has potential to result in non-compliance with minimum flow requirement and result in adverse effect on aquatic habitat. | Minimum streamflow, Flow Setting and Winter Flow Adjustment − Implement adjusted minimum streamflows in the Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam from November to January and below Wilson Creek diversion dam from November 1 to the earliest date to safely access the facility. | Same as proposed action. |
| | Flows in Bear River below Chicago Park powerhouse decrease sharply at the beginning of an outage at Chicago Park with the potential for stranding aquatic organisms. | Chicago Park Motoring during outage to maintain minimum streamflows − From May 1 through September 15, avoid non-routine planned outages and operate the turbine/generator unit in Chicago Park powerhouse in a synchronous condense mode when the unit is not generating electricity. During non-routine planned outages that would cause Dutch Flat afterbay to spill, make a good faith effort to motor the powerhouse until the flows from the Dutch Flat afterbay spill reach the tailrace of Chicago Park powerhouse. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Fish would continue to be lost due to canal dewatering and reduction of minimum flows would adversely affect downstream aquatic habitat. | Canal Outages − Notify licensing stakeholders of all annual planned and non-routine planned canal outages at the annual consultation meeting; provide required minimum streamflow, or natural inflow, whichever is less. For canal outages expected to extend past 30 days, consult with agencies and notify Commission of any modifications to minimum streamflows agreed on for the outage period. Notify agencies within one business day in event of emergency outage. | Same as proposed action. |
| | Flows decline rapidly once spill terminates; stage (water depth) in downstream reaches can decrease rapidly with the potential for stranding aquatic organisms. | Spill Cessation and Minimization of Flow Fluctuations in Middle Yuba River, Canyon Creek, and Bear River -- Implement spill cessation schedule at Milton diversion dam, Bowman-Spaulding diversion dam, and Dutch Flat afterbay dam to avoid short-term high-flow fluctuations in the downstream reaches. Existing stranding of aquatic organisms would be minimized. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Occasional rapid fluctuations in flow releases and spills from Rollins dam with the potential for stranding aquatic organisms. | Rollins Reservoir Elevation Control to manage spill cessation and flow fluctuations − Manage the elevation of Rollins reservoir within the top 2 or 3 feet by adjusting the draft out of the reservoir into the Bear River based on inflows to Rollins reservoir that are greater than downstream water supply demand in order to eliminate rapid fluctuations in the Bear River below Rollins dam. Existing fish stranding would be minimized. | Same as proposed action. |
| | No ongoing foothill yellow-legged frog monitoring of this stream reach, so effectiveness of existing measures unknown. | Steephollow Creek foothill yellow-legged frog monitoring - Baseline monitoring of foothill yellow-legged frog in Steephollow Creek in first 3 years of license to assess effects of intermittent spills from Chicago Park flume; spill event-based (>100 cfs, April 1-June 15; >300 cfs, June 16-September 15) monitoring during years 2 and 3 with additional protective BLM and California Fish and Wildlife measures. | Same as proposed action. |
| | Some fish residing in project canals may be lost when canals are drained during canal outages. | Implementation of the Fish Protection and Management During Canal Outages Plan, filed November 21, 2013, would minimize loss of fish. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Undetermined level of entrainment of resident fish at entrance to Milton-Bowman conduit would continue. | Milton-Bowman conduit fish entrainment – Develop and implement a Fish Entrainment Protection Plan including design, installation, and seasonal operation of fish screen per Forest Service condition 32. | Same as proposed action. |
| | LWD is periodically removed at log boom upstream of Rollins dam and stockpiled or burned, reducing downstream aquatic habitat. | LWD Management − Ensure mobile instream LWD passes downstream of project dams. Survey and identify project dams where LWD is blocked from passing downstream and identify opportunities and locations for reintroduction of LWD to downstream stream reaches. Ensure that LWD passes beyond Jackson Meadows dam, Milton Diversion dam, Sawmill dam, French dam, Faucherie dam, and Bowman dam. | Same as proposed action. |
| | No measure to actively move LWD downstream from Dutch Flat afterbay | Develop and implement a LWD Management Plan for Dutch Flat afterbay dam. | Same as proposed action. |
| | No measure to actively move LWD downstream from Rollins dam | Develop and implement a LWD Management Plan for Rollins dam. Relocate LWD that accumulates on the upstream side of Rollins dam spillway log boom to the downstream side where it can pass over the spillway during spill events and conduct LWD surveys at 5-year intervals downstream of Rollins reservoir. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Existing stream gages would continue to operate as designed. Unable to monitor compliance with minimum flows for stream reaches without gages. | Gaging Plan filed April 11, 2014 − Measure streamflow for each of the reaches with a minimum streamflow requirement. Modify existing gages or install new streamflow gages in some of the reaches with a new minimum streamflow requirement. | Same as proposed action. |
| | No measures to control aquatic invasive species in project-affected waters. | Develop and implement the Aquatic Invasive Species Prevention Guidelines section of Non-native Invasive Plant Management Plan to minimize the spread of aquatic invasive species. | Same as proposed action, but develop as a separate plan for Aquatic Invasive Species Management and Monitoring consistent with Forest Service condition 37. |
| | No ongoing fish population monitoring, so effectiveness of existing measures unknown. | Implement Fish Population Monitoring Plan, filed November 21, 2013, to assess the effects of the proposed flow modifications. | Same as proposed action. |
| | Breeding populations of foothill yellow-legged frog (FYLF) may be affected by project operations through the modification of flows and stream temperatures as a result of project discharges. No ongoing frog monitoring, so effectiveness of existing measures unknown. | Implement Foothill Yellow-legged Frog Monitoring Plan, filed November 21, 2013, to assess the effects of the proposed flow modifications. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | No ongoing channel morphology monitoring, so effectiveness of existing measures unknown. | Implement Channel Morphology Monitoring Plan, filed November 21, 2013, to assess the effects of the proposed flow modifications. | Same as proposed action. |
| | Potential for impacts to riparian habitat. | Monitor riparian vegetation in accordance with the Forest Service/BLM Riparian Vegetation Monitoring Plan, filed April 11, 2014. Monitoring of riparian vegetation would allow a continued assessment of the effects to riparian vegetation in areas affected by project operations. | Same as proposed action. |
| | No ongoing water temperature and stage monitoring, so effectiveness of existing measures unknown. | Implement Forest Service/BLM Water Temperature and Stage Monitoring Plan, filed April 11, 2014, to assess the effects of the proposed flow modifications. | Same as proposed action. |
| | No ongoing western pond turtle monitoring, so effectiveness of existing measures unknown. | Implement Western Pond Turtle Incidental Observations to document and report distribution of species in project-affected area. | Same as proposed action. |
| | No ongoing aquatic benthic macroinvertebrate monitoring, so effectiveness of existing measures unknown. | Same as no-action alternative. | Develop and implement monitoring plan for Aquatic Benthic Macroinvertebrates based on Forest Service condition 51. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Terrestrial** | The spread of non-native invasive plants can impact wildlife habitat. | Implementation of NID's proposed March 2013 Integrated Vegetation Management Plan at the project would control the spread of non-native invasive plants and protect wildlife habitat. | Same as proposed action but modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance. |
| | No restrictions on use of pesticides or herbicides on project lands could result in harm to environmental resources. | Implement Integrated Vegetation Management Plan that contains specific provisions for the use of pesticides and herbicides at the project, and would help protect sensitive species and their habitats. | Same as proposed action. |
| | Potential destruction of culturally significant plants | Same as no-action. | Consult with tribes to identify culturally significant plants and modify the proposed Vegetation Management Plan to identify and protect culturally important species. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Project transmission lines could result in mortality of raptors and other birds from electrocution and collision. | Record annually all incidental observations by licensee's operations staff of bird collisions/ electrocutions along Project powerlines. Utilize of raptor-safe powerline configurations consistent with Avian Protection on Power Lines guidelines for new powerlines and when replacing existing structures. Replace or retrofit powerlines where avian interaction/mortality is substantial. Implementation of these measures would reduce project impacts to avian resources and would minimize risk of avian mortality. If bird collision or electrocution issues are detected, recording incidents and retrofitting structures using the same guidelines would benefit avian resources. | Same as proposed action but include all proposed measures for avian protection at the project in an Avian Management Plan. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Mortality of deer and other target species would continue to occur and wildlife movement would be restricted. | Consult with appropriate agencies, prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings. Assess wildlife escape and crossing structures annually. Annually monitor animal losses in project canals, including details of mortality. Maintain and construct wildlife crossing structures in the Bowman-Spaulding canal and prepare an annual report with recommendations to reduce animal mortalities. | Same as proposed action, but include proposed wildlife protection and monitoring measures in a Wildlife Crossing Plan for the project. |
| | Bats that use project buildings may be affected by human activity. | Document known bat roosts within project buildings. If bats or signs of roosting are present where staff have routine presence, place humane exclusion devices to prevent occupation by bats, and annually inspect exclusion devices. These measures would minimize any impacts to bats. | Same as proposed action, but include proposed measures for bat documentation and protection in a Bat Management Plan for the project. |
| | Recreational use and disturbance could affect nesting bald eagles. No project-wide plan for the protection of bald eagles or bald eagle nests. | Implementation of Bald Eagle Management Plan would minimize impacts to nesting eagles from operation and maintenance and recreational use. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Recreation Resources** | Existing project recreation facilities would continue to serve the public but may not meet current demand or expectations. | Modify and enhance recreation facilities, as proposed in Alternative Recreation Plan, to increase public recreation opportunities. | Similar to proposed action, but includes additional measures and improvements at Pass Creek Boat Launch; Pass Creek campground; Jackson Meadows vista; Aspen Group campground; Canyon Creek campground; Faucherie Group campground; Findley campground; Woodcamp campground; Woodcamp boat launch; Milton diversion impoundment; French Lake; and additional camping facilities at Jackson Meadows. |
| | Existing trails within the project boundary would continue to serve the public, but may not be sufficient to meet current needs or expectations. | Add and improve trails, as proposed in the Alternative Recreation Plan, to enhance trail use. | Similar to NID's proposed action but does not include modifications or enhancements to trails, trailheads or trail facilities (trailhead parking, kiosks, etc.) that are located outside the project boundary, unless such trails directly connect or are intended to connect two or more project facilities, and includes the following additional project-related trail measures at Vista Point and Aspen Group campground to a lake overlook, Sawmill Lake, Faucherie Lake to French Lake, and Rollins reservoir. |
| | Existing boat ramps at the project would continue to provide boat launching opportunities at Jackson Meadows and Rollins reservoirs under some reservoir water level conditions. | Extend the Pass Creek boat ramp, as proposed in the Alternative Recreation Plan. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Project recreation facilities would continue to be maintained. | Proposed recreation facility operation and maintenance would ensure recreation facility maintenance is done on an appropriate schedule and would enhance the condition, usability, and safety of project recreation facilities. | Same as proposed action. |
| | Monitoring of recreational use at the project would continue to occur on a 6-year cycle. | Proposed recreational use monitoring would enhance the level of information gathered on recreational use beyond the Form 80 requirements at the project facilities, as well as on facility condition. | Same as proposed action. |
| | The Chicago Park powerhouse and forebay area would continue to provide day use opportunities including shoreline fishing, picnicking, biking, and hiking/walking and undeveloped recreation would continue to occur in the powerhouse area. | The proposal to develop a rehabilitation plan with BLM to block, gate, and rehabilitate roads and trails at Chicago Park powerhouse and to annually meet with BLM to discuss the following year's projects would allow for a coordinated effort to reduce the resource damage occurring from off-road trails and roads. | Same as proposed action. |
| | No funding would be required by the FERC license to BLM for operation, maintenance, law enforcement patrolling, and administration services. | Entering into an Recreation Operation and Maintenance Agreement with BLM to provide BLM $30,000 annually for operation, maintenance, law enforcement patrolling, and administration would provide funding assistance to BLM for these services. | Not included in staff alternative because NID is ultimately responsible for those facilities within the FERC boundary and recreation that extends to BLM lands outside the project boundary are outside the Commission's authority. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Fish stocking would continue at selected project reservoirs. Existing levels of fish stocking may not meet current or future angler demand. | Funding of California Fish and Wildlife for the stocking of up to 20,000 trout fry and 25,000 kokanee fry in Bowman Lake and the stocking of up to 10,000 catchable rainbow trout, 10,000 catchable brown trout, and 25,000 kokanee fry in Rollins reservoir. | In lieu of funding California Fish and Wildlife for fish stocking, development and implementation of a Fish Stocking Plan for the project would ensure that fish stocking continues at existing stocked reservoirs and lakes to meet current and future ecological and recreational needs. |
| | Existing streamflows and flow releases would provide whitewater boating opportunities along various project stream reaches at the current frequency. | Spill Cessation and Minimization of Flow Fluctuations (see Aquatic Resources) in Middle Yuba River, Canyon Creek, and Bear River would minimize flow fluctuations in downstream reaches and enhance whitewater boating opportunities below Milton diversion dam, Bowman-Spaulding diversion dam, and Dutch Flat afterbay dam. Enhanced flows at the Milton diversion dam, French dam, and Bowman-Spaulding diversion dam would significantly increase whitewater boating opportunities in three reaches. | Same as proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| | Streamflow information would continue to be available at existing stream gages and through existing public information outlets. | Develop a plan to provide real-time streamflow information in cfs to the public via the internet for the Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam, within one year.<br><br>Streamflow information (preferably in 15-minute intervals but in no less than hourly intervals) would be available to the public via internet, which would make it easier for recreational users to check on current streamflow conditions at river/stream reaches directly affected by project operations. | Same as proposed action, but modified to include 15-minute interval reporting of streamflow information for these reaches (the Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam) where it is currently provided in 15-minute intervals and also require submittal of streamflow information plan to the Commission for approval. |
| **Cultural** | Significant cultural resources (i.e., historic properties) would be adversely affected by project-related activities and effects. | Implementation of the HPMP (filed October 15, 2012) upon license issuance would protect cultural resources and resolve project-related adverse effects to historic properties. | Same as the proposed action. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Land Use** | Continue to maintain all project roads and facilities. | Implement the Transportation Plan, filed August 29, 2012, to improve road management and to ensure public access to project lands and waters and the adequate protection of natural and environmental resources. | Same as proposed action. |
| | Continue to follow State of California and local rules and regulations. Continue to implement emergency response preparedness requirements. | Implement the Fire Prevention and Response Plan (filed November 21, 2013) on federal lands filed with the Commission to reduce the occurrence of wildfires in the project area, and to minimize damage to natural resources. | Revise the Fire Prevention and Response Plan to include all project lands and a period of review and revision. |
| | Project boundary would include facilities not necessary for the continued operation of the project and would not include all primary project roads and recreation facilities. | Revise the project boundary to remove the mineral survey area south of the Dutch Flat afterbay, the administrative site at Jackson Meadows reservoir, and the recreation road that provides access to it, and to include certain primary project roads, and new and rehabilitated recreation facilities. | Same as proposed action. |
| | Continue to comply with existing regulations regarding hazardous materials. | Development and implementation of a Rollins upgrade construction hazardous materials spill prevention control and countermeasure plan would minimize the risk of chemical spills. | Develop and file a single, project-wide Hazardous Substances Plan to identify acceptable prevention and mitigation measures and to ensure that hazardous substances are promptly contained or cleaned up. |

Table 5-10. Comparison of Alternatives for the Yuba-Bear Project. (Source: staff)

| Resource | No-action Alternative | Proposed Action | Staff Alternative |
|---|---|---|---|
| **Aesthetic Resources** | Visual quality would be degraded by project facilities. | Implement the Visual Resources Management Plan, filed June 18, 2012, to reduce project visual effects and improve the visual quality in the project area. | Same as proposed action. |

### 5.5.2 Comprehensive Development and Recommended Alternative

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreation opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for relicensing the Yuba-Bear Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the staff alternative as the preferred alternative for the Yuba-Bear Project. This alternative includes elements of the applicant's proposal, section 4(e) conditions, resource agency recommendations, alternative conditions under the EPAct, and some additional measures. We recommend this alternative because: (1) issuance of a new hydropower license by the Commission would allow NID to operate the project as an economically beneficial and dependable source of water and electrical energy for its customers; (2) the 79.3 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended measures would protect and enhance fish and wildlife resources and would provide improved recreation opportunities at the protect.

Finally, for the reasons outlined in section 5.2.2.3, we recommend that certain 4(e) conditions specified by the Forest Service or BLM, in whole or in part, not be included in the staff alternative. We recognize, however, that the Commission is required to include valid 4(e) conditions in any license issued for the project. As such, each of the measures that staff recommend be modified in the staff alternative would not be included in any license issued by the Commission. Instead, those staff-modified conditions would be replaced with agencies' corresponding conditions, as filed with the Commission.

Of the 40 Forest Service section 4(e) conditions we consider to be environmental measures, we wholly include 37 of these conditions in the staff alternative as specified by the Forest Service. Of the three Forest Service conditions not wholly included in the staff alternative as specified by the Forest Service, we recommend modifying: (1) condition 26, *Water Year Type*; and (2) condition 58, *Recreation Streamflow Information*. We do not recommend preparation of a biological evaluation for construction of project-related facilities not addressed in the Commission's EIS (condition 43).

Of the 44 BLM section 4(e) conditions we consider to be environmental measures, we wholly include 40 of these conditions in the staff alternative as specified by BLM. We recommend modifying: condition 37, *Recreation Streamflow Information*. We do not recommend entering into a Recreation Operation and Maintenance Agreement with BLM to provide BLM $30,000 annually for operation, maintenance, law enforcement patrolling, and administration (condition 34), developing a plan in coordination with BLM to address the costs of managing project-related recreation on BLM lands (condition 36), and preparation of a biological evaluation for construction of project-related facilities not addressed in the Commission's EIS (conditions 19/53).

In the following section, we make recommendations as to which environmental measures proposed by NID or recommended by agencies or other entities should be included in any license issued for the project. In addition to NID's proposed environmental measures, we recommend additional staff-recommended environmental measures to be included in any license issued for the project, and we describe these requirements in the draft license articles in appendix G.

#### 5.5.2.1 Measures Proposed by NID

Based on our environmental analysis of NID's proposal in section 3, and the costs presented in section 4, we conclude that the following environmental measures proposed by NID would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project. Our recommended modifications to NID's proposed measures are shown in *italic* text.

**General Measures**

- Consult annually with the Forest Service and BLM to review operations and monitoring data from the prior year and conduct planning for ongoing project operations.

- Conduct annual employee training to familiarize project staff with special-status species, non-native invasive plants, and sensitive areas known to occur within the project boundary on Forest Service or BLM land, and the procedures for reporting to each agency.

- Annually review special-status species lists and assess new species on federal project lands.

- Consult with the Forest Service, BLM, or, as appropriate, California Fish and Wildlife, to determine potential project-related effects of any proposed future ground-disturbing activity on federal project land.

- Develop and implement a Coordinated Operations Plan for Yuba-Bear Project, Upper Drum-Spaulding Project, and Lower Drum Project regarding implementation of flow-related measures in each project's license.

- Obtain prior written approval of the Forest Service or BLM, as appropriate, for the use of pesticides or herbicides on or affecting public land.

**Geology and Soils**

- Develop and implement an erosion control and restoration plan to prevent adverse effects on environmental resources associated with erosion during the Rollins upgrade construction.

- Implement Erosion and Sediment Control and Management Plan (filed April 11, 2014) to prevent adverse effects on environmental resources associated with erosion during recreation facility construction.

- Implement Clear and Trap Creeks Channel Stabilization Plan (filed June 18, 2012) to stabilize and restore existing erosion effects from spills downstream of the Bowman-Spaulding canal, including at a minimum, Clear and Trap Creeks and Christmas Tree waterway. *Finalize plan to include other potential erosion sites determined in consultation with the agencies and post-restoration monitoring to ensure that restoration activities have been successful and effective over time. Coordinate plan with Canal Release Point Plan.*

- Implement Canal Release Point Plan (filed April 11, 2014) to inventory, record, treat, and monitor potentially significant project-related erosion and sedimentation impacts on federal project lands and minimize future erosion and sedimentation.

**Aquatic Resources**

- Use six water year types (wet, above normal, below normal, dry, critically dry, and extreme critically dry) to determine appropriate monthly minimum streamflows, as shown in appendix A-2, table 3-98. Implement extreme critically dry water year type flows below Rollins dam, Milton diversion dam, and Bowman-Spaulding diversion dam in a critically dry year that follows a critically dry or extreme critically dry year.

- To enhance aquatic habitat and support and protect resident aquatic species, provide the same or increased minimum streamflows to six project-affected reaches and provide new minimum streamflows to nine project-affected reaches, as described in section 3.3.2.2.2, *Instream Flows*, and shown in the tables of appendix A-2 of this EIS as listed below.

| **Project-affected Reach** | **Table No. in Appendix A-2** |
|---|---|
| Middle Yuba River – below Jackson Meadows dam | 3-149 |
| Middle Yuba River – below Milton diversion dam | 3-151 |
| Wilson Creek – below Wilson Creek diversion dam | 3-155 |
| Jackson Creek – below Jackson dam | 3-156 |
| Canyon Creek – below French dam | 3-157 |
| Canyon Creek – below Faucherie dam | 3-159 |
| Canyon Creek - below Sawmill dam | 3-161 |
| Canyon Creek – below Bowman-Spaulding diversion dam | 3-163 |
| Texas Creek – below Texas Creek diversion dam | 3-167 |
| Clear Creek – below Bowman-Spaulding diversion conduit | 3-168 |
| Fall Creek below Bowman-Spaulding diversion dam | 3-170 |
| Trap Creek – below Bowman-Spaulding diversion conduit | 3-173 |

| Project-affected Reach | Table No. in Appendix A-2 |
|---|---|
| Rucker Creek – below Bowman-Spaulding diversion conduit | 3-174 |
| Bear River – below Dutch Flat afterbay dam | 3-175 |
| Bear River – below Rollins dam | 3-178 |

- Notify licensing stakeholders at the annual consultation meeting of all annual planned and non-routine planned canal outages in the Bowman-Spaulding diversion conduit. Provide minimum streamflow or inflow, whichever is less during canal outages in Bowman-Spaulding conduit and Upper Drum-Spaulding Project's Drum canal. Consult with licensing stakeholders if the outage is anticipated to extend past 30 days and notify the Commission of any modifications to minimum streamflows agreed on for the extended outage period. Notify agencies within one business day in event of emergency outage.

- Implement overwintering minimum streamflow adjustments below Milton diversion dam and Bowman-Spaulding diversion dam in response to extended periods of low regional precipitation, as described in section 3.3.2.2.2, *Instream Flows*.

- Implement Gaging Plan (filed April 11, 2014) to measure streamflows at specified locations for documenting compliance with the proposed minimum streamflow requirements listed above and described in section 3.3.2.2.2, *Instream Flows*, as shown in appendix A-2, table 3-189.

- Implement the periodic minimum streamflow settings due to remote location and access difficulties at Wilson Creek diversion dam, as described in section 3.3.2.2.2, *Instream Flows*.

- From May 1 through September 15, avoid non-routine planned outages and operate the turbine/generator unit in Chicago Park powerhouse in a synchronous condense mode when the unit is not generating electricity. During non-routine planned outages that would cause Dutch Flat afterbay dam to spill to the downstream Bear River, make a good faith effort to motor the Chicago Park powerhouse until the increased flows from the Dutch Flat afterbay dam reach the tailrace of Chicago Park powerhouse to prevent a sharp decrease in flows in the Bear River downstream of the Chicago Park powerhouse.

- To reduce the risk of stranding of aquatic resources, implement spill cessation schedules and minimize flow fluctuations at Milton and Bowman-Spaulding diversion dams and Dutch Flat afterbay dam, as described in section 3.3.2.2.1, *Water Quantity*, as shown in appendix A-2, tables 3-184, 3-185, 3-186, and 3-187.

- To prevent rapid flow fluctuations in the lower Bear River below Rollins dam, balance inflow from upstream with outflows when the Rollins reservoir water surface elevation is within the top 2 to 3 feet of the reservoir.

- Implement Canal Fish Rescue Plan (filed November 21, 2013) to minimize fish losses when canals are drained for maintenance and repair.

- Develop and implement a Fish Entrainment Protection Plan for the Milton-Bowman conduit, including design, installation, and seasonal operation of fish screens to minimize entrainment of juvenile fish into the conduit.

- Ensure mobile instream LWD continues downstream beyond Jackson Meadows dam, Milton Diversion dam, Sawmill dam, French dam, Faucherie dam, and Bowman dam. Annually in October, relocate LWD that has accumulated on the upstream side of Rollins dam spillway log boom to the downstream side of the log boom. Allow the LWD between the log boom and spillway to pass over the spillway when the reservoir spills to enhance aquatic habitat in the Bear River below Rollins dam.

- Develop and implement a LWD management plan for Yuba-Bear Project affected waters.to identify dams where active management of LWD is necessary to ensure passage downstream of the dam. Specific plans would also be developed for management of LWD at Dutch Flat afterbay dam and Rollins dam.

- Implement Fish Population Monitoring Plan (filed November 21, 2013) to assess effects of proposed flow modifications in project-affected stream reaches identified in plan.

- Implement Foothill Yellow Legged Frog Monitoring Plan (filed November 21, 2013) to assess effects of proposed flow modifications on populations in project-affected stream reaches identified in plan.

- Implement Water Temperature and Stage Monitoring Plan (filed April 11, 2014) to assess effects of proposed flow modifications on water temperature management in project-affected stream reaches identified in plan.

- Implement Channel Morphology Monitoring Plan (filed November 21, 2013) to assess effects of proposed flow modifications on channel structure and stability in project-affected stream reaches identified in plan.

- Implement Riparian Vegetation Monitoring Plan (filed April 11, 2014) to assess effects of proposed flow modifications on diversity and persistence of riparian vegetation in project-affected stream reaches identified in the plan.

- Implement procedures to document and report incidental observations of western pond turtle during other monitoring surveys and operations consistent with Forest Service condition 51.

- Implement *Aquatic Invasive Species Prevention Guidelines* (included in Integrated Vegetation Management Plan) to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters. *Develop an aquatic invasive species monitoring and management plan to include the prevention guidelines.*

**Terrestrial Resources**

- Implement an Integrated Vegetation Management Plan on federal lands that combines all measures related to the management of terrestrial vegetation at project facilities and recreation sites and includes control of non-native invasive species, provisions for special-status species, provisions for pesticide use, and annual training, management, and reporting, *as modified to apply to all accessible project lands (particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance), require*

*consultation with tribes to identify culturally significant plants, and protect culturally important species.*

- Record annually all incidental observations of bird collisions/electrocutions at the Bowman-Spaulding transmission line. Consult with the Forest Service, U.S. Fish and Wildlife Service, and California Fish and Wildlife concerning measures needed to ensure the protection of birds where incidental observations of bird collisions/electrocutions illustrate a problem pole or transmission structure. Replace or retrofit poles with substantial raptor-project interaction issues as appropriate. *Include all proposed measures for avian protection at the project in an Avian Management Plan, and LOPs planned for the protection of special-status birds and their habitat.*

- Record animal losses from drowning in all project canals. Provide this information to California Fish and Wildlife, the Forest Service, or BLM, as appropriate, as well as to the Commission. After consultation with the appropriate resource agencies, develop additional measures to address suspected project-related causes of mortality if there is an increasing trend in wildlife mortalities in a canal.

- Consult with the Forest Service or BLM, as appropriate, prior to replacing or retrofitting existing wildlife escape facilities and wildlife crossings along project canals, and consult with California Fish and Wildlife regarding specifications and design. Assess existing wildlife escape facilities annually to ensure they are functional and in proper working order.

- Maintain wildlife crossings on Bowman-Spaulding canal consistent with proposed wildlife crossing plan and *prepare a Wildlife Crossing Management Plan for the project that includes provisions for replacement/addition of wildlife crossing, consultation, monitoring, and reporting*.

- Implement proposed bat management measures. Document all known bat roosts within project buildings, dams, or other structures. Provide inspection results to California Fish and Wildlife, the Forest Service, and BLM, as appropriate. If bats or signs of roosting are present where project personnel routinely work, place humane exclusion devices to prevent occupation of the structure by bats. *Incorporate the proposed bat management provisions in a Bat Management Plan for the project.*

- Implement the July 2013 Bald Eagle Management Plan (filed November 21, 2013) to protect nesting bald eagles from disturbance during project operations and recreational activities.

**Recreation Resources**

- Implement a Recreation Plan (filed August 29, 2012) for upgrades, maintenance, and development of new project recreation facilities on federal project lands, *as modified with regard to the implementation schedule, trail development, campground upgrades, accessibility, parking and road improvements, boat launches, water systems, and monitoring, and to exclude provisions for campground hosts or added amenities at campground host sites, and enhancements to trails, trailheads, or trail facilities that do not serve a project purpose.*

- Develop a rehabilitation plan with BLM to block, gate, and rehabilitate roads and trails at Chicago Park powerhouse and to annually meet with BLM to discuss the following year's projects.

- Provide reservoir storage information via the internet *year-round* for the following locations: Jackson Meadows reservoir; French Lake; Faucherie Lake; Sawmill Lake; Jackson Lake; Bowman Lake; and Rollins Lake.

- Develop a plan to provide real-time streamflow information in cfs to the public via the internet for the Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam, within one year of license issuance, *as modified to include 15-minute interval reporting of streamflow information for these reaches* (*Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton Reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam) where it is currently provided in 15-minute intervals and require submittal of the plan to the Commission for approval.*

- Provide increased flows (target streamflow of between 120 and 150 cfs over a continuous 24-hour period as measured at gage YB-306) in Canyon Creek below French dam for whitewater boating starting between September 1 and September 30 of each year, until the date that French Lake elevation reaches 6,638 feet msl.

- Provide recreational streamflow events (continuous mean daily target streamflow of 300 cfs for at least 6 continuous days as measured at USGS gage 11408550 [Middle Yuba River below Milton diversion dam]) in any years in which spill at Milton diversion dam is 300 cfs or greater after May 1.

- Provide recreational streamflow events (continuous mean daily target streamflow of 275 cfs for at least 5 continuous days as measured at gage 11416500 [Canyon Creek downstream of the Bowman-Spaulding diversion dam] after April 1) in any years in which flow as measured at USGS gage 11416500 is 275 cfs or greater.

**Cultural Resources**

- Implement the HPMP (filed October 15, 2012) upon license issuance to ensure protection of cultural resources and resources that are eligible for inclusion in the National Register.

**Land Use and Aesthetic Resources**

- Implement the Transportation Management Plan (filed August 29, 2012) to rehabilitate and maintain primary project roads to ensure that project roads are adequately maintained.

- Implement the Fire Prevention and Response Plan (filed November 21, 2013) to provide fire prevention procedures, reporting, and safe fire practices for NID personnel and contractors responsible for operating and maintaining the project, *as revised to include all project lands and to include a period of review and revision.*

- Revise the project boundary to remove the mineral survey area south of the Dutch Flat afterbay and the administrative site at Jackson Meadows reservoir and the recreation road that provides access to it and to include certain primary project roads, and new and rehabilitated recreation facilities.

- Develop and implement a hazardous materials spill prevention, control, and countermeasure plan for the Rollins upgrade construction, *as modified to address spill prevention, control, and countermeasures for all project uses/activities on all project lands*.

- Develop and implement a recreation facilities construction hazardous materials spill prevention, control and countermeasure plan, *as modified to address spill prevention, control, and countermeasures for all project uses/activities on all project lands*.

- Implement the Visual Resource Management Plan (filed June 18, 2012) on federal lands to improve the visual quality of the project by reducing the visual contrast of existing and proposed project facilities.

#### 5.5.2.2 Additional Measures Recommended by Staff

In addition to NID's proposed measures listed above (and modified as indicated), we recommend the following staff-recommended measures in any license that may be issued for the Yuba-Bear Project:

- Develop and implement an aquatic benthic macroinvertebrate monitoring plan to minimize the potential for the introduction, dispersal, and growth of non-native invasive species in project-affected waters.

- Develop and implement a Fish Stocking Plan that addresses annual stocking in Rollins reservoir, Jackson Meadows reservoir, Bowman Lake, and Faucherie Lake, stocking Sawmill Lake every other year until the first Form 80 reporting year after implementation of the plan, and includes provisions for stocking fish in additional project reservoirs (French Lake) based on changes in recreational use and angling pressure over the term of the new license (replaces NID's proposal to pay for fish stocking).

Below, we discuss our rationale for some of the key proposed and additional staff-recommended measures.

*Minimum Streamflows*

To protect and enhance aquatic resources NID, Forest Service, BLM, and California Fish and Wildlife have agreed on minimum streamflows for project-affected reaches. These flows would generally be the same or higher than under the existing license and, in some cases, higher than estimated unregulated streamflows during the dry summer period. Many of these project-affected stream reaches have no minimum streamflow requirement under the existing license.

In many project-affected stream reaches the proposed minimum streamflows would vary depending on six water year types from extreme critical dry to wet based on California DWR Bulletin 120. These flows, particularly in larger stream reaches with higher base flows, would create seasonal and interannual flow variability more typical of natural unregulated streams. Extensive analysis by NID of the relationship of habitat and flow in these reaches supports the finding that the proposed higher minimum streamflows and increased flow variability would protect and enhance aquatic habitat for resident species. During extended periods of dry conditions, extreme critically dry minimum streamflows would be implemented below Rollins dam during a critically dry year that is preceded by a critically dry or extreme critically dry water year type.

We estimate that the annualized cost to deliver the proposed minimum streamflows would be $26,000 with an additional $1,000 annual cost to determine and implement flows based on water year

types. We recommend adopting these flow measures because substantial benefits to fish habitat are worth the cost.

NID also proposed two methods for demonstrating compliance with proposed minimum streamflows depending on the location and accessibility of the dam and the flow control structure. At dams where access is not an issue compliance would be demonstrated by the continuous, instantaneous record (Gaging Plan filed April 11, 2014) from designated existing, modified, or new stream gages maintained and operated consistent with USGS protocols. However, Wilson Creek diversion dam is at a remote location that is difficult to access and where safety is also an issue for winter access. At this location, compliance with minimum streamflows would be the periodic act of setting the dam outlet structure to provide the required minimum streamflow. Given the safety constraints, we conclude that this is a reasonable approach for determining compliance with minimum flow requirements. We estimate that the annualized cost to implement these two streamflow compliance measures would be $95,000. We recommend adopting these proposed compliance measures because they would be an effective mechanism to demonstrate compliance with proposed minimum streamflows at a reasonable cost.

*Spill Cessation and Minimization of Flow Fluctuations in the Middle Yuba River, Canyon Creek, and Bear River*

Rapid reductions in flow following a spill event can adversely affect aquatic resources in downstream reaches, particularly life stages that are immobile or have limited mobility. NID proposed a schedule for more gradual rate of flow reduction from May through September following spills to the Middle Yuba River from Milton diversion dam, Canyon Creek from the Bowman-Spaulding diversion dam, and Bear River from Dutch Flat afterbay. This schedule was also recommended by Forest Service, BLM, and California Fish and Wildlife. This proposal would reduce spill flows from 300 cfs to the specified minimum streamflow for the particular month and water year over a period of up to 22 days in the Middle Yuba River below Milton diversion dam. Following a spill, flows in Canyon Creek below the Bowman-Spaulding diversion dam would be reduced from 275 cfs to the specified minimum streamflow appropriate to the month and water year over a period of up to 21 days.

NID proposed a spill cessation schedule for the Bear River below Dutch Flat afterbay to reduce spill flows following an outage of the Chicago Park flume and or powerhouse. The rate of reduction would depend on the duration of the outage and spill; two schedules are proposed for spills of 3 days or less and spills longer than 3 days. Following a short spill, NID would reduce flows from 75 cfs to the appropriate minimum streamflow over a 3-day period. Following a longer spill, NID would reduce flows from 75 cfs to the appropriate minimum streamflow over a period of up to 21 days.

NID's proposed spill cessation measures would minimize the rapid fluctuations in flow associated with the end of spill events in the Middle Yuba River below Milton diversion dam, Canyon Creek below Bowman-Spaulding diversion dam, and in the Bear River below Dutch Flat afterbay, which would reduce stranding of aquatic organisms. We recommend adopting this measure because it would result in flow reductions following spill events that mimic the natural recession from high flows and provide a substantial benefit to fish and aquatic habitat at a reasonable annual cost of $15,000.

*Canal Outages*

In certain situation, flows released from project canals to stream reaches provide minimum instream flows for protection of aquatic resources. When these canals are taken out of service during planned maintenance or during unplanned emergencies, the canals drain and become dry. In these instances, flow releases from the canals to the stream reaches are interrupted and flow in the stream reaches downstream of the canal are maintained only by inflow, which at some locations could be

reduced to no flow during some months. In other stream reaches, canal outages could result in abrupt spill, resulting in abnormally high flows.

NID identified project-affected stream reaches where its ability to deliver minimum streamflows could be affected during maintenance and emergency outages of project canals, conduits, and flumes. During canal outages, NID proposes to meet the required minimum flow for that month and water year, or the natural inflow, whichever is less. The Forest Service, BLM, and California Fish and Wildlife recommend NID's proposal for canal outages that affect streamflows. NID proposes to notify all licensing participants at the annual consultation meeting of the past year unplanned and future year planned canal outages, and also propose to notify and consult with licensing participants if a canal outage is anticipated to extend beyond 30 days.

NID proposes and BLM, Forest Service, and California Fish and Wildlife recommend implementation of a plan to protect fish residing in project canals when a canal is drained during a planned, unplanned, or emergency outage. The Fish Protection and Management during Canal Outages Plan (filed November 21, 2013) identifies the canals, locations and procedures for fish collection and rescue, and procedures for notifying the resource agencies. The plan would be implemented within the first year following issuance of the license for the Yuba-Bear Project. We estimate that the annualized cost of this plan would be $52,000. We recommend adopting this measure because it would reduce fish mortality associated with canal outages during planned maintenance and during unplanned emergencies at a reasonable cost.

*Milton-Bowman Conduit Fish Entrainment Protection Plan*

Fish entrainment into the Milton-Bowman conduit is occurring but NID is suggesting that the level of entrainment is uncertain. Study results (technical memorandum 3-5, *Fish Entrainment*) using hydroacoustic methods indicated that fish entrainment at the entrance to the Milton-Bowman conduit may be relatively high. However, NID concluded that the estimates of entrainment from the hydroacoustic monitoring may be overestimated because the hydroacoustic signal may have not adequately distinguished between fish and debris entering the canal and may have frequently recorded multiple counts of individual fish meandering in the conduit in the vicinity of the hydroacoustic equipment.

NID proposes to monitor fish entrainment into the Milton-Bowman conduit on a weekly basis between April 15 and August 15. Forest Service condition 32 specifies and California Fish and Wildlife recommends the design and construction of a cylindrical narrow-slot fish screen at the entrance to the Milton-Bowman conduit. The condition/recommendation includes design guidelines and specifications from *Fish Screening Criteria for Anadromous Salmonids* (NMFS, 1997) and *Fish Screening Criteria* (California Fish and Wildlife, 2002). The Fish Entrainment Protection Plan would identify required local, state, and federal permits; specify design information; develop a construction implementation schedule; develop design, construction, and operation and maintenance costs; and outline an agency (Forest Service, California Fish and Wildlife, and California Water Board) consultation process/schedule for planning, permitting, and construction of the screens. The plan and applications for all permits would be completed within 1 year of license issuance and construction would be completed within 2 years of receiving the necessary permits and approvals.

Entrainment of fish into the Milton-Bowman conduit results in permanent loss of resident trout, particularly early life stages of resident rainbow trout, from the Middle Yuba River population. In addition, the proposed fish rescue plan cannot be safely and effectively implemented because of the unique design of the conduit that results in the total loss of entrained resident trout during dewatering of the conduit associated with planned and unplanned outages. Because the Milton-Bowman conduit is a tunnel over most of its length, access is not practical or feasible for rescue of entrained fish during a canal outage. Therefore, entrainment of fish into the Milton Bowman conduit results in permanent loss of these

fish from the Middle Yuba River population. In addition, NID did not provide specific information to substantiate their assumption that the study results over estimated entrainment.

The quality of the trout fishery in the reach in the vicinity of the Milton diversion dam is likely affected by many factors including both the existing minimum streamflows and permanent loss of a portion of the fish population by entrainment into the Milton-Bowman conduit. To support higher instream flow releases to the Middle Yuba River from the project, California Fish and Wildlife states that the abundance, biomass, and condition of trout in this stream reach are not as high as in other reference study reaches. We find that the relatively high level of entrainment into the conduit combined with the effects on aquatic habitat of the existing minimum flows may have substantially reduced the quality of the resident trout fishery. With the improvement in aquatic habitat as a result of increased minimum flows, along with eliminating the permanent loss of resident trout by entrainment with screening of the conduit, enhancement of the resident trout population is likely, with an associated improvement in the quality of the trout fishery with a potential for high recreational value to fisherman. For these reasons, we recommend the development and implementation of the Fish Entrainment Protection Plan for Milton-Bowman conduit, as specified in Forest Service condition 32, and outlined by NID in its alternative 4(e) conditions (August 30, 2012). Implementation of the Fish Entrainment Protection Plan would minimize fish entrainment and loss at an annualized cost of $245,000, but given the impacts to the rainbow trout fishery noted above and the recreational value of the fishery, the fish protection measures are worth this cost.

*Large Woody Debris Management Plan*

NID manages the LWD trapped in the log boom at Rollins dam and other project reservoirs by removing the LWD from the log boom, stockpiling it, and burning it onsite. NID proposes to relocate the LWD that accumulates on the upstream side of the Rollins dam spillway log boom to the downstream side of the log boom where it would pass over the dam during periods of high flow.

NID proposes no plan for the Milton and Bowman-Spaulding diversion dams because it explains that LWD is not trapped by these facilities, but passes over these structures. Other smaller, high elevation lakes are excluded from NID's plan because the associated watersheds and downstream reaches are granitic bedrock canyons, which generate minimal LWD for downstream reaches.

BLM condition 9 specifies and California Fish and Wildlife recommends an additional survey of the quantity and distribution of LWD along the 10-mile reach of the Bear River downstream from Rollins dam during the first year following issuance of the license and at 5-year intervals thereafter. LWD would be anchored in the channel, as needed. BLM condition 23 specifies a similar LWD program at the Dutch Flat afterbay dam (Chicago Park Development).

Forest Service condition 52 specifies a more project-wide LWD management program, including survey of locations and quantity of LWD collected and identification of appropriate locations downstream of project dams for reintroduction of LWD for mobilization during 2- and 5-year flow events. NID concurs with the Forest Service condition and would implement an LWD management plan for Jackson Meadows and Bowman dams (the two largest project storage reservoirs on Forest Service lands) within 1 year of license issuance.

NMFS and FWS recommend development of an LWD management plan for future implementation to enhance habitat for eventual reintroduction of spring-run Chinook salmon and Central Valley steelhead in the Middle Yuba River below Milton diversion dam and Canyon Creek below the Bowman-Spaulding diversion dam. NMFS also recommends an interim measure for passage of LWD at Milton diversion dam and Bowman-Spaulding diversion dam beginning at license issuance until an LWD Management Plan can be developed and implemented when reintroduction occurs.

Available information suggests that some existing habitat conditions associated with LWD would likely support resident trout and anadromous salmonids. NID's studies indicated that the amount of LWD observed in project-affected stream reaches (technical memorandum 1-1, *Channel Morphology, Attachment 1-1I*) is less than observed in other Sierra Nevada (Ruediger and Ward, 1996) streams and is frequently not immersed within the stream channel (section 3.3.2.2, *Aquatic Resources, Environmental Effects*). Ruediger and Ward (1996) and Berg et al. (1998) reported that LWD is typically stable with little movement and played a limited role in aquatic habitat formation and cover. NID reported that the volume of LWD transported to and removed from project reservoirs is also relatively low and that LWD passes over most project dams and diversion dams (if it is not captured by log booms) during periods of high flow.

We recommend that NID develop, after consultation with the agencies, an LWD management plan that includes the criteria defined in Forest Service condition 52, BLM conditions 9 and 23, and California Fish and Wildlife's recommendation 2.10 in combination with NID's 4(e) alternative to Forest Service condition 36. The combination of these measures identifies specific locations for LWD management, and describes the extent and frequency of surveys to assess the effectiveness of LWD mobilization and dispersal in the downstream reaches. In addition, the BLM conditions would, in the short-term, address LWD accumulation at Dutch Flat afterbay and Rollins dams where passage of LWD is known require active management. LWD contributes to productive aquatic ecosystems and is an important component in the formation of complex aquatic habitat units and channel maintenance in some systems. The plan would be filed with the Commission within 1 year of license issuance and be implemented upon Commission approval. We recommend adopting this measure because additional LWD surveys would identify stream reaches that require LWD management and could provide a substantial benefit to fish habitat at a reasonable annual cost of $74,000.

Finally, we do not recommend implementation of the interim LWD measure proposed by NMFS for introduction of LWD into the Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam. The LWD Management Plan that we have recommended (section 3.3.2.2.8, *Aquatic Biota*) requires an LWD survey that would provide information for developing LWD management plans that would be implemented for specific stream reaches, as appropriate. This information would be used to evaluate the need for introduction of LWD in project-affected stream reaches and is more appropriate to the existing aquatic resources in the Middle Yuba River and Canyon Creek.

*Clear and Trap Creek Channel Stabilization Plan*

NID has proposed a channel stabilization plan to restore eroded stream reaches of Clear and Trap Creek and Christmas Tree wasteway, damage by historical operations of the Bowman Spaulding canal. Although the NID plan appears to be consistent with the Forest Service condition for these three stream reaches, it does not address other reaches similarly affected by project operations and does not provide monitoring to demonstrate that the restoration work at these sites is effective over time.

We estimate that the annualized cost for design and construction to restore habitat and prevent future erosion damage at Clear and Trap Creek and Christmas Tree wasteway would be $350,000. Assuming similar costs for other sites that may be identified during finalization of the restoration plan through consultation between NID and the agencies, the cost per site would be about $70,000. We recommend adopting these flow measures because substantial benefits to fish habitat and water quality are worth the cost.

*Aquatic Invasive Species Monitoring and Management Plan*

The Forest Service (condition 37) specifies and California Fish and Wildlife (recommendation 6) recommends that NID prepare and implement an Aquatic Invasive Species Management and Monitoring Plan. These agencies identify the types of information that should be included in the plan. In general, the plan would include prevention and educational measures, incidental monitoring, contingency measures if invasive species are found in project waters, and provisions for modification of the plan if more-effective control measures are developed in the future. NID proposes an Integrated Vegetation Management Plan (August 29, 2012) that includes a section (*Aquatic Invasive Species Prevention Guidelines*) for monitoring and management of aquatic non-native invasive species in project waters. The NID guidelines contains the types of information identified by Forest Service and California Fish and Wildlife including prevention and educational measures, incidental monitoring, contingency measures if invasive species are found in project waters, and provisions for modification of the guidelines if more-effective control measures are developed in the future. However, the Forest Service condition to develop an Aquatic Invasive Species Management and Monitoring Plan is more protective of project-affected reaches because it requires NID to more thoroughly specify how aquatic invasive species would be managed, what degree of monitoring and reporting will be performed. We recommend that NID develop, after consultation with the agencies, and implement an aquatic invasive species monitoring and management plan based on the Forest Service and California Fish and Wildlife conditions and recommendations. The estimated annualized cost for implementation of this plan is about $7,000. This would be a reasonable cost to the project and would provide protection from aquatic invasive species within the project boundary, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance.

*Monitoring Program*

As discussed in section 3.3.2.2, proposed increases in minimum flows and management of spill cessation flows could affect habitat for resident fish species and the foothill yellow-legged frogs resulting from changes in habitat suitability, water temperature, aquatic and riparian vegetation, and channel morphology. The Forest Service (condition 51) and California Fish and Wildlife (recommendation 8) propose that NID develop a monitoring program that would include monitoring of aquatic species and aquatic habitat. Forest Service condition 51 and BLM condition 22 would require NID to implement the Fish Population and Foothill Yellow-legged Frog, Western Pond Turtle Incidental Observations, and Channel Morphology Monitoring Plans specified and filed with the Commission November 2013. The Forest Service/BLM Water Temperature and Stage Monitoring Plan was filed by Forest Service on April 11, 2014. Forest Service and BLM also specify development and implementation of a monitoring plan for aquatic benthic macroinvertebrates that NID has not agreed with. These monitoring plans would assess the effects of new license conditions on the distribution, abundance, and conditions of fish populations and foothill yellow-legged frog, and western pond turtle at selected stream reaches most likely to be affected by those new license conditions.

California Fish and Wildlife (recommendation 8) recommends a more comprehensive monitoring program covering multiple project-affected resources including monitoring of aquatic species, non-native invasive species, sensitive plants, recreation resources, cultural resources, wildlife crossing placement and effectiveness and sensitive raptors. Monitoring for recreation resources, cultural resources, wildlife crossing placement and effectiveness, and sensitive raptors are included within the analysis of the specific resources.

**Fish Population Monitoring Plan**

The Fish Population Monitoring Plan (filed November 21, 2013) by Forest Service and accepted by NID (May 20, 2014) identifies the specific sampling methods (electrofishing and snorkel observation),

frequency, and stream reaches that would be sampled. The plan describes qualitative and quantitative levels (Level I and Level II, respectively) of sampling intensity depending on the stream reach. The purpose of Level I would be for presence/absence and individual fish length and weight; Level II would provide data for fish population estimates. Four stream reaches where emergency releases occur and channel stabilization measures would be implemented below the Bowman-Spaulding conduit would be surveyed using Level I during summer or fall following any year when the minimum flow setting could not be met. These reaches include Texas Creek, Clear Creek, Trap Creek, and Rucker Creek. An additional 9 stream reaches would be sampled quantitatively including sites on Fall Creek, four locations on Middle Yuba River between RM 46.4 and RM 13.6, two locations on Canyon Creek at RM 7.9 and 1.3, and Bear River below Dutch Flat afterbay and 2 locations below the Bear River canal diversion dam (RM 8 and 3.4). Quantitative sampling in these reach (except Middle Yuba River at RM 43.6 and Canyon Creek at RM 1.3) would be sampled during late September/early October in years 3, 4, 9, 10, 14, 15, 19, 20, 24, and 25 of the license and assumes that sampling after year 25 would be part of the next relicensing process. The other two stream reaches would be sampled during years 1-10, then years 14, 15, 19, 20, 24, and 25 of the license; at the end of the first 10 years of sampling the data would be evaluated to determine if the frequency and locations should be modified. Information on physical and chemical habitat conditions would be recorded during each sampling event.

The plan provides specific direction for types of habitat to sample, data recording, and data analyses including age structure, population size and biomass, and fish size and condition. NID would provide a draft monitoring report to the Forest Service, BLM, California Fish and Wildlife and California Water Board and other parties who submit a written request for a copy of the draft report for a 45-day written comment period. NID would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If NID does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. NID would file the final monitoring report with the Commission.

The estimated average annual cost to implement the Fish Population Monitoring Plan filed November 21, 2013 would be about $204,000. The information generated by the Fish Population Monitoring Plan would be valuable and necessary to assess the effects of the various flow conditions in the new license on fish resources in project-affected reaches and worth the estimated cost to implement.

**Foothill Yellow-legged Frog Monitoring Plan**

The Foothill Yellow-legged Frog Monitoring Plan filed with the Commission November 21, 2013 by Forest Service and NID accepted May 20, 2014 identifies the specific sampling methods, frequency, and stream reaches that would be sampled. Six stream reaches are identified for sampling including three in Middle Yuba River (RM 29.5, 26.9, and14.7), one each in Canyon Creek (RM 1.2), Bear River below Dutch Flat afterbay, and below Bear River canal diversion dam. As appropriate, sampling locations would be co-located with fish sampling sites. The Middle Yuba River at RM 29.6 and 14.7 and Bear River below Bear River canal diversion dam would be sampled 3 times during the first 5 years of the license then years 9, 10, 14, 15, 19, 20, 23, 24, and 25. Middle Yuba River at RM 26.9, Canyon Creek, and Bear River below the Dutch Flat afterbay would be sampled in years 1-10, 14, 15, 19, 20, 23, 24, and 25; during the first 5 years NID would attempt to sample once during a wet or above normal year, during a below normal year, and during a dry, critically dry or extreme critically dry year.

The plan describes field methods for observation, photo documentation, and data recording. Three survey visits would be conducted at each site during a year when monitoring occurs, Two visits in the spring/early summer for the detection of eggs and early tadpoles, and one in the late summer/early fall to detect older tadpoles and recently metamorphosed frogs. To ensure that the survey schedule coincides with the FYLF breeding season in stream reaches where surveys would occur, stream temperatures would

be monitored at selected locations prior to the anticipated commencement of surveys. The first spring survey visit would occur after water temperature reach 10ºC and there is a corresponding reduction in spring high flows. At the end of the first ten years of monitoring, the results would be reviewed by Forest Service, California Fish and Wildlife, California Water Board, and NID to determine whether the monitoring schedule or monitoring locations should be modified for years 11 through the end of the license.

The plan describes data recording and analyses and specifically requires NID to analyze the relationship between streamflows in the South Yuba River downstream of Lake Spaulding dam and foothill yellow-legged frog abundance at survey sites. Results would be summarized after each sampling season to compare foothill yellow-legged frog abundance and life stage timing for each year in which monitoring occurs. Data would be provided to agencies and other interested parties electronically in spreadsheets (e.g., Excel) and spatial formats (e.g., GIS shapefiles). NID would provide a draft monitoring report to the Forest Service, BLM, California Fish and Wildlife and California Water Board and other parties who submit a written request for a copy of the draft report for a 45-day written comment period. PG&E would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If NID does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. NID would file the final monitoring report with the Commission.

NID agrees to implement the Foothill Yellow-legged Frog Monitoring Plan filed by Forest Service (May 20, 2014) and we estimate the cost for implementation to be about an average of $57,000 per year. We recommend implementation of the November 21, 2013 plan filed by the Forest Service. The information generated by the Foothill Yellow-legged Frog Monitoring Plan would be valuable and necessary to assess the effects of the various flow conditions in the new license on existing populations of this frog in project-affected reaches and worth the estimated cost to implement.

**Western Pond Turtle Incidental Observations**

Forest Service condition 51 requires NID to record and report incidental observations for western pond turtles during all monitoring work. A written report would be compiled annually and provided at the Annual Consultation meeting. NID has agreed to implement this measure.

Specific surveys for western pond turtle are not appropriate because it is unlikely that this species would be affected by project O&M activities. Nesting and hatching success, key factors affecting the success of populations of western pond turtle that occur in terrestrial habitat, are not affected by changes in project flows and riparian habitat. In addition, effective survey methods for identification of nesting sites have not been developed and focused surveys for western pond turtle in the project boundary are not likely to provide any more detailed data than NID's recording of incidental observations. We recommend implementation of the incidental observation and recording of western pond turtle described in Forest Service condition 51 and consider the estimated cost of about $2,000 annually to be worth the additional information provided on distribution and abundance of this sensitive species.

**Channel Morphology Monitoring Plan**

The Channel Morphology Monitoring Plan filed with the Commission November 21, 2013 by Forest Service identifies the specific sampling methods and frequency. Monitoring would occur at two stream reaches that would be affected by flow changes under the proposed new license conditions. Monitoring would occur in Middle Yuba River immediately upstream of the confluence of Wolf Creek and Bear River below the Bear River canal diversion dam at RM 3.4. To the extent possible, the sites would be located where channel morphology or instream flow sampling occurred during NID's relicensing studies. The sites would be co-located with riparian vegetation condition monitoring sites and

would be selected in coordination with Forest Service, BLM, California Fish and Wildlife, and California Water Board.

Monitoring at each site during the first full year after license issuance would establish permanent cross-sections and collect baseline data for comparison with subsequent monitoring. During the next nine years, NID would monitor each site up to three years in which spill events occur. After Year 10, monitor once at each site following spring runoff after each larger flood event (25 year recurrence flow and greater). NID would monitor at least once during every 10-year period of the license even if no large flow events occur within that 10-year period.

The plan describes the data to be collected at each cross-section monitoring site including the entire alluvial valley and specific channel structure and components Other data include pebble counts, scaled site and facies maps, residual pool depth, bank erosion, channel stability, fine particles in spawning gravel beds, and photo documentation. The plan establishes guidelines for data entry and analyses. The effects on the stream channel from large flood events evaluated relative to conditions under normal operations. The analyses for each site would evaluate changes in cross section, channel location and orientation, substrate, channel or bank stability, pool depth, fine material in spawning-sized gravel, or other pertinent project-related factors that affect the site.

NID would provide a draft monitoring report to the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other parties who submit a written request for a copy of the draft report for a 45-day written comment period. NID would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If NID does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. NID would file the final monitoring report with the Commission. We recommend implementation of the November 13 plans filed by the Forest Service.

NID has agreed (May 20, 2014) to implement the Channel Morphology Monitoring Plan filed by Forest Service (November 21, 2013). We recommend implementation of the November 21, 2013 plan filed by the Forest Service and estimate the average annual cost to implement at about $37,000. The information generated under the plan would be used to assess the effects of increased flows under the new license on channel structure and stability and associated aquatic habitat in the selected project-affected reaches.

**Riparian Vegetation Monitoring Plan**

The Riparian Vegetation Monitoring Plan filed with the Commission April 11, 2014 by Forest Service, BLM, and NID identifies the specific sampling methods and frequency. Monitoring would occur at two stream reaches that would be affected by flow changes under the proposed new license conditions. Monitoring would occur in Middle Yuba River above the confluence of Wolf Creek, affected by new minimum streamflows and spill cessation and Bear River below Bear River canal diversion dam affected by new minimum streamflows and flow fluctuation management measures. To the extent possible, the sites would be located where channel morphology or instream flow sampling occurred during NID's relicensing studies and would be co-located with monitoring cross-sections established for the Channel Morphology Monitoring Plan. The sites would be selected in coordination with Forest Service, BLM, California Fish and Wildlife, and California Water Board.

Monitoring at each site during the first full year after license issuance would establish permanent cross-sections and collect baseline data on diversity and density of riparian herbaceous and woody vegetation for comparison with subsequent monitoring in order to assess persistence and changes in vegetation. NID would monitor each during years 5 and 10 of the new license and one additional year

during the first 10 years of the license following a spill event. The plan defines the flow conditions that would constitute a spill event for each stream reach.

The analyses for each site would identify significant changes in non-native species, changes in lateral distribution, abundance, and richness of woody vegetation. The focus of riparian vegetation monitoring is to track woody riparian vegetation recruitment and establishment over time since an important component of riparian plant community health is successful reproduction of the native plants within that plant community. Other observations, such as premature leaf drop, insect infestation, trampling from animals or people, and disease, which may or may not be related to the project, would also be documented and reported. During each monitoring period, the hydrology, climate, and other environmental factors that may affect the trends in riparian resource condition, (upward or downward) since the previous sampling period will be assessed. Climate trends would also be evaluated, such as distribution of particularly wet or dry years and particularly hot and cold years in between sampling periods. Other activities or changes in the magnitude of activities within the watersheds, such as recreation and fire would also be assessed. Other trends also would be evaluated, such as the distribution of high and non-spill years in between sampling periods.

In addition to the data analysis, an observational description would be developed to illustrate the general state of the riparian community. The description would be inclusive of the data captured in the vegetation transects (i.e. richness and abundance), but would also focus on factors considered in riparian assessments, including the lateral and horizontal distribution of plant groups, diversity in age of native woody riparian species, presence or absence of nonnative invasive or special-status plants, bank protection (e.g. tree roots or sod-forming herbaceous plants), and the general vigor of the plants in the riparian plant community. Any additional factors contributing to the condition of the riparian plant community (e.g. impacts from recreational users or sediment from an upslope fire) would be included in the description.

NID has agreed (May 20, 2014) to implement the Forest Service/BLM Riparian Vegetation Monitoring Plan filed by Forest Service and BLM (April 11, 2014). The information generated under the plan would be used to assess the effects of increased flows under the new license on vegetation and bank stability and associated aquatic habitat in the selected project-affected reaches. We recommend implementation of the plan filed by the Forest Service and BLM and estimate the average annual cost to implement at about $5,000.

**Aquatic Benthic Macroinvertebrate Monitoring**

Forest Service condition 51 requires NID to develop an Aquatic Benthic Macroinvertebrate Monitoring Plan after consultation with the agencies within 1 year of license issuance. The plan would describe the sampling locations methods frequency, data recording, analyses, and reporting. The plan would be filed with the Commission and implemented upon Commission approval. Forest Service and NID have not agreed on details of a final plan. Consequently, Forest Service condition 51 requires NID to develop an Aquatic Benthic Macroinvertebrate Monitoring Plan after consultation with the agencies within 1 year of license issuance. The plan would describe the sampling locations, methods, frequency, data recording, analyses, and reporting. The plan would be filed with the Commission and implemented upon Commission approval.

Forest Service identified three sites on Middle Yuba River and one site each on Canyon Creek, Texas Creek, Clear Creek, and Trap Creek co-located with the fish population surveys. Forest Service proposes monitor annually for the first 10 years following license issuance and then continue monitoring after year 10 during each year that fish monitoring surveys occur.

Following each sampling year NID would be required to provide a draft annual monitoring report for aquatic benthic macroinvertebrates to the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other parties who submit a written request for a copy of the draft report for a 45-day written comment period. NID would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If NID does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. NID would file the final monitoring report with the Commission.

NID stated in its August 29, 2012 alternative conditions that they do not agree with the necessity for benthic macroinvertebrate monitoring. However, Forest Service contends that monitoring would help identify whether other environmental measures benefiting aquatic communities. We agree with the Forest Service justification for an aquatic benthic macroinvertebrate plan. Therefore, we recommend that NID develop an Aquatic Benthic Macroinvertebrate Monitoring Plan after consultation with Forest Service and other agencies for implementation within 1 year of license issuance consistent with Forest Service condition 51. We estimate the average annual cost to implement this plan at about $26,000. The information related to the response of the benthic macroinvertebrate community, which is a major food source for resident rainbow trout to flow modifications in project-affected reaches would be worth the cost for implementation.

**Water Temperature and Stage Monitoring**

The Water Temperature and Stage Monitoring Plan filed with the Commission April 11, 2014 by Forest Service and NID identifies the specific sampling locations, methods, and frequency. The plan identifies the following monitoring sites:

- Middle Yuba River below Jackson Meadows Dam, in the vicinity of river mile 46.4 (second year of two consecutive Extreme Critical or Critically Dry (EC and CD) water years (or combination of consecutive EC/CD) to check temperature during potentially extreme conditions).
- Middle Yuba River below Milton Dam, in the vicinity of river mile 29.5, National Gulch area (annually).
- Middle Yuba River below Milton Dam, in the vicinity of river mile 26.6, Wolf Creek area (annually). *stage
- Middle Yuba River below Milton Dam, in the vicinity of river mile 14, near Fish Population and Foothill Yellow-legged Frog monitoring sites (same frequency as Fish Population monitoring, and if there are two Extremely Dry or Critically Dry water years (or a combination of the two) in a row, monitor the second of these years to check temperature during potentially extreme conditions).
- Texas Creek below Texas Creek Diversion Dam, in the vicinity of RM 0.6 (same frequency as Fish Population monitoring).
- Canyon Creek below Bowman Dam, in the vicinity of river mile 1.3 (annually). *stage
- Fall Creek below Fall Creek Diversion Dam, in the vicinity of river mile 1.9 (same frequency as Fish Population monitoring).
- Rucker Creek below Rucker Creek Diversion Dam, in the vicinity of river mile 1.2 (same frequency as Fish Population monitoring).

- Bear River, below Dutch Flat, in the vicinity of river mile 20.8 (same frequency as Foothill Yellow-legged Frog Monitoring Plan).*stage
- Bear River, below Bear River Diversion Dam, in the vicinity of river mile 3.4, near Dog Bar (same frequency as Fish Population and Foothill Yellow-legged Frog monitoring plans).

Monitoring would be year round at the National Gulch and Wolf Creek locations on Middle Yuba River and Canyon creek below Bowman dam. Monitoring at all other locations would occur between April 1 and November.

NID would provide a draft annual report for water temperature and stage monitoring to the Forest Service, BLM, California Fish and Wildlife, California Water Board, and other parties who request a copy. NID would issue a final monitoring report incorporating revisions in response to comments submitted by the agencies at least 30 days in advance of the Annual Consultation Meeting. If NID does not accept a suggested revision by an agency, the final monitoring report would describe why the revision was not accepted. NID would file the final monitoring report with the Commission.

Implementation of proposed minimum streamflows and spill cessation schedules have been proposed in part to maintain cooler water temperatures to benefit aquatic resources in the affected reaches. Implementation of the Water Temperature and Stage Monitoring Plan in conjunction with the other monitoring plans discussed above would provide information about the response of aquatic habitat and aquatic resources within the project boundary to changes in instream flows and project operations included in the new license and would further facilitate evaluation of the effects of flow and operational changes in the new project license. We estimate the average annual cost for implementation of this plan would be $71,000 and we conclude that the information about the condition of aquatic resources and habitat generated by these programs would be worth this cost.

*Integrated Vegetation Management Plan*

NID's proposed March 2013 Integrated Vegetation Management Plan provides guidance for the management of vegetation on federally owned project lands, as well as vegetation management related to NID's operation and maintenance activities within the project boundary. The proposed Integrated Vegetation Management Plan includes provisions for the management of non-native invasive plants, vegetation management related to O&M activities, sensitive area protections, including provisions for special-status plants and wildlife, VELB management, as well as provisions for training, consultation and reporting. The Integrated Vegetation Management Plan does not apply to all project lands (e.g., invasive species control only applies federal lands) and does not contain any provisions for the recognition of culturally significant plants and their protection. Invasive weed populations are known to occur outside federal lands and are subjected to similar project-related effects within NID's boundary. Therefore, we recommend that NID modify and expand the Integrated Vegetation Management Plan to apply to all accessible project lands, particularly recreation sites and sensitive habitats and lands disturbed by future construction, recreational use, and project maintenance, and to include a list of culturally significant plant species that occur in the project area, developed after consultation with tribes. The Integrated Vegetation Management Plan should also include provisions for appropriate monitoring and protection of culturally significant plants species. The estimated annualized cost for the recommended modified Integrated Vegetation Management Plan is about $48,000 per year. Expanding the plan to apply to all project lands and to incorporate measures for culturally significant plants would negligibly increase the annualized. This would be a reasonable cost to the project, would ensure the implementation of protective vegetation management measures, and would provide adequate protection to culturally significant plants within the project boundary.

Additionally, we recommend that NID protect culturally significant plant species to the tribes as part of their vegetation management plan.

*Wildlife Crossing in Bowman-Spaulding Canal*

The Bowman-Spaulding canal is located within critical deer summer range for the Nevada City Deer Herd. Although no mortality was reported in 2009, the canal can affect wildlife movement through the area.

NID proposes to retrofit existing footbridges or construct new wildlife crossings on at the Bowman-Spaulding Canal, at specified locations. Specifications for wildlife crossing facilities (slope, width, fence height, etc.) are also specified in the proposal. NID also proposes to monitor animal losses from drowning in project canals, and to consult with agencies when replacing escape and crossing facilities. Its proposals are consistent with Forest Service conditions 39, 40, and 41 and BLM conditions 16 and 17. We recommend that all of NID's proposals relative to wildlife crossing of canals, be incorporated into a single Wildlife Crossing Management Plan for the project. Consolidation of these activities into a single management plan would benefit wildlife by ensuring consistency in managing and modifying wildlife crossings, as necessary, over the term of the new license. The plan would also ensure consistency in consulting with appropriate agencies regarding canal mortalities and potential changes to wildlife crossings or escape facilities. The wildlife crossing measures proposed by NID for the Yuba-Bear Project canals are estimated to cost $22,000, annually and would be worth the cost. The development and implementation of a Wildlife Crossing Management Plan is estimated to negligibly increase the annualized cost.

*Project Powerlines and Raptor Collisions/Electrocutions*

NID proposes to record incidental observations of bird collisions/electrocutions along project powerlines. NID also proposes to utilize raptor-safe powerline configurations consistent with APLIC's "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006, the most current version of this document for new powerlines and when replacing existing structures. If raptor monitoring indicates a substantial raptor-project transmission line interaction issue, the poles where the interaction issue occurs on federal land would be replaced or retrofitted. Implementation of these measures would reduce project impacts to avian resources and would minimize risk of avian mortality. If bird collision or electrocution issues are detected, recording incidents and retrofitting structures using the same guidelines would benefit avian resources. However, the benefits derived from these proposed measures would be further enhanced by the development of an Avian Management Plan for the project, that incorporates the proposed provisions, and provides consistent specifications for monitoring and report avian/powerline interactions, and for the implementation of powerline modifications or retrofits through the use of raptor-safe powerline configurations. The benefits would be worth the levelized cost of $5,000.

*Recreation Plan*

The project currently provides public recreation opportunities, and NID proposes extensive development, expansions, modifications, upgrades, and maintenance of public recreation facilities in its Alternative Recreation Plan. However, for reasons noted below, we recommend that NID modify its Alternative Recreation Plan submitted on August 30, 2012 to include our additional staff recommended recreation measures in its final recreation plan.

Individual and site-specific recreation measures contained in the Alternative Recreation Plan address the majority of project effects and meet identified recreation needs at the project. However, we also recommend several elements specified by the Forest Service in condition 57.

Implementation Schedule—Most of the facilities are in a functioning condition, and visitor needs are currently met by the spectrum of facilities and their existing conditions. However, some of the existing recreation facilities are currently, or would soon be, in need of modification and/or reconstruction to meet visitor needs, protect natural resources, and provide for public health and safety. For most facilities, our recommended schedule is the same as that proposed by NID in the Alternative Recreation Plan. However, for some facilities, we recommend an alternative schedule that is based on agency recommendations and our assessment of the current condition of the facility and user needs. We recommend that NID complete the improvements at the Pass Creek boat launch within 5 years and complete the toilet upgrades to the Woodcamp campground within 3 years. We estimate the added cost associated with these modifications to the facility development schedule to be minor on an annualized basis.

Trails—There are numerous trails in proximity to the project, and there is a demonstrated demand for trail use by project visitors. However, as discussed in section 3.3.5.2, *Recreational Resources, Environmental Effects*, and discussed further below, we find that some of the trail measures included in the proposed Recreation Plan include trails or trailheads that appear to be outside the project boundary, do not connect two or more project recreation facilities, and do not serve a project purpose. Requiring NID to construct, reconstruct, modify, and maintain trails that are necessary for project purposes would provide additional trails for visitors and ensure they are properly maintained that, in turn, would minimize resource damage, such as erosion, and provide for visitor safety. Therefore, we recommend that the proposed trail improvements included in the Recreation Plan be limited to the construction of, modification to, and maintenance of trails and trailheads that are necessary for project purposes, including: (1) the East Meadow campground pedestrian trail; (2) the Pass Creek boat launch accessible shoreline trail; (3) the Aspen group campground pedestrian trail; and (4) the Woodcamp complex trail system.

In addition, we recommend that the Recreation Plan include provisions for the addition or modification of project-related trails at the project, as specified by the Forest Service, including: (1) improvements to the campground trail at Silvertip Group campground; (2) construction of the a non-motorized trail from Vista Point and Aspen Group campground to a lake overlook; (3) additional project-related trails at Sawmill Lake; and (4) the addition of project-related trails at Faucherie Lake and French Lake. We also recommend that the Recreation Plan include provisions for trail and trailhead improvements for project-related trails in the Jackson Meadows area and a trail along the shoreline of Rollins reservoir within the project boundary, consistent with the proposed Rollins reservoir segment of the Bear River trail. We recommend that NID consult with trail planners on the development of this trail so that it is consistent with the proposed Rollins reservoir segment of the Bear River trail.

Campgrounds and Dispersed Campsites —Some existing campgrounds and campsites do not accommodate visitor needs and require expansion. Others are in need of facility upgrades or improvements to address deteriorating facility condition, improve usability and user safety, or improve access. In addition to NID's proposed actions at the project campgrounds, we recommend that the Recreation Plan include the following: (1) provisions for upgrading Pass Creek campground to replace the restrooms with accessible restrooms; (2) barrier improvements at the Aspen Group campground to prevent OHV use; (3) provisions for expanding parking and making upgrades to campsite areas, signage, and trails at Silvertip group campground; (4) provisions for providing a campground or appropriate camping facilities in the Jackson Meadows area; (5) provisions for reconstructing the Canyon Creek campground to include a group campsite and provide accessible camping opportunities; and (6) provisions for improvements to the Faucherie Group campground, including toilet and picnic table replacement. We recommend these additional measures to improve campground conditions and meet existing and anticipated future needs. Modifications or additions to the campgrounds, as proposed, would

provide recreational users of the project with improved opportunities for camping, with facilities and conditions consistent with those in the region.

Accessibility Improvements—Currently, a limited number of recreation facilities accessible to visitors with disabilities are provided at the project. NID is proposing a number of accessibility improvements at the project as part of facility modifications or upgrades. In addition to NID's proposed actions, we recommend the Recreation Plan include the following: (1) replace Pass Creek campground restrooms with accessible restrooms; (2) designate an accessible parking space at the Aspen group campground; (3) replace the toilet at Findley campground with an accessible toilet; (4) replace the toilet at Woodcamp campground with an accessible toilet; (5) add an accessible dock at Woodcamp boat launch; (6) provide accessible routes within the Silvertip group campground; (7) include provisions to provide accessible camping opportunities at Canyon Creek campground; and (8) include a provision to provide accessible parking at the Faucherie group campground. Constructing accessible recreation facilities would provide improved access to the project's recreational resources.

Parking and Road Improvements—Circulation roads and parking areas are important components of project recreation sites. General maintenance of facility roads and parking would be addressed by NID on an ongoing basis as outlined in the Alternative Recreation Plan. However, some specific road and parking needs need to be addressed in the short term due to current recreation use. Therefore, we recommend the Recreation Plan include: (1) additional parking at Pass Creek boat launch; (2) installing vehicle barriers at Aspen group campground; (3) repairing the circulation road at Findley campground; (4) reconstruction of campground road and parking area and additional parking at Silvertip group campground; (5) improvements to parking at the Jackson Meadows vista; (6) improvements to the existing parking area, including the installation of OHV barriers, at French Lake; (7) improvements to the campground roads and spurs at Canyon Creek campground; and (8) expanded parking at Faucherie group campground. Addressing these issues within 5 years would provide visitors with improved access and would help meet existing needs in the short term. The additional parking facilities would provide visitors with improved access to the project, help meet existing and future demands, reduce vehicle congestion, and reduce parking in unimproved or unauthorized areas, which can lead to resource effects, such as erosion.

Boat Ramps and Boat Launch Facilities—Boat ramps for trailered boat launch are currently provided at Jackson Meadows reservoir and Rollins reservoir. Informal boat launch facilities, intended primarily for hand launching, are also provided at Milton diversion impoundment, Bowman Lake, Faucherie Lake, and the Dutch Flat afterbay. Some of these existing boat ramps and boat launch facilities are in need of an upgrade, expansion, or modification to improve launching conditions for recreational boaters to address issues associated with worn or deteriorating facilities, vehicle launching at sites intended for hand launching, as well as use-levels and crowding. In addition to NID's proposed measures for improving or modifying boat launch facilities, we recommend that additional parking be provided at the Pass Creek boat launch. Improvements to Pass Creek boat launch would enhance trailered boat launching at this site by providing a usable boat launch at lower reservoir water levels than what the current launch allows. Expansion of the parking area would reduce vehicle and trailer congestion, and would help to meet existing and future demand for boating access to Jackson Meadows reservoir. We also recommend the upgrade of the existing Woodcamp boat launch to a two-lane launch ramp with accessible courtesy dock. Although use at the Woodcamp boat launch is low, use rates at the Pass Creek boat launch are very high, and improvements to the Woodcamp boat launch, as specified by the Forest Service, would help to meet anticipated increased demand for boat launch facilities at Jackson Meadow reservoir overall.

Water Systems—Providing potable water at developed recreation sites at the project is consistent with amenities that are typically provided at Forest Service facilities with a development scale of 3 or

higher. Visitor needs are currently not met at these types of project recreation facilities because some have no potable water. In addition to bringing the project water systems up to standard, as NID proposes, we also recommend that NID provide potable water at one of the Bowman Lake area campgrounds. This measure would benefit project visitors by providing a water source for recreationists using Bowman Lake.

Operation and Maintenance—NID proposes and the Forest Service specifies provisions for campground hosts in the Recreation Plan. NID may provide campground host sites, but the responsibility for project recreation facility operation and maintenance is the responsibility of NID, and campground hosts may or may not be needed. Therefore, we do not recommend including this requirement in the license. In addition, we recommend that the plan be modified to remove any requirements for NID to provide water and septic facilities at designated host campsites, such as that proposed at the Woodcamp campground. We estimate that upgrading this host site would cost an additional $30,000 and cannot be justified.

Recreation Monitoring—The NID Alternative Recreation Plan includes provisions for monitoring project recreation facilities over the term of the license and references the Forest Service's details regarding the specified monitoring measures, including monitoring triggers, indicators, methods, and triggered actions. Including additional detailed monitoring measures, as specified by the Forest Service and BLM, would ensure that the monitoring is conducted in a consistent manner. We recommend that the Alternative Recreation Plan include these additional details specified by the Forest Service and BLM. We conclude that specification of these measures in the final Recreation Plan would not measurably increase monitoring costs over those associated with the Alternative Recreation Plan.

In total, our recommended Recreation Plan would have an estimated levelized annual cost of about $3,013,000, which is about $489,000 more than the estimated levelized annual cost of NID's Alternative Recreation Plan. We conclude that the benefits of our recommended plan would be worth the cost because it would: (1) address project effects and provide for project visitor use such as providing project trails and modifying recreation facilities; (2) provide a comprehensive recreation management plan that the Commission can use to determine compliance; (3) protect natural resources at recreation developments; and (4) enhance recreation enjoyment for project visitors.

In addition to the proposed modification discussed above, there are provisions that we do not recommend. In its 4(e) condition 57, the Forest Service specifies the following measures related to non-project facilities that lie outside the project boundary: (1) improvements at the Jackson Creek campground; (2) creation of Canyon Creek dispersed campsites; and (3) additional recreational facilities at Langs Crossing. Jackson Creek is a Development Scale 3 campground located on NFS land outside the project boundary near Jackson Creek. Jackson Creek does not provide direct access to project facilities or project lands or waters. While the existing Canyon Creek campground is within the project boundary, there are currently no dispersed sites within the project boundary. However, there are six to eight existing dispersed campsites to the east of the Canyon Creek campground outside of the FERC project boundary. The specified dispersed campsites would not provide direct access to the project. While dispersed camping in this area would serve to meet recreational needs in the general area of the project, it would not specifically address recreational use at the project. The Langs Crossing area is also located outside the project boundary approximately 1 mile below Spaulding dam and does not serve a project purpose nor does it provide access to project facilities. Therefore, given the lack of nexus it would not be appropriate to require NID to provide facilities related to this area. We do not recommend that NID provide facilities, as specified by the Forest Service, or share responsibility for providing recreational facilities at Langs Crossing, as recommended by California Fish and Wildlife. Based on the information available to us, we do not recommend these specific measures be included in the Recreation Plan.

We do not recommend the Forest Service's specified reconstruction of the existing boat ramp at Pass Creek boat launch within 15 years. Our current recommendation to extend/modify the existing launch to provide low-water boat launching would ensure that the boat ramp is in good condition and maintained by NID; therefore, reconstruction of this boat ramp would not be needed within 15 years. We also do not recommend reconstruction of Findley campground within 10 years because the facility is sufficient to meet the current low to moderate use levels. Recreation monitoring, as recommended by staff, would allow NID and the agencies to determine the need for campground reconstruction in the future based on facility condition and future use.

We do not recommend the expansion of Bowman campground by 20 sites or additional campgrounds at Bowman Lake. Current use at the Bowman campground is generally low and there is no demonstrated need for additional sites or new campgrounds. Although use data were not provided for this site, dispersed camping is an established use at Bowman Lake. Improving some of the dispersed primitive campsites and eliminating some, but not all, would consolidate camping use in areas most suited for camping and reduce human effects. Consolidation of camping/campsites into designated campground areas would also reduce shoreline impacts associated with dispersed camping at undesignated and unimproved sites, such as vegetation impacts and shoreline erosion.

We do not recommend certain improvement measures as specified in Forest Service condition 57 for trails and trailheads. As discussed in section 3.3.5.2, *Recreational Resources, Environmental Effects*, many of the trails in the project area are non-project trails outside the project boundary. In certain locations, trailheads for these non-project trails are located within the project boundary, even if the trail itself is not a project-related facility. We recommend that NID continue to maintain these existing trailhead facilities that lie within the project boundary or are associated with project facilities in a safe and useful condition, but we do not recommend major modifications or enhancements to these facilities, nor do we recommend the construction of new trails that connect Forest Service trailheads outside of the project boundary to project facilities. Therefore, we do not recommend construction of the trails at Sawmill Lake or French Lake, except for a walkway across the Sawmill spillway and a primitive trail from Faucherie Lake to Sawmill Lake, which would connect two project reservoirs.

We do not recommend that any new license for the project require NID to cooperate with trail planners on the development and maintenance of the entire Bear River trail or related trail facilities, except for the Rollins reservoir shoreline segment discussed above. However, NID is free to cooperate with the trail planners on its own. The bulk of the Bear River trail would be located outside the project boundary, located on land owned by others, and would not serve a project purpose. Although the proposed location of the trail would coincide or intersect the project boundary at various canals and diversions, the intended purpose of the proposed trail is to provide riverine access that coincides or intersects in several locations with the project boundary, not to provide trail access to or between project recreation facilities. Therefore, we conclude that the proposed segments of this trail, except for the proposed segment along Rollins reservoir shoreline, are not necessary for project purposes.

Forest Service condition 57 and BLM condition 36 specify that NID develop a plan to address the costs to the Forest Service and BLM for managing project-related recreation, fire management, resource protection, and law enforcement. NID proposes and BLM condition 34 specifies that NID enter into a recreation O&M agreement to provide $30,000 annually to BLM for operation, maintenance, law enforcement patrolling, and administration. NID is responsible for operating and maintaining project-related recreation facilities. Further, NID already provides this funding support to help offset these costs through land use fees and county taxes. If NID were to develop a plan to include additional funding to support these activities, the Commission would have no way of ensuring any funding provided to the agencies for law enforcement would be used for project purposes. Therefore, we do not recommend that NID be required to prepare a plan that identifies the cost to the Forest Service and BLM for fire

management, resource protection, or law enforcement nor do we recommend that NID be required to enter a recreation O&M agreement to provide annual funding to BLM.

*Recreation Flow Information*

Real-time information on recreational flow is needed on a year-round basis to support a growing demand for whitewater boating activities, even during the winter. NID proposes and Forest Service condition 58 specifies that NID provide on the internet real-time streamflow information in cfs for the following project-related stream reaches: Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton reservoir dam, Canyon Creek below French dam, and Canyon Creek below Bowman reservoir dam. The Forest Service and BLM note a preference for the data to be reported in 15-minute intervals, however, data reported in no less than hourly intervals would be acceptable. NID proposes and BLM condition 37 specifies that NID develop a plan to provide real-time streamflow information to the public via the Internet for the following project-related stream reaches: the Bear River below Dutch Flat afterbay dam and the Bear River below Rollins reservoir dam. We recommend that NID continue providing real-time (15-minute intervals) streamflow information to the public on the internet for the six reaches (Middle Yuba River at Jackson Meadows reservoir dam, Middle Yuba River below Milton reservoir dam, Canyon Creek below French dam, Canyon Creek below Bowman reservoir dam, Bear River below Dutch Flat afterbay dam, and Bear River below Rollins reservoir dam) where it is currently provided in 15-minute intervals on a year-round basis. NID is currently providing year-round real-time flow information, and it is appropriate to continue. We estimate the cost of providing year-round flow information to be $8,000 on a levelized annual basis.

*Fish Stocking Plan*

Angling is one of the primary recreational activities associated with the Yuba-Bear Project. Although natural reproduction occurs in some of the project waters, stocking is necessary to sustain populations of game fish in waters with high angler usage. NID proposes to pay California Fish and Wildlife annually for the stocking of up to 20,000 trout fry and 25,000 kokanee fry in Bowman Lake ($75,000) and the stocking of up to 10,000 catchable rainbow trout, 10,000 catchable brown trout, and 25,000 kokanee fry in Rollins ($40,000). California Fish and Wildlife's recommendation 17 and the Forest Service's 10(a) recommendation 8 recommend NID fund the stocking of fish in Bowman, Faucherie, French, and Sawmill Lakes, and Jackson Meadows and Rollins reservoirs on an annual basis. We estimate the cost would be about $242,000. Maintaining the existing stocking numbers in those reservoirs such as Rollins and Jackson Meadows reservoirs with high recreational use and high angling pressure would help meet the estimated future demand for angling at the project for the term of the a new license. However, stocking fish at only those reservoirs, as proposed by NID, is insufficient to meet the needs of anglers at other project waters. Faucherie and Bowman Lakes are used moderately by anglers with a little over half of the visitors participating in angling at Faucherie Lake and approximately half of the visitors at Bowman Lake. Although anglers comprised one-third of those visitors at Sawmill Lake, Sawmill Lake received a moderate level of recreational use and would also benefit from regular periodic fish stocking. In a response letter dated September 14, 2012, to California Fish and Wildlife and Forest Service, NID stated it would be appropriate to reimburse California Fish and Wildlife for the annual fish stocking in Jackson Meadows, Bowman, and Rollins reservoirs up to the maximum levels included in the agencies' recommendations; however, stocking in French, Faucherie, and Sawmill Lakes should occur no more than once every 3 years.

To provide adequate fish stocking at the project, we recommend that NID prepare and implement a Fish Stocking Plan for the Yuba-Bear Project. The plan would be developed after consultation with California Fish and Wildlife, the Forest Service, and BLM, and filed for Commission approval. The plan should address annual stocking in Bowman Lake, Rollins reservoir, Faucherie Lake, Jackson Meadows

reservoir, stocking in Sawmill Lake every other year until the first Form 80 reporting year after implementation of the plan, and include provisions for stocking fish in additional project reservoirs (French Lake) based on changes in recreational use, collected from recreation use monitoring, and angling pressure over the term of the new license. The plan would provide the means for a coordinated fish stocking program with the flexibility to increase or decrease stocking numbers, change fish stocking sizes, and change the frequency of stocking a particular reservoir over the term of a new license. A Fish Stocking Plan that also includes annual consultation would help address any changes in California Fish and Wildlife fish stocking management targets and the availability of hatchery fish. A Fish Stocking Plan would benefit project visitors and would be worth the estimated levelized annual cost of $242,000.

*Historic Properties Management Plan*

Through implementation of NID's final HPMP, project-related adverse effects would be resolved on historic properties. Benefits for the protection and preservation of historic properties would be worth the cost of $4,000 annually.

#### 5.5.2.3 Measures Not Recommended by Staff

Some of the measures proposed by NID and recommended by other interested parties would not contribute to the best comprehensive use of the Yuba River and Bear River water resources, do not exhibit sufficient nexus to the project's environmental effects, or would not result in benefits to non-power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend such measures.

*Middle Yuba River Block Flow Release for Water Temperature Management*

Our analysis indicates that the proposed minimum streamflows (section 3.3.2.2.2, *Instream Flows*) for the Middle Yuba River below Milton diversion dam are likely to ensure maintenance of water temperature at less than 20°C between Milton diversion dam and the confluence of Wolf Creek, which would benefit resident rainbow trout without adversely affecting the population of foothill yellow-legged frog in this stream reach. The additional *Block Flows* recommended by California Fish and Wildlife and Foothills Water Network would further reduce water temperature in the reach from 20°C to 19°C or less above Wolf Creek confluence but could result in an uncertain and potentially adverse effect on various aquatic resource species. Cooler water temperatures in Middle Yuba River from East Fork Creek downstream to Wolf Creek could inhibit natural development rates of early life stages (eggs and tadpoles) of the foothill yellow-legged frog observed in the vicinity of National Gulch. Given that the existing trout fishery is considered to be of "remarkably good quality" (Foothills Water Network, data) under the existing license conditions and proposed increased minimum streamflows are likely to improve and enhance existing conditions, the risk of implementing the *Block Flow* condition to foothill yellow-legged frog does not appear to be adequately balanced by the benefit to other aquatic resources. The difference in predicted water temperatures between the specified minimum streamflow below Milton diversion dam and the recommended Block Flow diminishes with distance downstream and would be less than 1°C above the non-project Our House diversion dam. It should be noted that the water temperature model indicates that the *Block Flow* proposal would reduce water temperatures below what would be expected under unregulated conditions.

Water temperature modeling submitted by NID (January 21, 2013) based on 2009 conditions indicates that during critically dry or extreme critically dry water years when proposed minimum streamflows below Milton diversion dam would be 11 cfs, water temperatures in Middle Yuba River would be below 20°C downstream to RM 25, about 2 miles below Wolf Creek. Under existing license minimum streamflows (3cfs), water temperatures would have been less than 20°C downstream only to about RM 29. If the proposed minimum streamflow of 11 cfs was augmented by 30 cfs under the Block

Flow recommendation, water temperatures would remain less than 20°C about another 4 miles downstream (RM 21). Without the 30 cfs augmentation, water temperatures at RM 21 would be about 22°C. At 3 cfs minimum streamflows under the existing license, water temperatures at this location would be near 23°C, potentially lethal to rainbow trout.

Proposed monitoring of fish populations, foothill yellow-legged frog, and water temperature and stage would provide data to evaluate the effects of proposed increased minimum streamflows and spill cessation measures on resident species of concern. The proposed consultation Group for the Middle Yuba River would be involved in the evaluation of the results of the monitoring program and evaluation of aquatic resource conditions under the new license.

We conclude that 20°C would be a more appropriate temperature goal for the Middle Yuba River above Wolf Creek for balancing aquatic resource needs; maintaining 20°C at Wolf Creek would likely maintain adequate temperatures for foothill yellow-legged frog in the vicinity of their upstream extent near RM 30. NID estimates (October 2, 2013) that the cost to implement the Block Flow recommendation would be about $186,000 annually. NID also points out that use of the full 2,500 acre-feet allocation is most likely to occur during dry hot years when the 2,500 acre-feet deficit would have the most significant adverse effect on their water delivery system. Therefore, we do not recommend the *Block Flow* proposal for the Middle Yuba River below Milton diversion dam as the benefits do not outweigh the costs.

*Mercury Bioaccumulation Monitoring*

Forest Service revised preliminary condition 35 specifies that NID implement a mercury bioaccumulation monitoring program. However, Forest Service did not include this as a final condition indicating that it would accept the determination of the SWRCB on this issue under the State's water quality certification process. NID does not propose any substantive changes to reservoir levels or frequency and magnitude of channel modifying flows. Therefore, we do not expect any changes in methylmercury concentration levels in sportfish as a result of project operations. Although the information generated from implementation of this plan would provide appropriate agencies with data on whether or not to issue health advisories for anglers using project waters, bioaccumulation of mercury is not a project-related effect. Consequently, we conclude that the estimated levelized annual cost of $17,840 for implementation of this plan is not warranted as a license condition.

*Recommendations to Support Reintroduction of Spring-run Chinook Salmon and Central Valley Steelhead to Middle Yuba River and South Yuba above Englebright dam*

Actions to reintroduce Central Valley spring Chinook salmon and Central Valley steelhead upstream of the Corps' Daguerre Point and Englebright dams on the Yuba River have been identified in NMFS' Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead (NMFS, 2014). NMFS anticipates that reintroduction of these anadromous fish species would take place within the term of a new license issued for the Upper Drum-Spaulding Project, but no schedule has been determined.[7]

[7] On June 21, 2013, the California Sportfishing Protection Alliance, Trout Unlimited, and American Rivers filed a motion for additional investigation and supplemental draft EIS to address project effects on anadromous fish habitat in the South and Middle Yuba Rivers and the feasibility of alternative measures to mitigate project effects on anadromous fish and their habitat once fish are reintroduced into

The Yuba Salmon Forum, a group made up of state and federal agencies, conservation groups, utilities, water agencies, and interested stakeholders has been created "to identify, evaluate, recommend, and seek to achieve implementation of effective near-term and long-term actions to achieve viable salmonid populations in the Yuba River watershed to contribute to recovery goals, while also considering other beneficial uses of water resources and habitat values in neighboring watersheds, as part of Central Valley salmonid recovery actions." The forum is in the process of evaluating preferred alternatives.

NMFS provided four environmental recommendations for the Yuba-Bear Project to support future reintroduction of these spring-run Chinook salmon and/or steelhead in the upper Yuba River (section3.3.2.2.2, *Instream Flows*; section 3.3.2.2.8, *Aquatic Biota*). Two of these recommendations (recommendations 3 and 4) each include four subparts. We consider two additional NMFS recommendations (recommendations 1 and 2) to be administrative and do not evaluate them in this final EIS.

NMFS intention is for these recommendations to be implemented at a future time should steelhead and/or Chinook salmon be reintroduced into upper Yuba River areas influenced by the project. NMFS recommends that the Drum-Spaulding Project operate under the new license in a manner consistent with the Biological Opinion on operation of the Daguerre Point and Englebright dams by the Corps of Engineers. [8]

*Bullfrog Eradication*

FWS recommended that NID develop a bullfrog eradication plan for all project lakes, reservoirs, and impoundment areas to enhance populations of CRLFs, FYLFs, and other frog species. FWS has not provided any specific evidence of how the project contributes to the presence of in the project area.

As discussed in section 3.3.3.2.2, *Wildlife*, development of a bullfrog eradication program for the project would be impracticable and ineffective. Bullfrogs would likely continue to recolonize the project area from adjacent suitable habitats. Further, bullfrog control has generally been restricted to small ponds

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project-affected waters. PCWA, NID, and PG&E filed reply comments on July 8, 2013. As discussed in this section, we believe the recommendations are premature.

[8] On February 29, 2012, NMFS issued its Biological Opinion for the Corps' operation and maintenance of both Englebright and Daguerre Point dams and Englebright reservoir on the Yuba River (NMFS, 2012). The Corps subsequently requested reinitiation of formal consultation on February 26, 2013. The 2012 Biological Opinion for was set aside on August 16, 2013 pending completion of consultation. Separate ESA consultations concerning operation of the Corps' Englebright dam and Daguerre Point dam were completed on May 12, 2014. NMFS concurred that operation and maintenance of Englebright dam would not adversely affect listed salmon populations (NMFS, 2014b) and issued a Biological Opinion regarding operation of Daguerre Point dam (NMFS, 2014b). Neither decision requires any specific measures related to upstream fish passage at Englebright dam. The Corps 2015 proposed budget, however, provides funds for a reconnaissance study to determine what more can be done to improve fish passage conditions in the Yuba River and a follow-up restoration feasibility study. The feasibility study would explore in greater depth any restoration opportunities identified in the reconnaissance study.

that can be drained; control of large reservoirs and rivers has not been shown to be practical (Adams and Pearl, 2007).

Although it is difficult to determine the cost of an eradication program, it is likely to exceed $50,000 per year. We do not believe the benefits would be worth the cost.

*Carnivore Management Plan*

FWS recommended that NID develop a Wolverine and Fisher Management Plan to protect these species within designated carnivore management area.

There are no designated wolverine carnivore management areas that overlaps the project area. Although Pacific fisher designated carnivore management areas overlap with some of the project areas, the existing populations of Pacific fisher do not overlap with the project boundary. FWS has not provided any evidence of potential project effects to these species. The development of a management plan, as recommended by FWS, would add limited protection to this species due to its lack of use of the available habitat within the project boundary. If issues arise concerning potential project impacts, they can be addressed through the annual consultation meetings. Therefore, we do not recommend development of a Carnivore Management Plan.

*Watershed Restoration Plan*

California Fish and Wildlife recommends that NID develop a Watershed Restoration Plan that describes the existing erosion condition of slopes below open canals and project facilities; describes the methods to resolve slopes that have been and would be damaged by past and future breaches of the open canal system; provides an inspection schedule to identify potential failures that would cause releases of water and subsequent damage to watershed resources; and provides a plan to notify California Fish and Wildlife if damage to watershed resources occurs and to describe the actions that would be taken to repair and restore the damaged site. Forest Service conditions 48, 49, and 50 and BLM condition 24 specify that NID implement measures to address erosion potential at discharge points from project facilities including past canal breaches. NID has agreed to implement the Canal Release Point Plan and the Erosion and Sediment Control and Management Plan filed April 11, 2014. In addition, we recommend that NID develop and implement within 1 year of license issuance a channel stabilization plan (consistent with Forest Service condition 48) that collectively would address the key parts of California Fish and Wildlife's watershed restoration recommendation.

NID proposes an Erosion and Sediment Control and Management Plan that includes similar provisions to those recommended by California Fish and Wildlife. This plan addresses both project-wide erosion control and sedimentation management needs and measures and specific issues related to steep slopes at project facilities and drainage structures. The Canal Release Plan addresses measures to protect locations below spills from project canal, conduits, and penstocks. The channel stabilization plan would identify areas where historical operations and spills from project structures have resulted in ongoing erosion and channel destabilization. This plan would identify measures to repair those areas and protect them from future erosional damage, including specifically Clear and Trap Creeks and Christmas Tree waterway

We estimate the annualized cost to develop and implement a channel stabilization plan and to implement the Canal Release and Erosion and Sediment Control and Management Plans would be $561,000. The estimated additional annualized cost to integrate California Fish and Wildlife's recommendation with NID's proposed plans is $110,000 and does not provide additional protection of resources worth this additional cost.

*Protection of Special-Status Species*

Forest Service condition 43 and BLM conditions 19 and 53 specify that NID submit a biological evaluation for approval by appropriate agencies prior to construction activities that may affect special-status species or critical habitat. California Fish and Wildlife makes a similar recommendation. However, before construction of any new project feature not addressed in this EIS could occur, NID would first need to file with the Commission an application to amend its license. If appropriate, a biological evaluation or, if a federally listed species could be involved, a biological assessment for special-status species, would be developed as part of the license amendment proceeding. Consequently, although the intent of this measure would be addressed through the amendment process, we find that there is no need to include this measure as a condition of a new license for this project.

*Paleontological Resources*

California Fish and Wildlife 10(a) measure 19 recommends that protection of paleontological resources should be included in the HPMP. NID has not included management measures for paleontological resources in the HPMP. Paleontological resources are not cultural resources and, thus, are not eligible for listing on the National Register and cannot be addressed in the HPMP pursuant to section 106**.** The Commission has no jurisdiction over NID to enforce these 10(a) recommendations to protect paleontological resources. Paleontological resources are protected by California statute (e.g., Public Resources Code Section 5097.5 (a), Removal or Destruction; Prohibition), appendix G to the CEQA Guidelines that was revised in 2009 to include an assessment of project effects on paleontological resources, and the Paleontological Resources Preservation Act (P.L. 111-011) Omnibus Public Land Management Act of 2009 Subtitle D--Paleontological Resources Preservation. It is the responsibility of the federal land manager to carry out such protective measures. In the case of a new license for the project, NID would be responsible for consulting with the Forest Service and BLM under these circumstances.

*Inadvertent Discoveries*

California Fish and Wildlife 10(a) measure 19 recommends that in situations when inadvertent discoveries are found on Forest Service or BLM lands, NID would not resume work on ground-disturbing activities until written approval from the Forest Service or BLM is received. NID has plans for handling inadvertent discoveries in the HPMP that do not require NID to receive written approval from the Forest Service or BLM to proceed following a discovery. These plans have been reviewed and commented on by the Forest Service, BLM, and tribes. NID's alternative 4(e) conditions for noticing, consulting, and documenting cultural resources involving inadvertent discoveries would adequately protect historic properties from project-related effects. Therefore, we conclude that the process NID has already provided in its HPMP is appropriate.

### 5.5.3 Unavoidable Adverse Impacts

The continued operation of the Yuba-Bear Project would result in some minor unavoidable adverse effects on geologic, soil, aquatic, terrestrial, and visual resources. The geologic and soil resources effects could include some minor continued erosion associated with project operation and renovation of recreational facilities and interruption of sediment transport at project reservoirs. Most of these effects would be reduced by the proposed resources enhancement measures, including: (1) implementation of the Erosion and Sediment Control Management plan; and (2) development and implementation of an LWD management plan.

Aquatic communities have developed and adapted to the high level of natural flow variability in western Sierra streams. Reduced flow variability as a result of historical project operations could have

resulted in shifts in community composition, diversity, and resilience. Proposed minimum flow and spill cessation measures would improve seasonal and inter-annual flow variability to better mimic natural flow variability in some project-affected reaches; however, inter-basin transfer of water via project facilities to meet water delivery commitments and contracts under legally established water rights would continue to reduce overall natural flow and variability in many project reaches.

Discharges from project canals augment natural flow in some project reaches (e.g., Bowman-Spaulding diversion conduit). When these canals are taken out of service for maintenance or in the event of an emergency and flow ceases, flow in these reaches returns to natural flow levels, which could be zero flow at some locations and during some months. In other reaches, canal outages can result in spills of atypical magnitude through the reach. Proposed measures would reduce, but not eliminate the outage associated flow shifts.

Some fish entrained into project conduits, canals, and flumes are subject to stress, injury, and mortality when flow ceases during outages. Proposed fish protection and rescue measures have been designed to reduce potential mortality during these periods. Some minor levels of mortality would still be likely to occur associated with capture, handling, and transport of fish collected in open canal structures or in closed conduits and tunnels where fish rescue protocols cannot be safely implemented.

As a result of historical environmental damage associated with mining and mineral extraction, bioaccumulation of mercury in fish and other aquatic organisms is expected to continue long into the future and throughout the period of the new license. We do not expect project operations under the new license conditions to affect the rate of mercury suspension, transport, or bioaccumulation.

For terrestrial resources, unavoidable adverse effects could include loss of vegetation and wildlife habitat from the construction of the Rollins upgrade or new or rehabilitated recreation facilities that require permanent removal of vegetation. Effects to vegetation and wildlife habitat would be reduced by implementation of the Integrated Vegetation Management Plan.

Electrocution or collision associated with project transmission lines could impact raptors and other large avian species.

Any construction related to the proposed Rollins upgrade or new or rehabilitated recreation facilities would result in short-term impacts to the visual quality of the project area. Visual impacts would ultimately be mitigated by the implementation of the Visual Resource Management Plan.

### 5.5.4 Summary of 10(j) Recommendations and 4(e) Conditions

#### 5.5.4.1 Fish and Wildlife Agency Recommendations

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. In response to our REA notice, the following fish and wildlife agencies submitted recommendations for the project: NMFS (letter filed July 31, 2012) and California Fish and Wildlife (letter filed July 30, 2012).

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. Table 5-11 lists the federal and state recommendations filed pursuant to section 10(j) and indicates whether the

recommendations are included under the staff alternative. Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document.

In the draft EIS, we evaluated 71 recommendations and associated subparts submitted by California Fish and Wildlife for the Yuba-Bear Project, 31 of them were found to be within the scope of section 10(j). Of these 31 recommendations, we recommended adopting 24, modifying 4, and not including 2.

NMFS submitted two recommendations (including subparts) concerning LWD that are within the scope of section 10(j). NMFS also submitted six recommendations (including subparts) concerning future reintroduction of spring-run Chinook salmon and/or Central Valley steelhead in the South Yuba River upstream of Englebright dam. These recommendations do not fall within the scope of section 10(j) because they depend upon a future action for which no schedule has been proposed.9 We do not recommend adoption of any of these eight recommendations. NMFS also filed two recommendations with regard to consistency with the February 29, 2012 biological opinion[10] on Corps of Engineers actions and formal consultation under the ESA (recommendations 1 and 2) that we consider administrative and are not addressed in our draft EIS.

We sent letters to California Fish and Wildlife and NMFS on June 20, 2013, informing them of our preliminary determination of inconsistencies for their recommendations filed July 30, 2012 and requesting concurrence, comments, or alternative recommendations. By letter filed August 22, 2013, California Fish and Wildlife responded, identifying recommendations on which the resource agencies and PG&E had subsequently reached agreement through further negotiations which now represent the agency's recommendations under section 10(j). We understand California Fish and Wildlife's August 22, 2013 letter to mean that it was amending some of its July 30, 2012 10(j) recommendations. California Fish and Wildlife now recommends: (1) Forest Service condition 50, Erosion and Sediment Control and Management as it applies to all Public Trust Lands (instead of a Watershed Restoration Plan); (2) Forest Service condition 2, Consultation Group for water temperature management (instead of an Ecological Group) as it applies to all Public Trust Lands; (3) Forest Service Condition 33 and BLM condition 11, Fish Protection and Management during Canal Outages Plan; (4) Forest Service condition 34 and BLM condition 12, Gaging Plan; (5) Forest Service condition 38 and BLM condition 31, Integrated Vegetation Management Plan; (6) Forest Service condition 39 and BLM condition 16, Monitor Animal Losses in Project Canals; (7) Forest Service condition 40 and BLM condition 17, Replacement of Wildlife Escape and Wildlife Crossing Facilities; (8) Forest Service condition 41, Wildlife Crossing—Bowman-Spaulding Canal; (9) Forest Service condition 43 and BLM condition 18, Bald Eagle Management Plan; (10) Forest Service condition 45, Project Powerlines; (11) Forest Service condition 46, Raptor Collisions; (12) Forest Service condition 47 and BLM condition 21, Bat Management; (13) Forest Service condition 52 and BLM condition 23, Large Woody Debris Management; and (14) Forest Service condition 53 and BLM condition 35, Recreation Plan. The other 54 recommendations in California Fish and Wildlife's July 30,

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[9] NMFS' recommendations would not be instituted until some indeterminate time and the events upon which these measures are expressly conditioned might never occur. Actions contingent upon uncertain future actions are not specific measures to protect, mitigate, or enhance fish and wildlife. Therefore, we do not consider these measures under section 10(j) of the FPA.

[10] As discussed in sections 5.1.2.3 and 5.5.2.3, the BO issued by NMFS was subsequently withdrawn.

2012 letter, not modified by its letter of August 22, 2013, continue as the recommendations of California Fish and Wildlife.

In their letter California Fish and Wildlife requested clarification of the Commission's analysis and recommendation related to Forest Service condition 3, Water Year Type, relative to back-to-back critically dry or extreme critically dry water years. California Fish and Wildlife also submitted additional clarification, data, and analysis for their recommendations for: (1) Middle Yuba River Block Flows below Milton-Bowman diversion dam; and (2) Fish Stocking in Project Reservoirs.

On November 12, 2013, we held a section 10(j) meeting with California Fish and Wildlife to attempt to resolve the inconsistencies. California Fish and Wildlife recommendations discussed at the meeting related to the Yuba Bear Project included: (1) Reservoir Fish Stocking; and (2) Block Flows for water temperature management in Middle Yuba River below Milton-Bowman diversion dam. During the meeting we resolved some but not all of the inconsistencies. The specifics of each recommendation's inconsistency and our determinations are discussed below. NMFS did not request, nor did they participate in this section 10(j) meeting.

*Reservoir Fish Stocking*

In its section 10(j) recommendations, California Fish and Wildlife's recommended that NID fund the stocking of fish in Bowman, Faucherie, French, and Sawmill Lakes, and Jackson Meadows and Rollins reservoirs on an annual basis. California Fish and Wildlife also recommended that NID annually consult with California Fish and Wildlife to obtain fish stocking targets, fish species, discuss fish acquisition, and verify the completion of the previous year's stocking commitment. In the draft EIS, instead of funding,[11] we recommended that NID prepare a Fish Stocking Plan that would address stocking in Bowman Lake, Rollins reservoir, Faucherie Lake, and Jackson Meadows reservoir, and would include provisions for stocking in additional project reservoirs based on changes in recreational use, collected from recreation use monitoring, and angling pressure over the term of the license. We concluded that the California Fish and Wildlife's recommendation was not worth the benefits as compared to our recommendation. Therefore, we made a preliminary determination that California Fish and Wildlife's recommendation was inconsistent with the public interest standard of section 4(e) and the comprehensive standard of section 10(a) of the FPA.

California Fish and Wildlife provided additional information on fish stocking costs in its August 22, 2013 draft EIS comment letter. California Fish and Wildlife explained that the costs for aerial stocking in the high elevation mountain lakes are very inexpensive and the price of fingerlings is cheap. At the 10(j) meeting, California Fish and Wildlife indicated it would be willing to contract with NID to provide fish and planes for stocking when available, which would reduce the cost of the aerial stocking.

[11] As a general matter, it is the Commission's policy to require licensees to implement necessary license conditions and not to provide funding to other entities. The Commission has no authority to ensure that providing funding to California Fish and Wildlife would accomplish a project purpose or ameliorate a project effect. However, the Commission can enforce specific measurable actions by the licensee, such as the development and implementation of a fish stocking plan to ensure that fish stocking at project reservoirs would support current and anticipated future fishing pressure at the project reservoirs.

California Fish and Wildlife noted and under its recommendation, not all reservoirs would be stocked annually.

Based on the discussion at the 10(j) meeting, we agreed that stocking of remote lakes should be considered as part of the Fish Stocking Plan that would be reviewed annually to determine which reservoirs should be stocked in a given year. We agreed that the annual Fish Stocking Plan would need to consider costs for fish stocking, if California Fish and Wildlife and its planes were not available to NID. During the section 10(j) meeting, California Fish and Wildlife agreed that this issue had been resolved.

In the final EIS, we consider recreation use in addition to fish stocking costs and the remoteness/access to the reservoirs recommended for stocking. Although cost was considered, the staff recommendation was not solely based on cost. We consider the costs for the recommendation based on the costs provided by California Fish and Wildlife, but also consider the costs if the Department had no plane to support aerial stocking. California Fish and Wildlife indicated it would be willing to contract with NID to provide fish and planes for stocking when available. Our recommendation is for a Fish Stocking Plan that would not require all of the reservoirs recommended for stocking by California Fish and Wildlife to be stocked annually. Reservoirs recommended for stocking by California Fish and Wildlife would be reviewed annually as a part of the Fish Stocking Plan in order to determine which reservoirs would be stocked in a given year. During the section 10(j) meeting, California Fish and Wildlife agreed that this issue had been resolved.

*Back-to-Back Critically or Extreme Critically Dry Water Years*

In the draft EIS, we recommended that minimum instream flows during the extreme critically dry water year type be implemented in the second year of two sequential critically dry years in the Bear River below Rollins dam, consistent with BLM condition 3. We concluded that this measure would reduce the potential effects of meeting minimum streamflows on water delivery requirements and power generation. In its comments on the draft EIS, California Fish and Wildlife indicated that it did not agree with this measure.

At the 10(j) meeting, California Fish and Wildlife suggested additional analysis of this issue be included in the final EIS and that the Commission focus on evaluating the differences in generation. PCWA stated that this measure would conserve water supply that could not otherwise be recaptured downstream during extended drought and that it had provided estimates of the benefit to conservation of water supply to the relicensing participants when the BLM condition was developed.

During critically dry years, the required minimum streamflows in Bear River below Rollins dam range from 20 cfs between November and March to 50 cfs between June and September. During extreme critically dry years, the required minimum streamflows would be 15 cfs during November to March and 20 cfs during June to September. By comparison, estimated unregulated flows in this reach would be 35 cfs in June declining to 15 cfs in August in critically dry years. Required minimum streamflows would provide an estimated 73 percent of the maximum weighted usable area for resident rainbow trout during critically dry summers and about 35 percent during extreme critically dry summers. Back to back critically dry water years occurred once between 1976 and 2008 which would have affected flows in the Bear River only during 1988 had this condition been in effect. During this same period, 1977 was the only year categorized as extreme critically dry.

We conclude that the limited benefits of the California Fish and Wildlife recommendation would not be worth the potential effect on water supply and costs from reduced power generation. Therefore, we are making a preliminary determination that California Fish and Wildlife's recommendation is inconsistent with the public interest standard of section 4(e) and the comprehensive standard of section 10(a) of the FPA.

*Block Flows in the Middle Yuba River below Milton Diversion Dam*

In the draft EIS, we did not recommend adopting California Fish and Wildlife's recommendation that NID make incremental releases of water greater than the specified minimum streamflow for the Middle Yuba River below Milton diversion dam to maintain water temperatures upstream of the Wolf Creek confluence at less than 19ºC (referred to as the Block Flow recommendation) to benefit resident rainbow trout. California Fish and Wildlife recommends that the "Block of Water" allocated for this purpose should not exceed 2,500 acre-feet annually. Implementation of the Block Flow recommendation could require frequent (weekly or daily) consultation between the agencies and NID and potential flow adjustments at 8-hour intervals, particularly during periods of hot weather.

Instead, we recommended increased minimum flows that are 2-10 higher than existing minimum streamflows during summer months depending on water year type. Water temperature modeling provided by NID indicates that required minimum streamflows under the new license would maintain water temperatures below 20ºC above the confluence of Wolf Creek, providing habitat suitable for resident rainbow. The proposed minimum streamflows under the new license would also maintain water temperatures higher than 17°C at National Gulch 3 miles upstream where a population of foothill yellow-legged frog has been documented. Downstream near Our House diversion dam impoundment, water temperatures with the Block Flow measure would be only slightly higher than with proposed minimum streamflows. The additional Block Flows do not appear to be necessary to manage water temperature in the Middle Yuba River below Milton diversion dam to benefit both resident rainbow trout and foothill yellow-legged frog.

Although the Block Flow recommendation would increase downstream angling opportunities to a greater degree than the minimum flows, we determined that the additional flow releases would negatively affect the yellow-legged frog by reducing water temperatures below the optimum range for egg incubation and tadpole growth and development, have a greater effect on water supply and power generation than the supplemental flows, be more difficult to administer, and not be worth the additional cost of about $20,000 annually. Therefore, we made a preliminary determination that California Fish and Wildlife's recommendation was inconsistent with the public interest standard of section 4(e) and the comprehensive standard of section 10(a) of the FPA.

California Fish and Wildlife responded requesting greater detail for the determination of inconsistency and providing supplemental information to support the potential benefit of their Block Flow recommendation for aquatic resources. Additional data and references for distribution and thermal requirements of foothill yellow-legged frog were provided by California Fish and Wildlife. The agency also provided further critique of the thermal modeling and temperature data used by NID to evaluate the effects of the Block Flow measure on water temperature and aquatic resources compared to increased minimum streamflows under the new license.

In the final EIS, we analyze the predicted changes and differences in water temperature in Middle Yuba River between Jackson Meadows reservoir and Our House diversion dam impoundment associated the Block Flow recommendation and the proposed minimum streamflows for this stream reach. We also consider the potential effect of these temperatures on other special-status species (e.g., foothill yellow-legged frog), reviewing recent information provided by the agencies on the thermal requirements and optimal thermal conditions for these species. Our analysis and recommendation seek to balance the potentially conflicting habitat requirements of resident rainbow trout and foothill yellow-legged frog in the Middle Yuba River. Rainbow trout are ubiquitous in project-affected reaches and a quality recreational fishery exists in the Middle Yuba River between Jackson Meadows dam and Wolf Creek. Although proposed minimum streamflows and California Fish and Wildlife's Block Flow recommendation would both enhance aquatic habitat for resident rainbow trout, the Block Flow

recommendation would benefit cold water habitat several miles farther downstream. However, the water temperature differences between the Block Flow and minimum streamflow proposals are predicted to diminish with distance downstream. The small decrease in temperature near Our House diversion dam impoundment provided by the Block Flow measure would not significantly affect the conditions associated with listing of the reach under CWA section 303(d). Aquatic habitat adequate for early development and growth of foothill yellow-legged frog is more limited and could be constrained by higher flows and associated decreased water temperatures associated with the Block Flow recommendation.

This issue remains unresolved. Implementation of the proposed minimum streamflows in conjunction with additional conditions including the Consultation Group specific to the Middle Yuba River for water temperature management (Forest Service condition 2), and monitoring plans for fish populations, foothill yellow-legged frog, aquatic benthic macroinvertebrates, water temperature and stage, and channel morphology would provide data to continue to evaluate on an annual basis the effects of flow modifications (e.g., minimum streamflows and spill cessation) in project-affected stream reaches and provide an opportunity to recommend further adjustments that might be indicated.

In summary, of the 72 recommendations (July 30, 2012 filing), amended recommendations (August 22, 2013 filing), and associated subparts submitted by California Fish and Wildlife for the Yuba-Bear Project, we consider 33 to be within the scope of section 10(j). The General Measures include 2 subparts*, Flow Measures* include 13 subparts, and *Terrestrial Protection Measures* include 10 subparts. Of those 33 recommendations within the scope of section 10(j), we wholly include 30, include 1 in part (recommendation 17, Reservoir Fish Stocking), and do not include 2 (recommendation 2.8, Block Flows and recommendation 28, Watershed Restoration Plan). We discuss the reasons for not including those recommendations in section 5.5.2, Comprehensive Development and Recommended Alternative. Table 5-11 indicates the basis for our preliminary determinations concerning measures that we consider inconsistent with section 10(j). Of the 39 recommendations that are not within the scope of section 10(j), 28 are standard recommendations, identical to some of the Forest Service's 4(e) standard conditions; the other 11 are considered 10(a) recommendations. Of the California Fish and Wildlife standard conditions, we only address the following recommendations in our final EIS: condition 1, *Consultation*; condition 12, *Special Status Species*; condition 16, *Pesticide Use Restrictions on NFS Lands*; condition 23, Hazardous Substance Plan; condition 27, *Slope Stability Plan*; and condition 28, *Watershed Restoration Plan*. The remaining 22 California Fish and Wildlife standard conditions are not specific recommendations for protection, mitigation, or enhancement of fish and wildlife resources.

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 1 | Consultation | California Fish and Wildlife (recommendation 1) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $15,000 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 2 | Annual employee training | California Fish and Wildlife (recommendation 1.1) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $20,000 | Yes |
| 3 | Coordinated Operation Plan | California Fish and Wildlife (recommendation 1.2) | Yes | $4,000 | Yes |
| 4 | Determine water year type in February, March, April, may, and October of each year based on unimpaired runoff in Yuba River at smarts Ville as set in the California DWR Bulletin 120. | California Fish and Wildlife (recommendation 2.1) | Yes | $1,000 | Yes |
| 5 | Provide higher Minimum Streamflows in 7 project-affected reaches, new minimum streamflows in 9 project-affected reaches, and the same minimum streamflows in 1 project-affected reach. | California Fish and Wildlife (recommendation 2.2) | Yes | $26,000 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 6 | Canal Outage − Notify licensing participants at the annual consultation meeting of all annual planned and non-routine planned canal outages. Implement modified minimum streamflows for the first 30 days of the outage. | California Fish and Wildlife (recommendation 2.3) | Yes | $7,000 | Yes |
| 7 | Flow Setting and Winter Flow Adjustment − Implement adjusted minimum streamflows in the Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam from November to January and below Wilson Creek diversion dam from November 1 to the earliest date to access the facility safely. | California Fish and Wildlife (recommendation 2.4 and 2.5) | Yes | $0 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 8 | Chicago Park powerhouse Motoring during Outages − Avoid non-routine outages at Chicago Park powerhouse from May 1 to September 15 and motor the powerhouse unit when it is not generating. Motor the powerhouse until spill flows from Dutch Flat afterbay reach Chicago Park tailrace. | California Fish and Wildlife (recommendation 2.6) | Yes | $1,000 | Yes |
| 9 | Spill Cessation and Minimization of Flow Fluctuations in Middle Yuba River, Canyon Creek, and Bear River − Implement spill cessation schedule at Milton diversion dam, Bowman-Spaulding diversion dam, and Dutch Flat afterbay dam to avoid short–term, high-flow fluctuations in the downstream reaches. | California Fish and Wildlife (recommendation 2.7) | Yes | $15,000 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 10 | *Block Flows* for Middle Yuba River − Release up to an additional 2,500 acre-feet of water to the Middle Yuba River below Milton diversion dam between June 15 and September 15 in all water year types in order to maintain water temperatures below 19°C above the confluence of Wolf Creek. Establish a Middle Yuba River Water Temperature Operations Group. | California Fish and Wildlife (recommendation 2.8) | Yes | $206,000 | No, the *Block Flow* proposal does not adequately balance the habitat needs of various aquatic resources and could adversely affect FYLF habitat. |
| 11 | Rollins reservoir Elevation Control − Manage the elevation of Rollins reservoir within the top 2 or 3 feet by adjusting the discharge (greater than downstream water supply demand) from the reservoir into the Bear River based on inflow to Rollins reservoir that are in order to eliminate rapid fluctuations in the Bear River below Rollins dam. | California Fish and Wildlife (recommendation 2.9) | Yes | $2,000 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 12 | Large Woody Debris Management Plan − Survey a 10-mile reach of Bear River below Rollins dam during the fifth year of the license and report findings of LWD. If there are less than 2.4 pieces per 100 meters, place additional material. Conduct an LWD survey every 5 years. | California Fish and Wildlife (recommendation 2.10) | Yes | $74,000 | Yes |
| 13 | Steephollow Creek Foothill Yellow-legged Frog Monitoring − Conduct baseline monitoring of foothill yellow-legged frog in Steephollow Creek in first 3 years of license to assess effects of spills from Chicago Park conduit; spill-event-based (>100 cfs, April 1-June 15; >300 cfs, June 16-September 15) monitoring in years 2 and 3. | California Fish and Wildlife (recommendation 2.11) | Yes | $17,000 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 14 | Milton-Bowman Conduit Fish Entrainment Plan − Develop a fish entrainment reduction plan including a fish screen at Milton-Bowman diversion dam that includes a design, schedule for implementation, cost, and monitoring of screen facility. | California Fish and Wildlife (recommendation 2.12) | Yes | $245,000 | Yes |
| 15 | Establish an ecological group to assist with the implementation of license measures, monitoring plans, and the review and evaluation of monitoring data and facility modifications. | California Fish and Wildlife (recommendation 2.13) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes, but the terms of this recommendation would be fulfilled through the annual consultation process and the Consultation Group Specific to the Yuba-Bear Project proposed by Forest Service (condition 2) and NID. |
| 16 | Implement a Canal Fish Rescue Plan. | California Fish and Wildlife (recommendation 3) | Yes | $52,000 | Yes |
| 17 | Gaging Plan − Finalize the gaging plan submitted with the amended final license application. | California Fish and Wildlife (recommendation 4) | Yes | $95,000 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 18 | Non-native Invasive Aquatic Species Management Plan − Develop a plan to address invasive species such as New Zealand mudsnail, Quagga mussels, and zebra mussels. | California Fish and Wildlife (recommendation 6) | Yes | $7,000 | Yes |
| 19 | Implement an integrated vegetation and non-native invasive species management plan. | California Fish and Wildlife (recommendation 7.1) | Yes | $48,000 | Yes |
| 20 | Monitor animal losses in all project canals, including recording details of each animal mortality occurrence. | California Fish and Wildlife (recommendation 7.2) | Yes | $3,000 | Yes |
| 21 | Consult with California Fish and Wildlife when replacing wildlife escape and wildlife crossing facilities regarding specifications and design. | California Fish and Wildlife (recommendation 7.3) | Yes | $1,000 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 22 | Maintain one existing wildlife crossing structure in the Bowman-Spaulding canal (canal mile 5.8), and either construct one new crossing or retrofit the existing crossing at canal mile 1.5; annually monitor and report crossing conditions and maintenance or repairs. | California Fish and Wildlife (recommendation 7.4) | Yes | $22,000 | Yes |
| 23 | Implement Bald Eagle Management Plan. | California Fish and Wildlife (recommendation 7.5) | Yes | $5,000 | Yes |
| 24 | Submit a biological evaluation, for approval by appropriate agencies, prior to construction activities on NFS or BLM lands that may affect special-status species or critical habitat. | California Fish and Wildlife (recommendation 7.8) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | No. Biological evaluation is already required prior to new construction. |
| 25 | Annually review current lists of special-status species that might occur in project area and that may be affected by project operations, and suggested procedure to follow if special-status species is detected. | California Fish and Wildlife (recommendation 7.9) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 26 | Annually record all incidental observations and details, by operation staff, of bird collision/electrocutions at the Bowman-Spaulding transmission line; replace poles according to the *Avian Protection on Power Lines: The State of the Art in 2006*. | California Fish and Wildlife (recommendation 7.10) | Yes | $5,000 | Yes |
| 27 | Document all bat roosts within project buildings, dams, or other structures that may be used as roosting structure; place humane exclusion devices in structure with bats present; perform annual inspection of exclusion devices and structures. | California Fish and Wildlife (recommendation 7.9) | Yes | $3,000 | Yes |
| 28 | Establish a monitoring program for aquatic species. | California Fish and Wildlife (recommendation 8) | Yes | $397,000 | Yes |
| 29 | Establish a monitoring program for non-native invasive species, sensitive species, recreation, bear management, and sensitive raptor species. | California Fish and Wildlife (recommendation 8) | Yes | $0 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 30 | Develop an LWD management plan after consultation with the appropriate agencies that identifies the locations LWD would be collected, describes the options for moving LWD below project facilities, and identifies placement locations. | California Fish and Wildlife (recommendation 9) | Yes | $74,000 | Yes |
| 31 | Schedule and facilitate a review meeting when the maintenance schedule, water year forecast, and reservoir level forecasts are finalized to discuss the implementation of minimum streamflows and reservoir related conditions, results of monitoring, and other issues related to preserving and protection ecological values. | California Fish and Wildlife (recommendation 10) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | Yes, however, we suggest that this consultation would be accomplished during the annual consultation meeting. |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 32 | Develop and implement a plan to evaluate the penstock and other drainage structure emergency and maintenance release points to determine if improvements can be made to minimize potential adverse resource impacts when release points are used. | California Fish and Wildlife (recommendation 11) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $6,000 | Yes |
| 33 | Submit a biological evaluation, for approval by appropriate agencies, prior to construction activities on NFS or BLM lands that may affect special-status species or critical habitat. | California Fish and Wildlife (recommendation 12) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $0 | No. Biological evaluation is already required prior to new construction. |
| 34 | Recreation survey, monitoring, reporting, and future development triggers. | California Fish and Wildlife (recommendation 12) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife recommend-ation 16) | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 35 | Annual Recreation Coordination Meeting: Each year during the term of the license, arrange to meet with interested agencies for an annual coordination meeting to discuss the measures needed to ensure public safety, and protection and use of the recreation facilities. | California Fish and Wildlife (measure 15) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | Included in the cost for the Recreation Plan (California Fish and Wildlife measure 16) | Yes |
| 36 | Restrict pesticide use on federal lands without prior written approval of appropriate agencies; includes details and restriction on allowed pesticides. | California Fish and Wildlife (recommendation 16) | Yes | $0 | Yes |
| 37 | Recreation Plan: Upon issuance of the license, implement the Recreation Plan as approved by the Commission. Recommendation includes site-specific recommendations for recreation facility modifications and improvements. | California Fish and Wildlife (recommendation 16) | No. Not a specific measure to protect, mitigate, or enhance fish and wildlife resources. | $3,013,000 | Yes, we recommend implementation of NID's Alternative Recreation Plan filed on August 30, 2012, as modified by staff. |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 38 | Reservoir Fish Stocking: Consult with California Fish and Wildlife annually to establish (1) stocking targets and species; (2) additional reservoirs for stocking (i.e., Faucherie, French Lake, Jackson Meadows, Sawmill); and (3) not-to-exceed stocking targets. NID could acquire the fish directly from fish hatcheries. The recommendation does not specify species to be stocked. | California Fish and Wildlife (recommendation 17) | Yes | $242,000 | Yes, but modified to develop a Fish Stocking Plan that includes annual stocking of Rollins reservoir, Jackson Meadows reservoir, Bowman Lake, and Faucherie Lake; stocking Sawmill Lake every other year until the first Form 80 reporting year. |
| 39 | Develop and implement an Erosion and Sediment Control and Management Plan | California Fish and Wildlife (recommendation 22) | Yes | $350,000 | Yes |
| 40 | Develop a Hazardous Substances Plan | California Fish and Wildlife (recommendation 23) | Yes | $4,000 | Yes |
| 41 | Develop and implement a Slope Stability Plan | California Fish and Wildlife (recommendation 27) | Yes | $350,000 | Yes |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 42 | Develop and implement a Watershed Restoration Plan | California Fish and Wildlife (recommendation 28) | Yes | $350,000 | No, but NID's Canal Release Point Plan (field on April 11, 2014) and development and implementation of a Channel Stabilization Plan addresses major issues and is consistent with Forest Service condition 48 and 49 and BLM condition 24. |
| 43 | Implement minimum flows below Milton diversion dam (10-200 cfs depending on week/month). The flows are based on the 7-day average water temperature at the Plumbago Road crossing. | NMFS (recommendation 3.1) | No, because it depends upon a future action. | Undeter-mined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish for which no schedule has been established. |
| 44 | Implement minimum flows below Bowman Lake (15-75 cfs) and Lake Spaulding (25-75 cfs) to maintain 19°C 7-day mean water temperature at the Poorman Creek confluence with the South Yuba River. | NMFS (recommendation 4.1) | No, because it depends upon a future action. | Undeter-mined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish for which no schedule has been established. |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 45 | Develop and implement an LWD Management Plan for South Yuba River at Lake Spaulding dam for implementation when anadromous species are reintroduced above Englebright dam. | NMFS (recommendations 3.2.1 and 4.2.1) | No, because it depends upon a future action. | Undeter-mined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish for which no schedule has been established. |
| 46 | Develop and implement an interim LWD measure for anadromous fish to allow passage/placement of LWD in Middle Yuba River below Milton diversion dam and in Canyon Creek below Bowman-Spaulding diversion dam. Deliver 40 cubic meters of LWD per year to the Middle Yuba River Yuba River and 30 cubic meters to South Yuba River below Canyon Creek. | NMFS (recommendations 3.2.2 and 4.2.2) | No, because it depends upon a future action. | Undeter-mined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish for which no schedule has been established. Forest Service condition 52 includes survey of LWD conditions and would addresses movement of LWD downstream in Middle Yuba River below Milton diversion dam and in Canyon Creek below Bowman-Spaulding diversion dam through development and implementation of a specific LWD plan, if necessary. |

Table 5-11. Fish and Wildlife Agency Recommendations for the Yuba-Bear Project. (Source: staff)

| No. | Recommendation | Agency | Within the Scope of Section 10(j) | Annualized Cost | Adopted? |
|---|---|---|---|---|---|
| 47 | Implement minimum flows below Milton diversion dam (10-30 cfs depending on week/month) if winter steelhead are introduced in the absence of spring-run Chinook salmon. | NMFS (recommendation 5.1) | No, because it depends upon a future action. | Undeter-mined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish for which no schedule has been established. |
| 48 | Implement minimum flows below Bowman Lake dam (25-50 cfs) and Lake Spaulding dam (15-30 cfs) for central valley steelhead in the absence of Chinook salmon reintroduction. Maintain 20°C 7-day mean water temperature at the Poorman Creek confluence with the South Yuba River. | NMFS (recommendation 6.1) | No, because it depends upon a future action. | Undeter-mined | No, the recommendation is premature because it depends upon future reintroduction of anadromous fish for which no schedule has been established. |

#### 5.5.4.2 Land Management 4(e) Conditions

In section 2.2.4.4, *Modifications to Applicants' Proposals—Mandatory Conditions, Yuba-Bear Project*, we list the 4(e) conditions submitted by the Forest Service and BLM, and we note that section 4(e) of the FPA provides that any license issued by the Commission "for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation." Thus, any 4(e) condition that meets the requirements of the law must be included in any license issued by the Commission, regardless of whether we include the condition in our staff alternative.

Of the Forest Service's 63 final section 4(e) conditions, we consider 23 of the conditions (conditions 3 through 20, 23, 24, 35, 36, and 63) to be administrative or legal in nature and not specific environmental measures. Of BLM's 66 section 4(e) conditions, we consider 21 of the conditions (conditions 13, 44 through 51, 54, 55, 56, and 58 through 66) to be administrative or legal in nature and not specific environmental measures. We do not analyze the administrative conditions in this final EIS.

Table 5-12 summarizes our conclusions with respect to the 85 4(e) conditions that we consider to be environmental measures. We include wholly in the staff alternative 37 Forest Service conditions and 40 BLM conditions as specified by the agencies, modify 2 Forest Service conditions (condition 26, *Water year Type* and condition 58, *Recreation Streamflow Information*) and 1 BLM conditions (condition 37, *Recreation Streamflow Information*) to adjust the scope of the measure, and do not recommend 1 Forest Service condition (condition 43, *Special Status Species*) and 3 BLM conditions (condition 19, condition 34, *Recreation Operation, Maintenance, and Administration Agreement*, and condition 36, *Recreation Costs of Managing Facilities*); the measures not adopted in total are discussed in more detail in section 5.5.2, *Comprehensive Development and Recommended Alternative.*

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 1 | Consultation | Forest Service | $15,000 | Yes |
| 2 | Consultation group specific to the Yuba-Bear Project for water temperature management | Forest Service | $50,000 | Yes |
| 21 | Hazardous Substances Plan | Forest Service | $4,000 | Yes |
| 22 | Pesticide-Use restrictions on National Forest System lands | Forest Service | $0 | Yes |
| 25 | Employee training | Forest Service | $20,000 | Yes |
| 25 | Coordinated Operations Plan | Forest Service | $4,000 | Yes |
| 26 | Water year type | Forest Service | $1,000 | Yes, with modification that extreme critically dry water year flows would be implemented in Bear River below Rollins dam, Middle Yuba river below Milton diversion dam, and Canyon Creek below Bowman-Spaulding diversion dam in a critically dry year that follows a critically dry or extreme critically dry year. |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 27 | Minimum streamflows in 13 project-affected reaches | Forest Service | $26,000 | Yes |
| 28 | Canal outages affecting 4 project reaches | Forest Service | $7,000 | Yes |
| 29 | Overwinter minimum streamflow adjustments in Middle Yuba River below Milton diversion dam and Canyon Creek below Bowman-Spaulding diversion dam | Forest Service | $0 | Yes |
| 30 | Wilson diversion dam flow setting | Forest Service | $0 | Yes |
| 31 | Spill cessation in Middle Yuba River below Milton diversion dam, Canyon Creek below Bowman-Spaulding diversion dam, and Bear River below Dutch Flat afterbay dam | Forest Service | $15,000 | Yes |
| 32 | Mitigation for entrainment into Milton-Bowman conduit by design, construction, and operation of fish screen at Milton-Bowman diversion | Forest Service | $23,000 | Yes |
| 33 | Canal outages fish rescue plan for 4 project canals | Forest Service | $52,000 | Yes |
| 34 | Gaging Plan | Forest Service | $95,000 | Yes |
| 37 | Develop Aquatic Invasive Species Management and Monitoring Plan | Forest Service | $7,000 | Yes |
| 38 | Vegetation and Non-native Invasive Plant Management Plan | Forest Service | $48,000 | Yes |
| 39 | Monitor animal losses in project canals | Forest Service | $3,000 | Yes |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 40 | Replacement of wildlife escape and wildlife crossing facilities | Forest Service | $1,000 | Yes |
| 41 | Bowman-Spaulding canal wildlife crossing | Forest Service | $22,000 | Yes |
| 42 | Bald Eagle Management Plan | Forest Service | $5,000 | Yes |
| 43 | Special-status species | Forest Service | $0 | No, a biological evaluation would be considered during any project construction activity. No additional condition is necessary. |
| 44 | Annual review of special-status species lists and assessment of new species on federal land | Forest Service | $0 | Yes |
| 45 | Project powerlines | Forest Service | $5,000 | Yes |
| 46 | Raptor collisions | Forest Service | $5,000 | Yes |
| 47 | Bat management | Forest Service | $3,000 | Yes |
| 48 | Channel Stabilization Plan | Forest Service | $350,000 | Yes |
| 49 | Facility Release Plan | Forest Service | $350,000 | Yes |
| 50 | Erosion and sediment control and management | Forest Service | $350,000 | Yes |
| 51 | Monitoring Program—Fish population | Forest Service | $204,000 | Yes |
| 51 | Monitoring Program—Channel morphology | Forest Service | $37,000 | Yes |
| 51 | Monitoring Program—Foothill yellow–legged frog | Forest Service | $57,000 | Yes |
| 51 | Monitoring Program—Water temperature and stage | Forest Service | $71,000 | Yes |
| 51 | Monitoring Program—Western pond turtle | Forest Service | $2,000 | Yes |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 51 | Monitoring Program—Aquatic benthic macroinvertebrates | Forest Service | $26,000 | Yes |
| 51 | Monitoring Program—Riparian vegetation | Forest Service | $5,000 | Yes |
| 52 | Large woody material | Forest Service | $74,000 | Yes |
| 53 | Facility occupancy indicators and standards | Forest Service | Included in the cost for the Recreation Plan (Forest Service condition 57) | Yes |
| 54 | Licensee contact | Forest Service | Included in the cost for the Recreation Plan (Forest Service condition 57) | Yes |
| 55 | Review of recreation developments | Forest Service | Included in the cost for the Recreation Plan (Forest Service condition 57) | Yes |
| 56 | Annual recreation coordination meeting | Forest Service | Included in the cost for the Recreation Plan (Forest Service condition 57) | Yes |
| 57 | Recreation Plan | Forest Service | $3,013,000 | Yes |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 58 | Recreation streamflow information | Forest Service | $8,000 | Yes, but modified to include additional reaches specified in BLM condition 37 and include 15-minute interval reporting of streamflow information for these reaches where it is currently provided in 15-minute intervals and also require submittal of streamflow information plan to the Commission for approval. |
| 59 | Visual Resource Management Plan | Forest Service | $5,000 | Yes |
| 60 | Historic Properties Management Plan | Forest Service | $116,000 | Yes |
| 61 | Transportation Management Plan | Forest Service | $142,000 | Yes |
| 62 | Fire Management and Response Plan | Forest Service | $4,000 | Yes |
| 1 | Employee training | BLM | $20,000 | Yes |
| 2 | Coordinated Operations Plan | BLM | $4,000 | Yes |
| 3 | Water year types | BLM | $1,000 | Yes |
| 4 | Minimum streamflows for 2 project-affected stream reaches | BLM | $26,000 | Yes |
| 5 | Canal outages | BLM | $7,000 | Yes |
| 6 | Chicago Park powerhouse motoring | BLM | $1,000 | Yes |
| 7 | Spill cessations measures | BLM | $15,000 | Yes |
| 8 | Rollins reservoir elevation control | BLM | $2,000 | Yes |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 9 | Rollins dam large woody material management | BLM | $74,000 | Yes |
| 10 | Steephollow Creek foothill yellow-legged frog monitoring | BLM | $17,000 | Yes |
| 11 | Canal outages fish rescue plan for 1 project canals | BLM | $52,000 | Yes |
| 12 | Gaging Plan | BLM | $95,000 | Yes |
| 14 | Develop aquatic invasive species management and monitoring | BLM | $7,000 | Yes |
| 15 | Vegetation and Non-native Invasive Plant Management Plan | BLM | $48,000 | Yes |
| 16 | Monitor animal losses in project canals | BLM | $3,000 | Yes |
| 17 | Replacement of wildlife escape and wildlife crossing facilities | BLM | $1,000 | Yes |
| 18 | Bald Eagle Management Plan | BLM | $5,000 | Yes |
| 19 | Special-status species (same as condition 53) | BLM | $0 | No, a biological evaluation would be considered during any project construction activity. No additional condition is necessary. |
| 20 | Annual review of special-status species lists and assessment of new species on federal land | BLM | $0 | Yes |
| 21 | Bat management | BLM | $3,000 | Yes |
| 22 | Monitoring Program—Fish population | BLM | $204,000 | Yes |
| 22 | Monitoring Program—Channel morphology | BLM | $37,000 | Yes |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 22 | Monitoring Program—Foothill yellow–legged frog | BLM | $57,000 | Yes |
| 22 | Monitoring Program—Water temperature and stage | BLM | $71,000 | Yes |
| 22 | Monitoring Program—Western pond turtle | BLM | $2,000 | Yes |
| 22 | Monitoring Program—Aquatic benthic macroinvertebrates | BLM | $26,000 | Yes |
| 22 | Monitoring Program—Riparian vegetation | BLM | $5,000 | Yes |
| 23 | Dutch Flat afterbay woody debris management plan | BLM | $74,000 | Yes |
| 24 | Facility Release Access Plan | BLM | $350,000 | Yes |
| 25 | Recreation Plan | BLM | $3,013,000 | Yes |
| 26 | Licensee contact | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | Yes |
| 27 | Annual recreation coordination meeting | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | Yes |
| 28 | Review of recreation developments | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | Yes |
| 29 | Recreation survey and monitoring | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | Yes |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 30 | General measures for all recreation sites | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | Yes |
| 31 | Vegetation management in recreation facilities | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | Yes |
| 32 | Dutch Flat afterbay day-use recreation site | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | Yes |
| 33 | Chicago Park power house and connecting facilities and roads | BLM | $50,000 | Yes |
| 34 | Recreation operation, maintenance, and administration agreement | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | No, for BLM lands located inside the proposed project boundary, NID would ultimately be responsible for the O&M and management of any project recreation facilities. Recreation that extends to BLM lands outside the project boundary are outside the Commission's authority. |
| 35 | Recreation Plan revision | BLM | Included in the cost for the Recreation Plan (BLM condition 25) | Yes |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 36 | Recreation costs of managing facilities | BLM | $0 | No, for BLM lands located inside the proposed project boundary, NID would ultimately be responsible for the O&M and management of any project recreation facilities. Recreation that extends to BLM lands outside the project boundary are outside the Commission's authority. |
| 37 | Recreation streamflow information | BLM | $8,000 | Yes, but modified to include additional reaches specified in Forest Service condition 58and include 15-minute interval reporting of streamflow information for these reaches where it is currently provided in 15-minute intervals and also require submittal of streamflow information plan to the Commission for approval. |
| 38 | Historic Properties Management Plan | BLM | $116,000 | Yes |
| 39 | Transportation Management Plan | BLM | $142,000 | Yes |
| 40 | Fire Management and Response Plan | BLM | $4,000 | Yes |
| 41 | Erosion and sediment control and management | BLM | $350,000 | Yes |
| 42 | Consultation | BLM | $15,000 | Yes |

Table 5-12. Forest Service and BLM 4(e) Conditions for the Yuba-Bear Project. (Source: staff)

| Condition No. | Condition | Agency | Annualized Cost | Adopted? |
|---|---|---|---|---|
| 43 | Consultation group specific to the Yuba-Bear Hydroelectric Project | BLM | $50,000 | Yes |
| 52 | Risks and hazards on BLM lands | BLM | $4,000 | Yes |
| 53 | Protection of BLM special-status species (same as condition 19) | BLM | $0 | No. See condition 19. |
| 57 | Pesticide-use restrictions on BLM lands | BLM | $0 | Yes |

## 5.6 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA, 16 U.S.C. § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by a project. We reviewed the following 23 comprehensive plans that are applicable to the Upper Drum-Spaulding, Lower Drum, Deer Creek, and Yuba-Bear Projects, located in California.[12] No inconsistencies were found.

California Advisory Committee on Salmon and Steelhead Trout. 1988. Restoring the Balance: 1988 Annual Report. Sausalito, California. 84 pp.

California Department of Fish and Wildlife. U.S. Fish and Wildlife Service. National Marine Fisheries Service. Bureau of Reclamation. 1988. Cooperative Agreement to Implement Actions to Benefit Winter-Run Chinook Salmon in the Sacramento River Basin. Sacramento, California. May 20, 1988. 10 pp.

California Department of Fish and Wildlife. 1990. Central Valley Salmon and Steelhead Restoration and Enhancement Plan. Sacramento, California. April 1990. 115 pp.

California Department of Fish and Wildlife. 1993. Restoring Central Valley Streams: A Plan for Action. Sacramento, California. November 1993. 129 pp.

California Department of Fish and Wildlife. 1996. Steelhead Restoration and Management Plan for California. February 1996. 234 pp.

California Department of Parks and Recreation. 1998. Public Opinions and Attitudes on Outdoor Recreation in California. Sacramento, California. March 1998.

[12] Although the BLM's Sierra Resource Management Plan and Record of Decision (February 2008) and other applicable resource plans have not been filed as comprehensive plans, we still evaluated them under the comprehensive development standard of section 10(a)(1) of the FPA.

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U.S. Fish and Wildlife Service. 2001. Final Restoration Plan for the Anadromous Fish Restoration Program. Department of the Interior, Sacramento, California. January 9, 2001.

U.S. Fish and Wildlife Service and Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. Department of the Interior. Environment Canada. May 1986.

U.S. Fish and Wildlife Service. Undated. The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington, D.C. Undated.

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