American River Basin Study

Assessing Climate Change Challenges

CITY OF FOLSOM
DISTINCTIVE BY NATURE

PCWA
water • energy • stewardship

City of SACRAMENTO

RWA
Regional Water Authority

CITY OF ROSEVILLE
CALIFORNIA

EL DORADO COUNTY WATER AGENCY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

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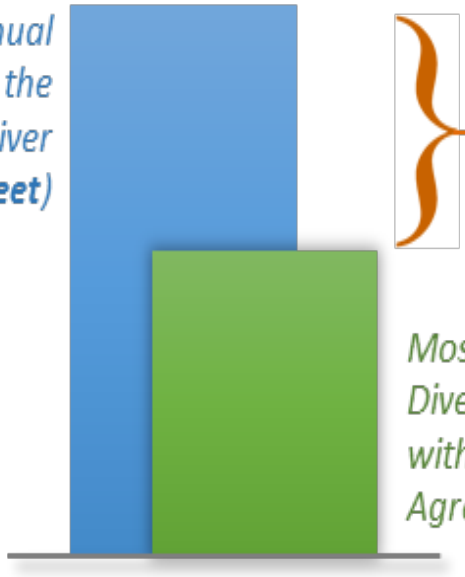
ARBS Objectives

1. Further refine water supply and demand assessment for the American River Basin
2. Address regional **supply-demand imbalance** and infrastructure deficiencies under the existing and **future climate change conditions**.
3. Improve **coordination of local and Federal water management**.
4. Align water management tools, strategies, and planning efforts of Reclamation and water agencies in the basin.
5. Identify water management strategies and actions that are functional under multiple future potential climate and socioeconomic conditions to 2100 AD.

Regional Commitment for Sustainability



*Full Annual Diversion from the American River (**506,200 acre-feet**)*

*Most Restrictive Conditions for Local Project Diversions from the American River Consistent with Commitments in the Water Forum Agreement (**277,900 acre-feet**)*

Up to **228,300 acre-feet**

of Reduced Diversions from the American River

Equivalent to:

- ***24%** of Folsom Reservoir Capacity*
- ***27%** of total M&I demand*
- ***45%** of the Full Diversion*
- ***57%** or more of annual unimpaired inflow to Folsom Reservoir when applicable (less than 400,000 AF)*

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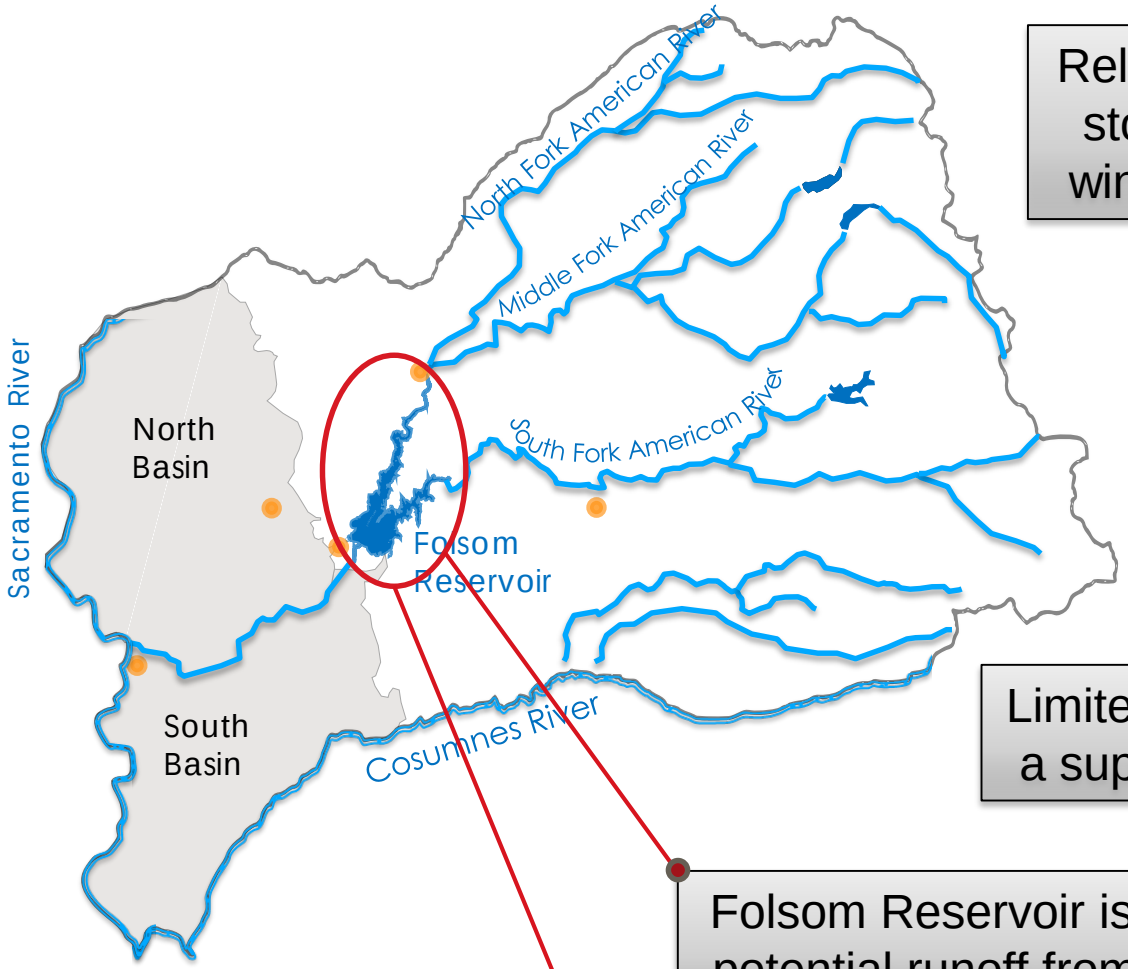
Key Regional Water Vulnerabilities



Reliance on snowpack to refill storage reservoirs following winter flood control releases.

Poor forest management has significant effects on snowpack retention and can result in major wildfires and water quality impacts.

Limited groundwater in the foothills as a supplemental water supply source.

Folsom Reservoir is small given the potential runoff from the watershed.

Reclamation operates Folsom Reservoir as a CVP facility for systemwide needs, not just regional.

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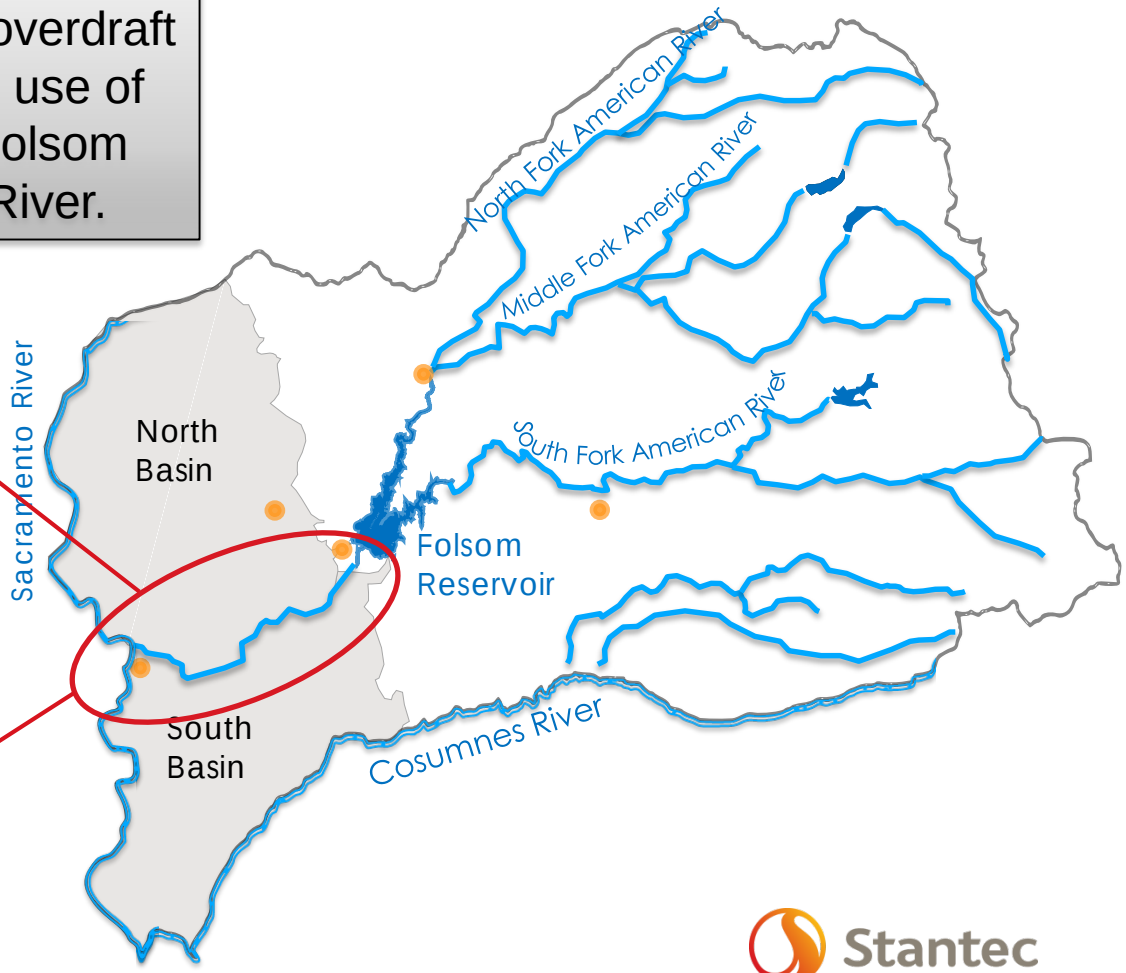
Key Regional Water Vulnerabilities

Basin-wide water demands heavily depend on supplies from Folsom Reservoir and the American River.

Groundwater management and overdraft correction relies on conjunctive use of available surface water from Folsom Reservoir and the American River.

Increasing flood risks in the Sacramento urban areas.

Ecosystem protection in the Lower American River relies on Folsom Reservoir for flow and temperature management.



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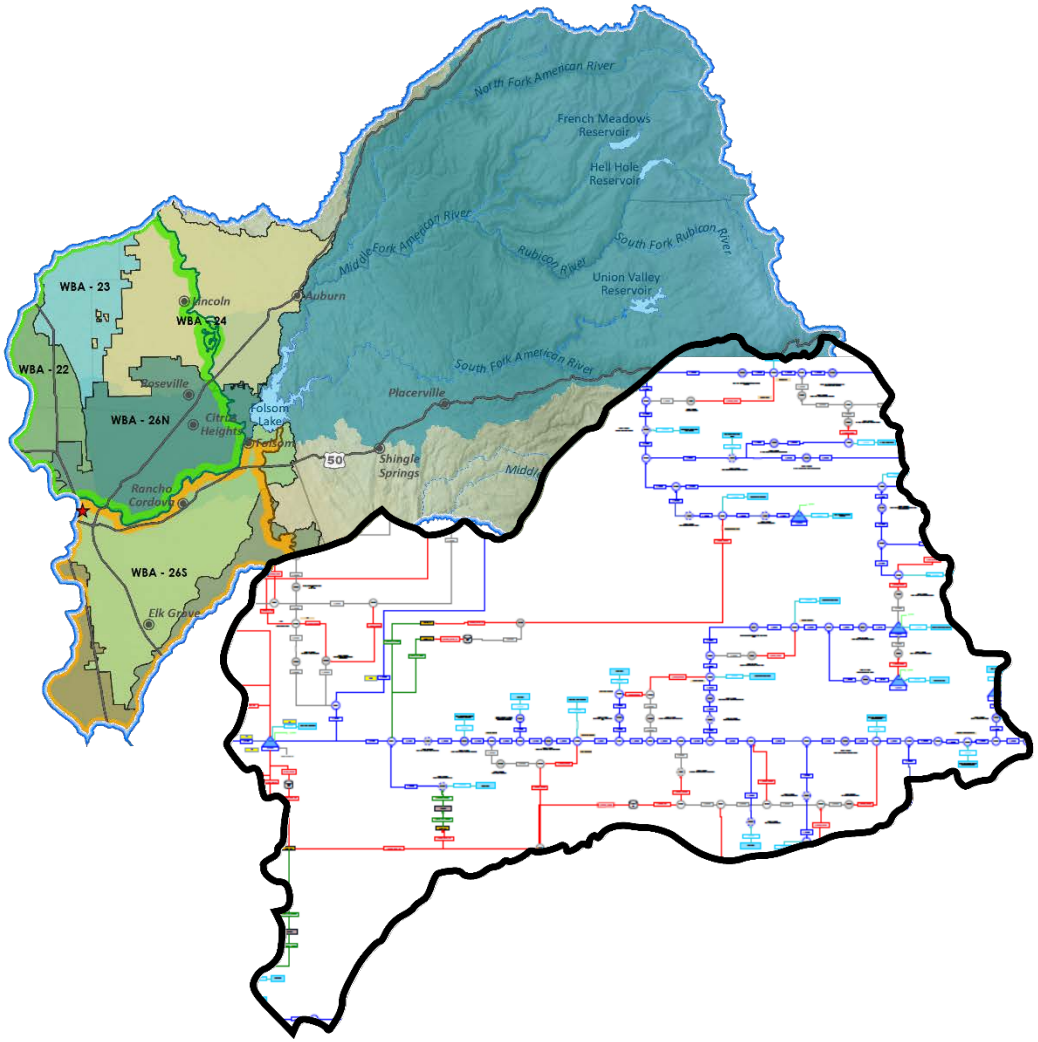
The ARBS is the First Major Application of CalSim 3.0.



CalSim 3.0 can directly incorporate **land use** and **climate change** projections in calculating future demands.

CalSim 3.0 incorporates a **Groundwater** Module, which allows for the simulation of conjunctive use.

CalSim 3.0 allows for the integrated modeling of **systemwide operations**, including the American River Basin.

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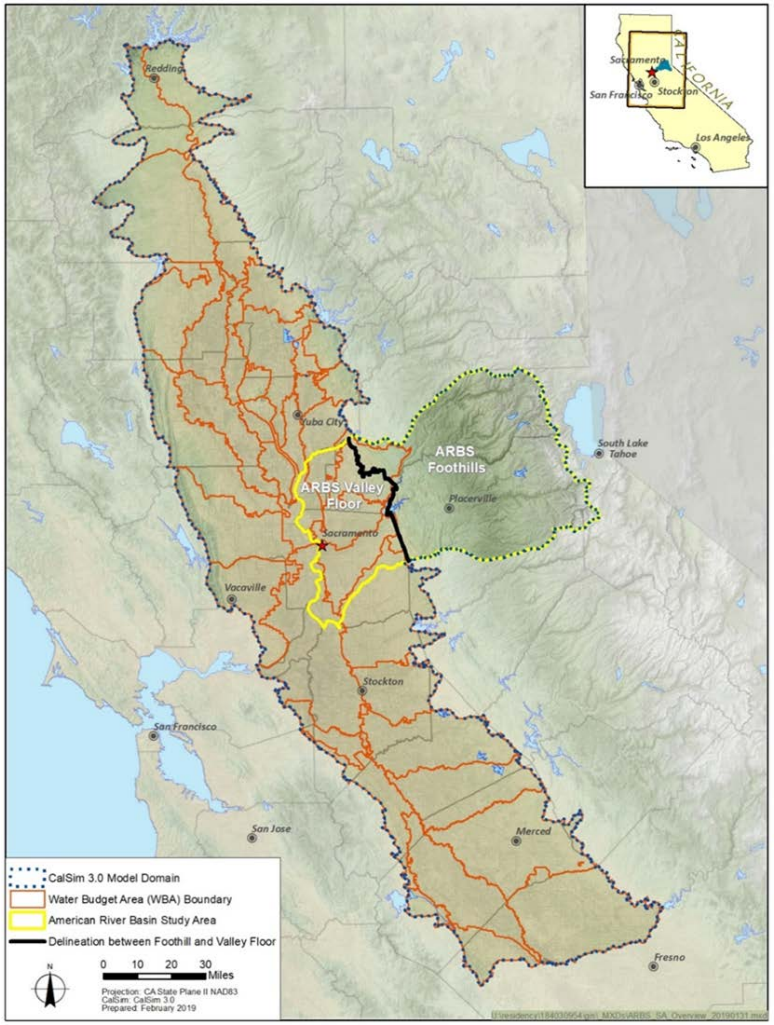
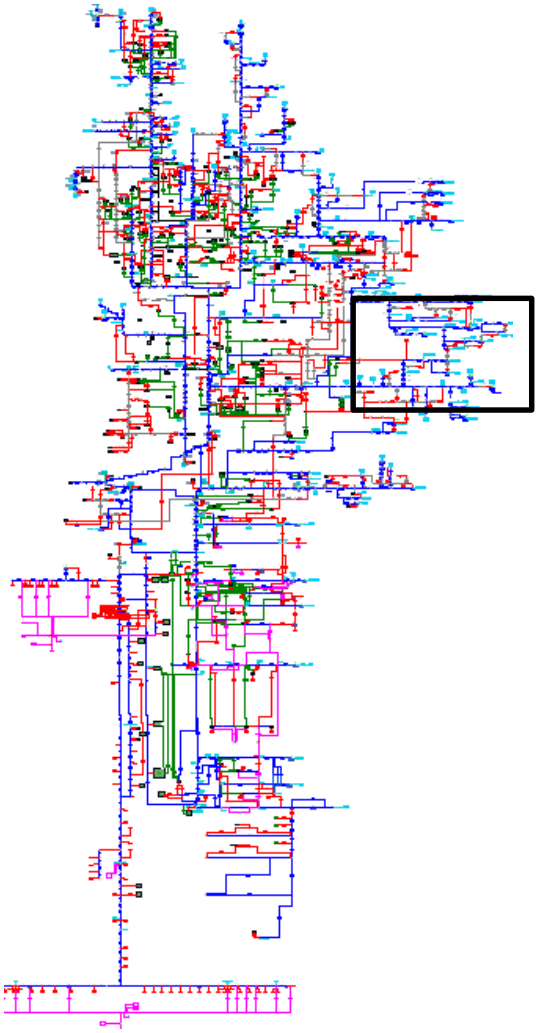
CalSim III Updates

Complete representation of operations in the American River Basin

CalSim III Domain



CalSim III Model Schematic



Future Climate Scenarios

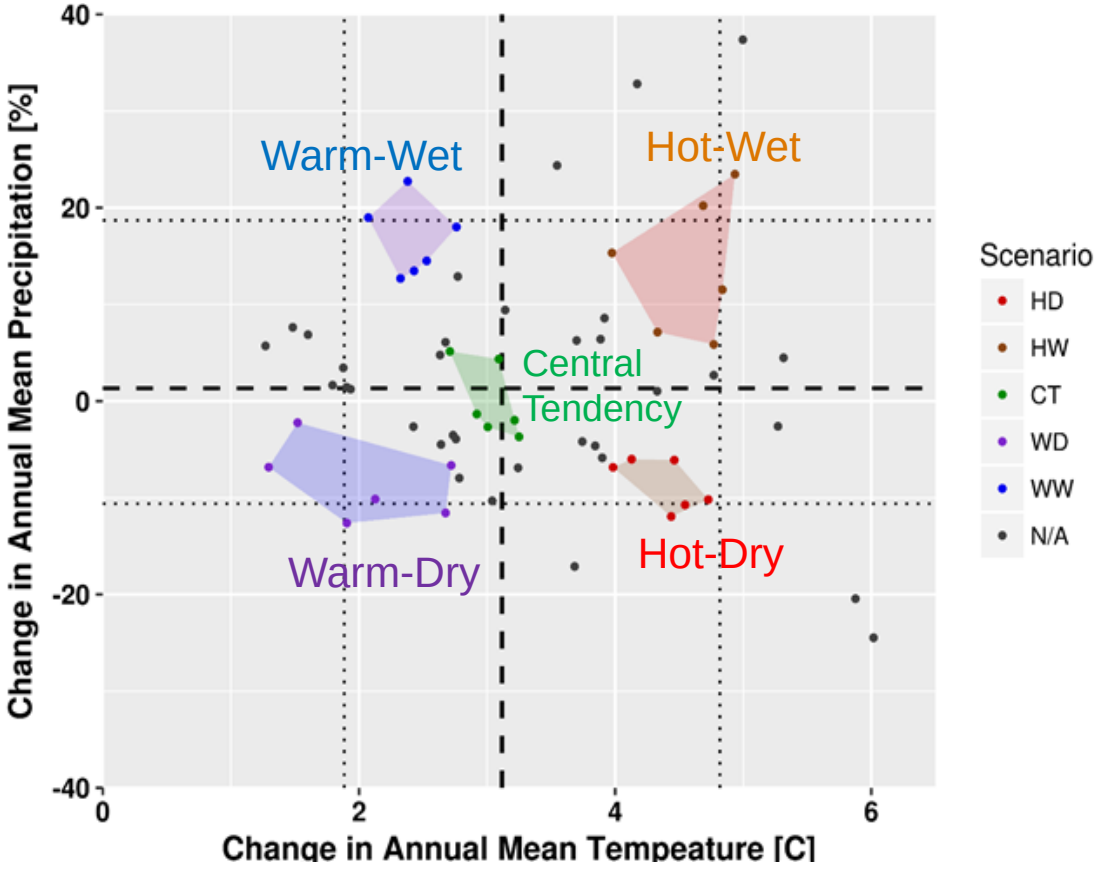
California future climate projections predict:

- Increase in temperature
- Uncertainty in amount of precipitations

Future climates reflect:

- 2 scenarios for global growth of greenhouse gases
- 32 global climate models
- Multiple initial climate conditions

To describe the full range of climate futures 5 scenarios are developed.



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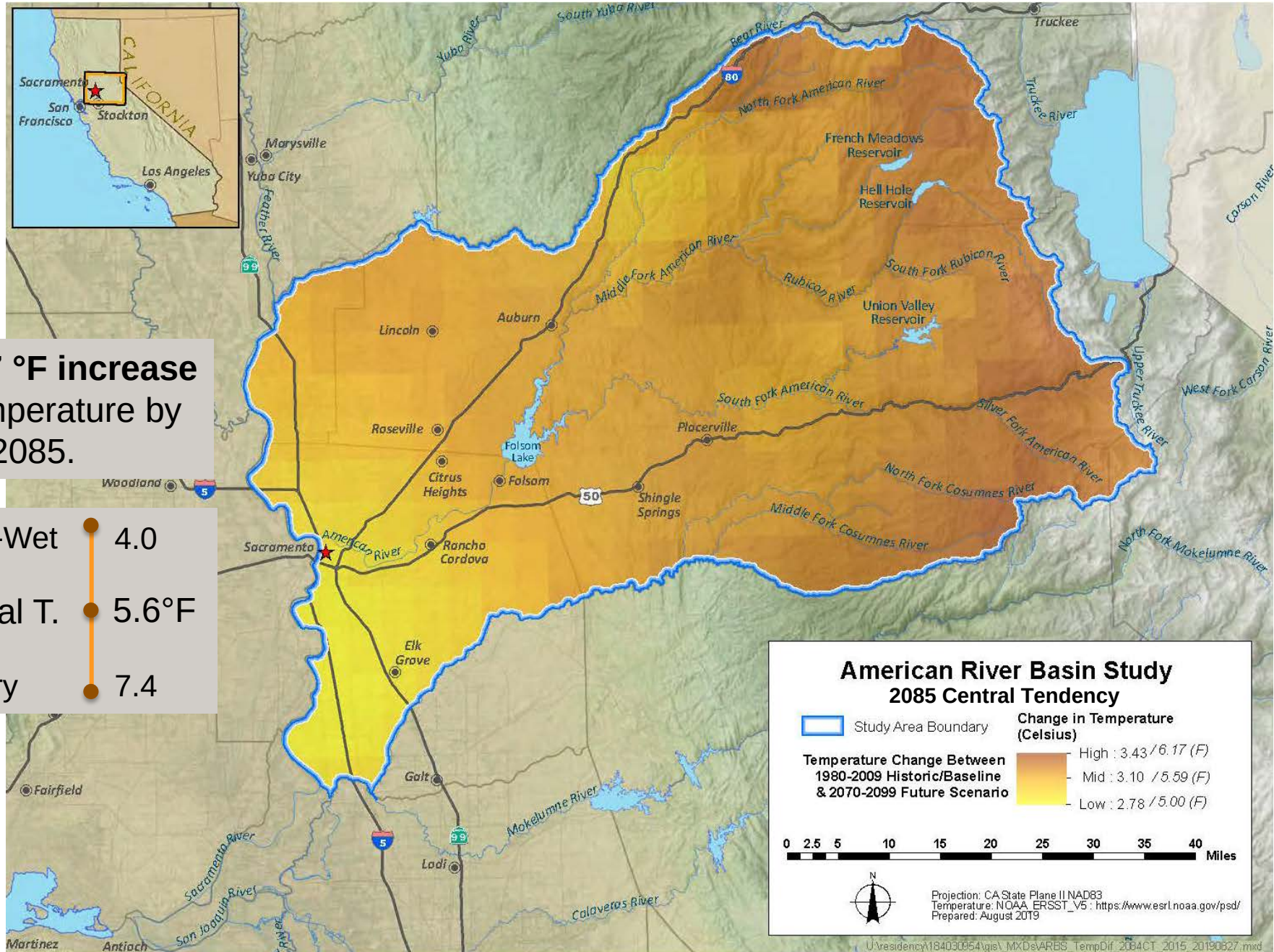
Future Changes in Temperature



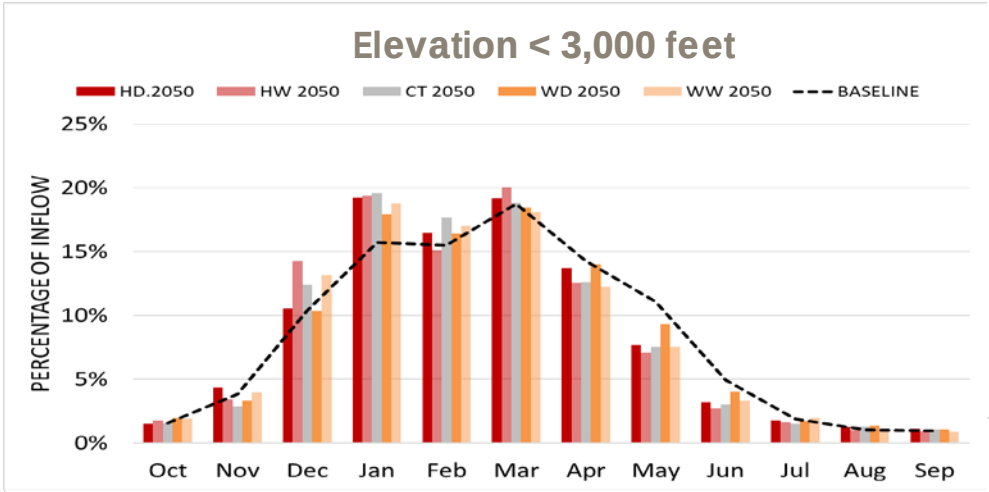
4 to 7 °F increase in temperature by year 2085.

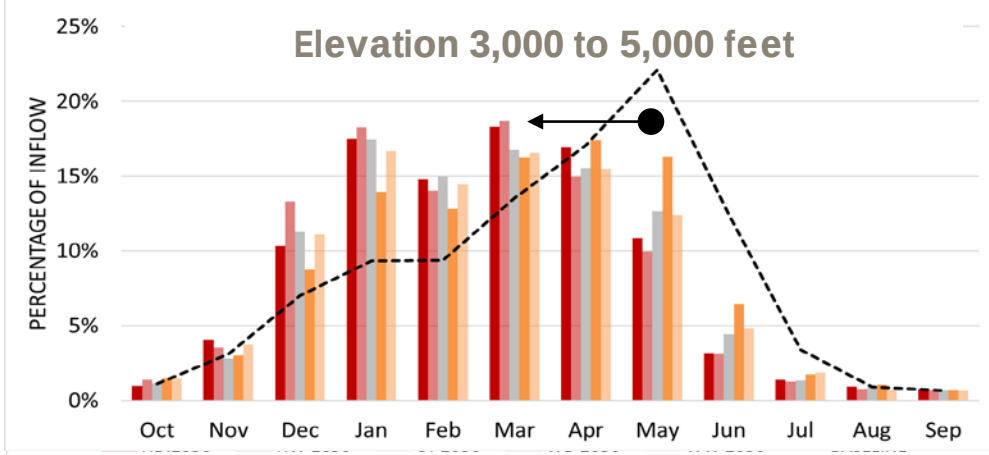
Warm-Wet	4.0
Central T.	5.6°F
Hot-Dry	7.4

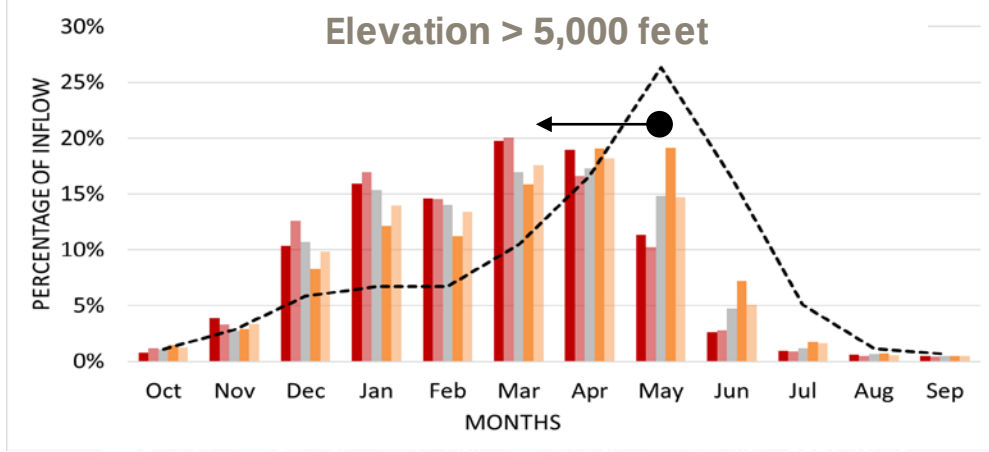
Changes in Timing of Snowmelt

Historically, runoff occurs in **late spring** at elevations above 3,000 feet, peaking around May.

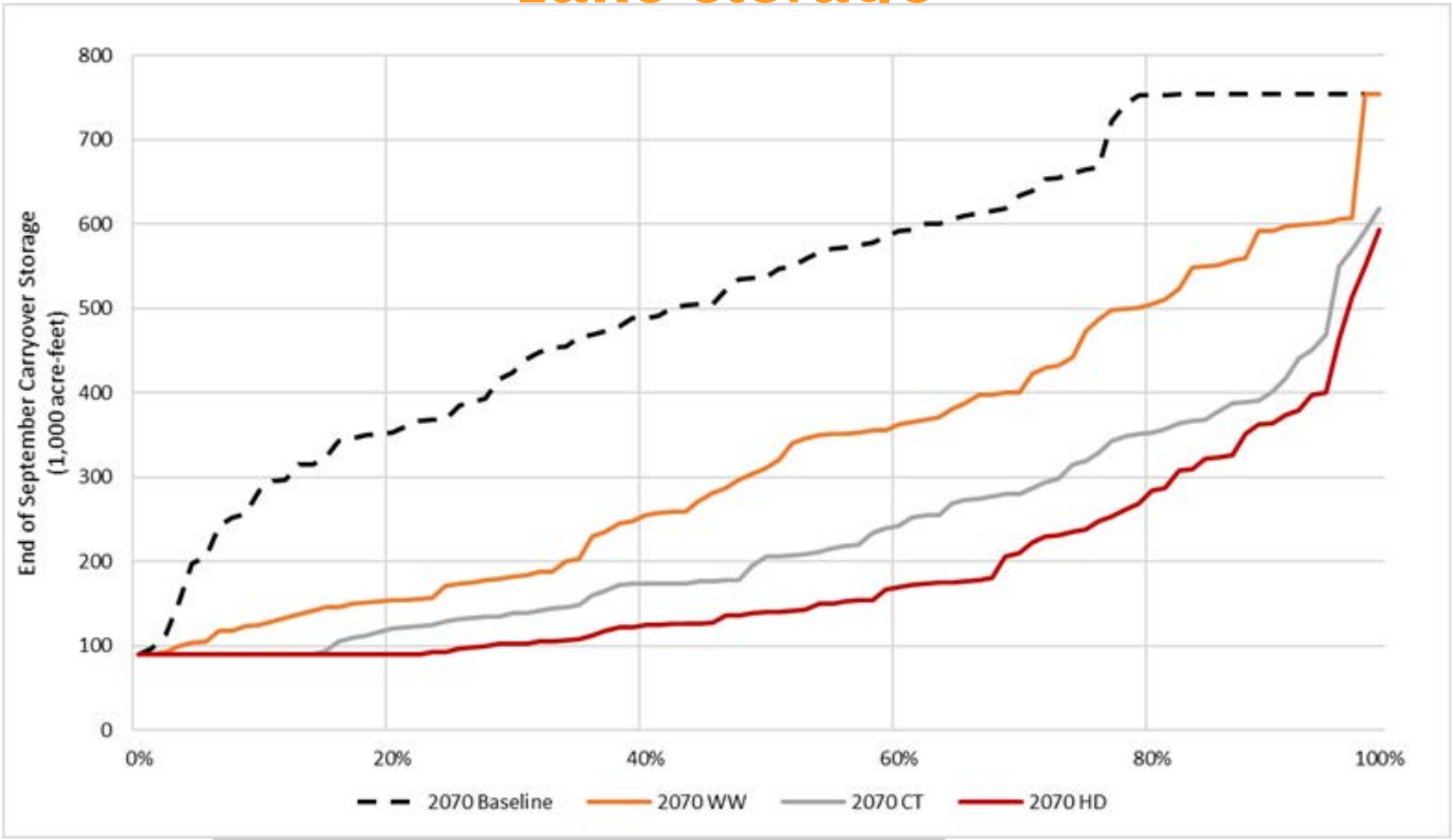
Under future conditions, runoff is expected earlier, with **peak snowmelt 30-60 days earlier**.







Changes in Runoff Timing Reduces Folsom Lake Storage



Lower storage affects ability to meet:
Regional water demands
Lower American River ecosystem needs

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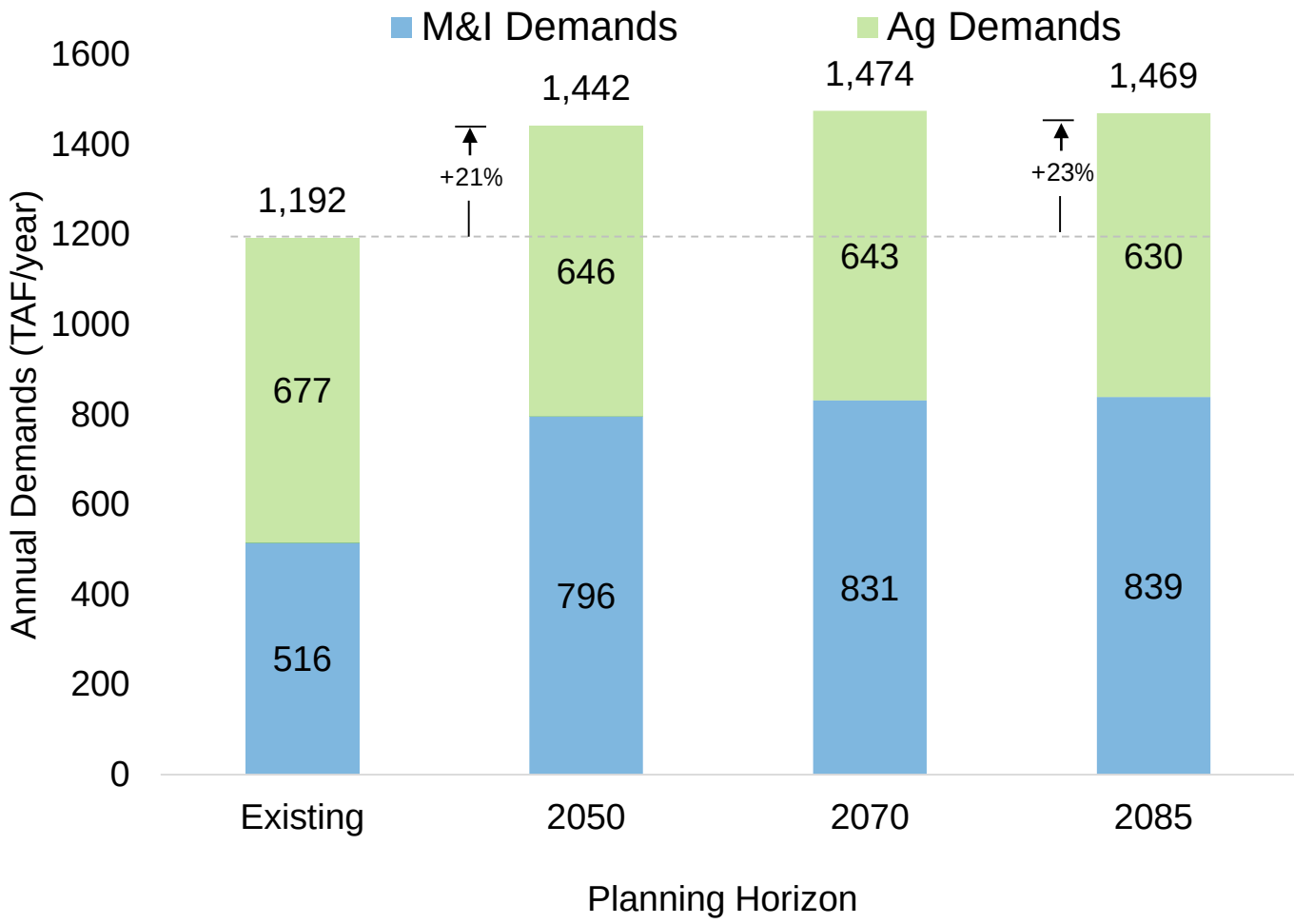
Overall Change in Water Demand

Key assumptions:

- No change in current crop types.
- No change in urban outdoor practices.
- Most urban buildout around 2050.
- Current levels of water use efficiency.



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Current Study Progress

- Climate Change Hydrology (2050, 2070, 2085)
- Detailed representation of upstream operations in CalSim 3.0 Model (American, Yuba, Bear, Cosumnes, Stanislaus)
- M&I & Agricultural Demands Projections (2050, 2070, 2085)
- Regional Vulnerabilities, Management Actions, and Adaptation Portfolios
- Evaluating Adaptation Portfolios, and developing documentation

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Questions?

Additional Resources

Data Resources

- Now:
  - CalSim II (2070 CC) & VIC hydrology (2016 CWC)
  - Climate change downscaled temperature and precipitation (DWR and USBR)
- April 2020: DWR potential release of CalSim II and CalSim 3.0 for the State Water Delivery Capability Report
- March/April 2020: ARBS public workshop on portfolio evaluations
- June 2020: Draft ARBS Report
- December 2020: release of Final ARBS Report and ARBS CalSim 3.0 and dataset

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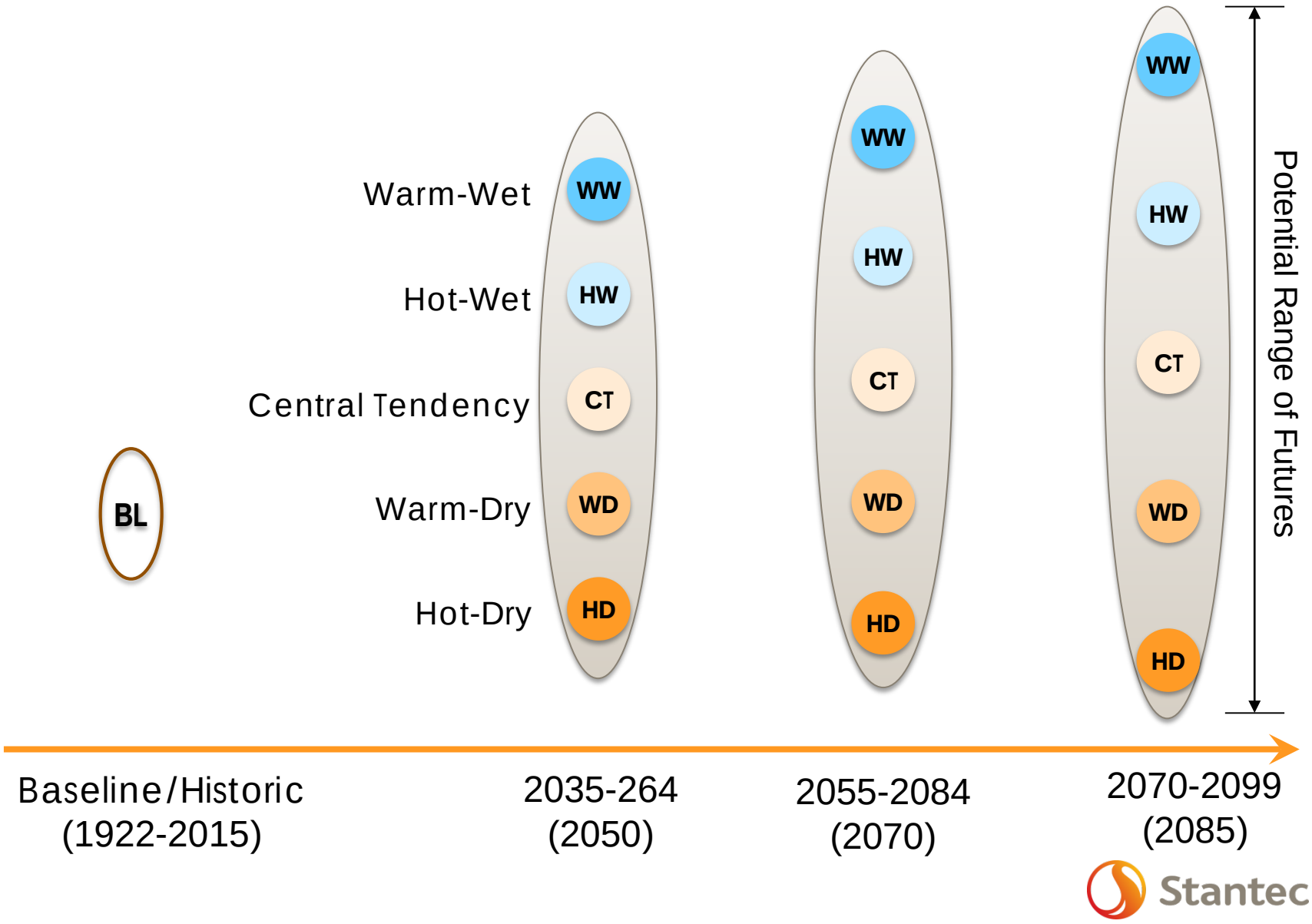
Future Climate Scenarios



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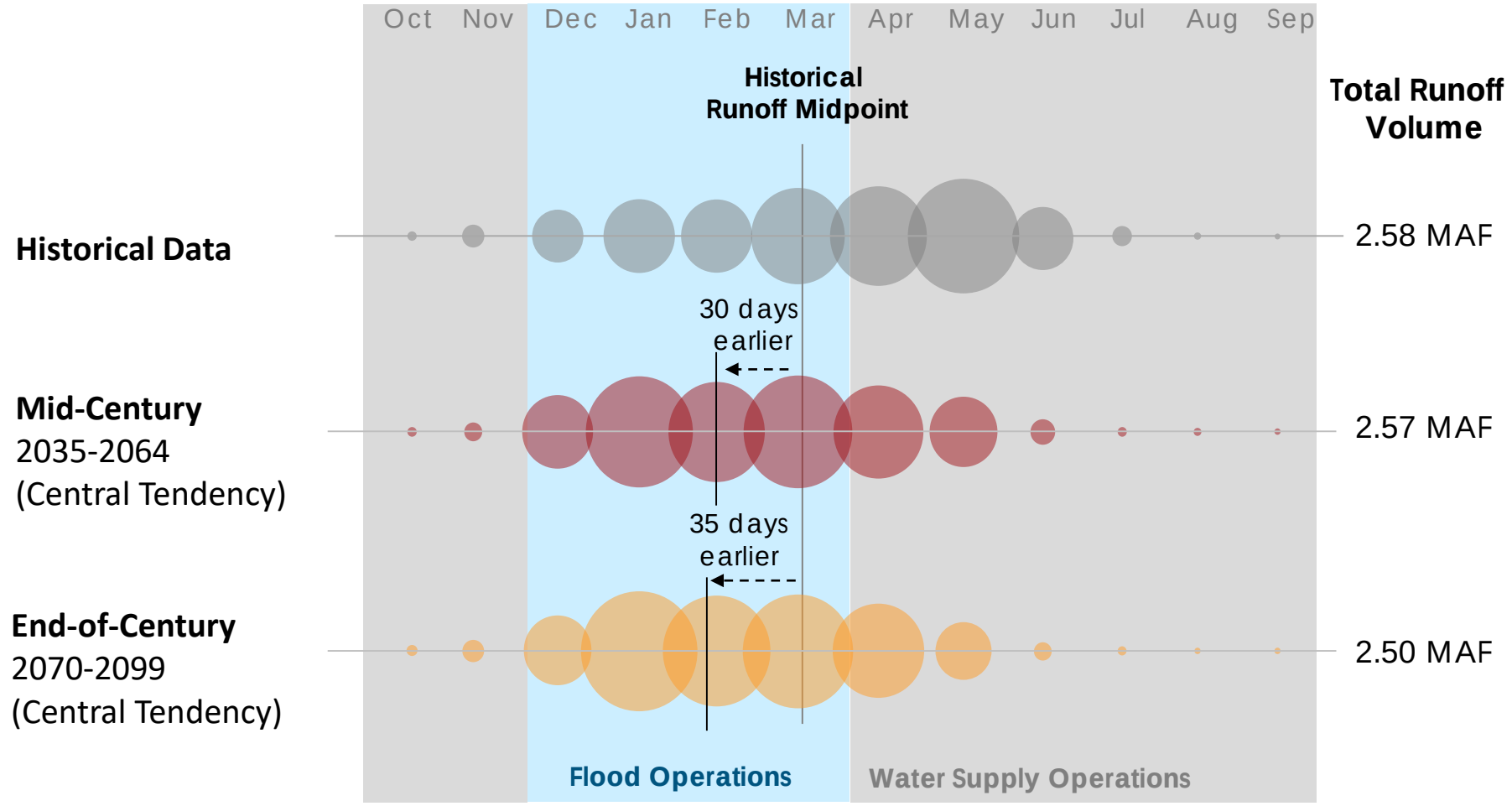
Potential Effects on Water Supply Availability



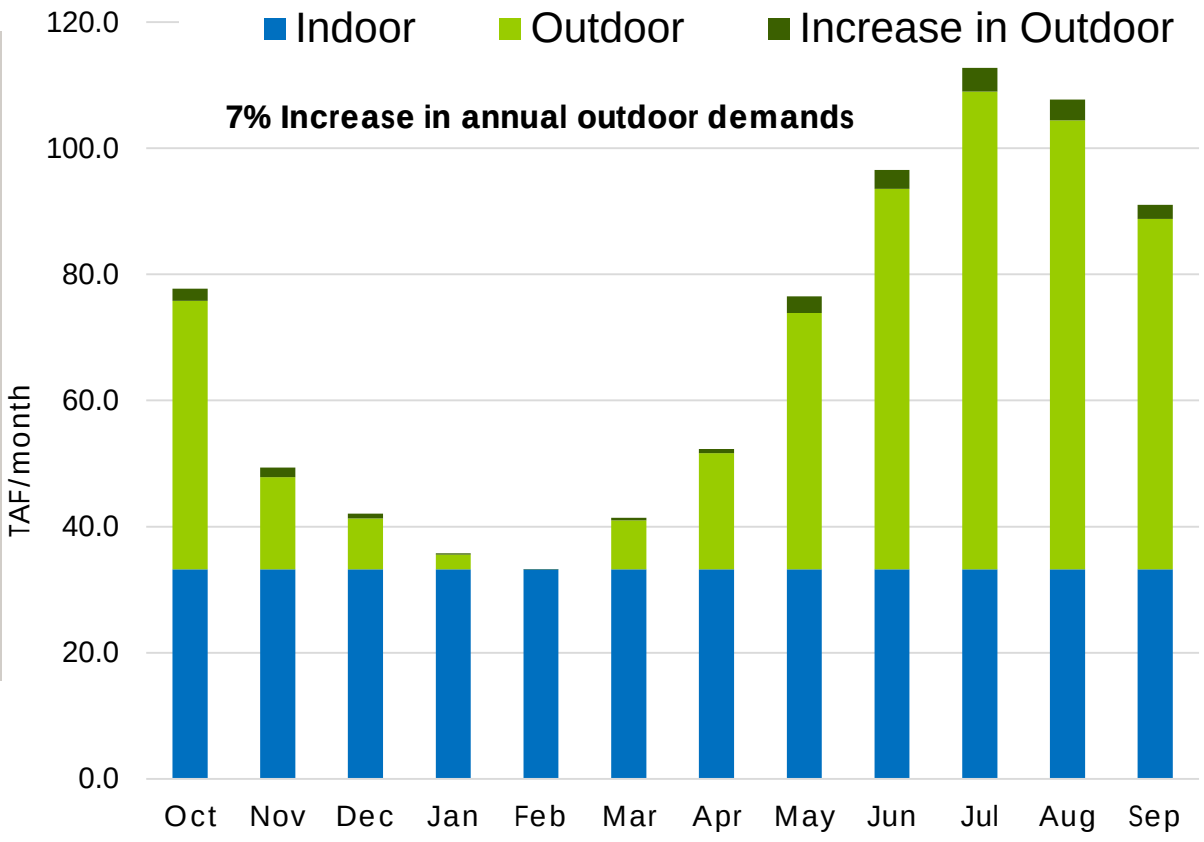
Earlier runoff would **increase the chance of spills** from Folsom reservoir during flood season.

Earlier runoff would **reduce water supply** available during summer and fall for M&I, ecosystem, hydropower, irrigation, recreation, etc.

Potential Effects on Urban Outdoor Demand

Higher evapotranspiration rate results in higher outdoor irrigation demand.

Under similar urban landscaping, irrigation water demands could increase up to 7%, about 3% in total demands (2050 Central-Tendency scenario)



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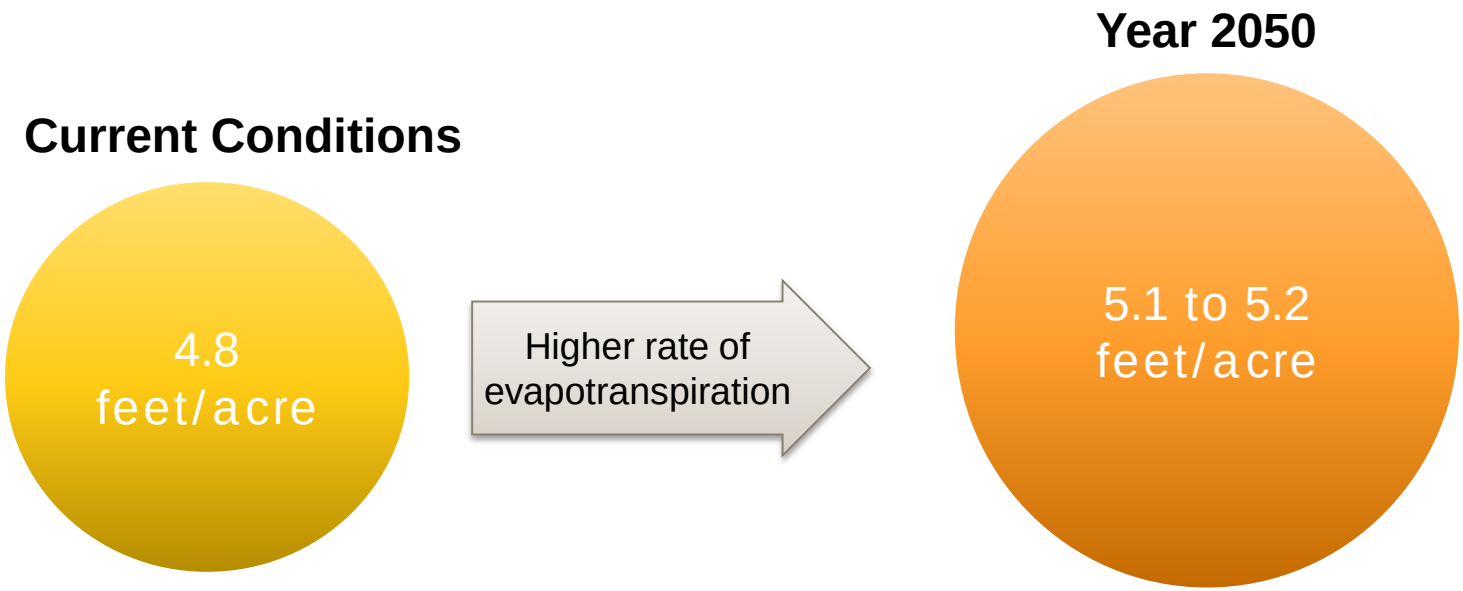
Potential Effects on Agricultural Water Demand



Agricultural demands including conveyance losses and on farm irrigation efficiency

Higher evapotranspiration rate results in higher agricultural water demands.

Under similar cropping patterns, irrigation water demands would increase 7.7% on average.

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