

Staff Report

for the Maintenance and Resources Committee Meeting of July 23, 2019

TO: Maintenance and Resources Committee

FROM: Jacqueline Longshore

DATE: July 16, 2019

SUBJECT: Integrated Vegetation Management Program – Pilot Study Phase 2

MAINTENANCE DEPT

RECOMMENDATION:

Informational item to update the committee on the status of the Integrated Vegetation Management (IVM) Program Pilot Study Phase 2.

BACKGROUND:

On-the-ground applications and data collection for the Phase 2 study is complete. Report of the Phase 2 data analysis and findings is expected in late summer. The following provides a summary of Phase 2 activities and a preliminary description of Phase 3.

Phase 2

Nine products and four mechanical approaches were tested at four different sites. In addition, native plant seeds and plugs were planted at two sites to analyze the efficacy of the approach for canal bank stabilization and competitive elimination of undesirable weed species.

The sites at which alternative approaches were tested included:

1. Auburn Ravine II (ARII) Canal (native plantings and alternative herbicides)
2. Miller Canal (native plantings and alternative herbicides)
3. Newtown Canal (native plantings and alternative herbicides)
4. Gold Hill Canal (native plantings)
5. Lake Wildwood Treatment Plant (mechanical treatments)

The three sites where herbicide alternatives were tested are selected to represent the varying elevations—from low (ARII) to mid (Miller) to high (Newtown)—found within NID’s canal system. Weed species vary at these three sites, which range in

elevation from 700 to 2,000 feet. These sites included 10-foot by 10-foot plots, laid out in a random block design with four replications of each treatment to allow for statistical analysis.

Alternative Herbicides

The nine alternative herbicides tested included:

1. Axxe (ammonium nonanoate)
2. Avenger Concentrate (d-limonene)
3. Finalsan (ammonium soap)
4. Suppress EC (cupressic acid)
5. Opportune (microbial compound, pre-emergent application)
6. Axxe + Opportune (post-emergent)
7. Scythe (pelargonic acid)
8. Weed Slayer (clove oil, molasses)
9. Phydura (citric acid, clove oil, malic acid)

Beginning in December 2018, prior to the onset of this year's heavy rains, Don Bartel, Sierra Consulting & IPM LLC, applied Opportune as a pre-emergent at the ARII and Miller canal sites. He began post-emergent herbicide applications at the ARII and Miller sites in January 2019. The timing of post-emergent applications was informed by Phase 1, which started too late in the spring season to be effective. Phase 2 applications began when annual grasses and broadleaf species were at the 1- to 4-leaf growth stage.

Mr. Bartel completed three herbicide applications at the ARII and Miller sites and one application at the Newtown site. The application at Newtown occurred later due to colder temperatures and delayed weed germination (the site is the highest in elevation and north-facing).

Mechanical Approaches

Four mechanical approaches were tested at the Lake Wildwood Treatment Plant. These included: 1) Flaming (using a Red Dragon propane weed burner), 2) Saturated steamer (a product made by Weedtechnics, an Australian company), 3) Mowing (hand-held weed trimmer/weed eater), and 4) Abrasive weeder (crushed walnut shell blaster that desiccates leaves). The mechanical test plots were larger (10-feet by 20-feet) to accommodate testing with equipment. The flaming and steamer tests were conducted on April 3, 2019, with a second flaming test on April 23, 2019.

Native Seeds and Plugs

In December of 2018, the following species were planted:

1. Black-rooted sedge (*Carex praegracilis*) 1" plugs
2. creeping wild rye (*Elymus triticoides*) 1" plugs

3. NID Grass Seed Mix: spike bentgrass (*Agrostis exarata*), blue wildrye (*Elymus glaucus*), california brome (*Bromus carinatus*), three weeks fescue (*Festuca microstachys*), and creeping wildrye (*Elymus triticoides*)
4. NID Diverse Seed Mix: spike bentgrass (*Agrostis exarata*), blue wildrye (*Elymus glaucus*), california brome (*Bromus carinatus*), three weeks fescue (*Festuca microstachys*), creeping wild rye (*Elymus triticoides*), one sided bluegrass (*Poa secunda* ssp. *secunda*), purple needlegrass (*Stipa pulchra*), purple clarkia (*Clarkia purpurea*), mini lupine (*Lupinus bicolor*), tomcat clover (*Trifolium wildenovii*), yarrow (*Achillea millefolium*), and dotseed plantain (*Plantago erecta*).

The seeds and plugs were obtained from Hedgerow Farms and were chosen based on their adaptability to the climate of the canals where they were planted.

The plantings were labor-intensive and time-consuming but showed some sign of success before the onset of intense summer heat and may require supplemental irrigation during the summer months. However, since the plants are adapted to our climate, they may prove to be resilient. Monitoring through the NID IVM Program will detect if there is successful resiliency. The creeping rye flowering stalks have grown taller than desired, and monitoring will continue to evaluate if the species growth further develops into undesirable thatch. Black-rooted sedge is showing growth that is early, fast, and reliable at all planting sites.

Seeding has shown to be less consistent in establishment and failed at some plots at the Newtown site. Freezing and the soil uplift from freezing ground may have damaged emerging seedlings. Future seeding may be better suited to occur beyond December in the frost-prone zones above 2,000 feet. Future seed plantings may also be more successful if the seed mix incorporates broad-leafed flowers and other herbs to provide a better competitive smothering effect on undesirable species.

Monitoring and Evaluation

Mr. Bartel and Daniel Nicholson, independent consultant, monitored and evaluated the sites on which herbicides and mechanical approaches were tested. Mr. Nicholson monitored and evaluated the native plant sites, with assistance from Brian Morris, Assistant Maintenance Superintendent. Mr. Bartel's monitoring and evaluation focused on percent control of vegetation, estimating overall plant response to the applied products. Mr. Nicholson completed vegetation surveys of leaf cover (percent basal leaf area) and plant species. The goal of this dual evaluation was to determine the overall efficacy of each product as well as highlighting species that may require alternative or additional treatments.

Mr. Bartel and Mr. Nicholson completed data collection during four visits to the Lake Wildwood and Newtown plots and nine visits on the ARII and Miller plots.

Next Steps for Phase 2

Mr. Bartel and Mr. Nicholson will provide the data they collected to Dave Weixelman. Mr. Weixelman completed the data analysis for Phase 1 and is a recently retired range ecologist who worked for the US Forest Service and has significant experience with vegetation, restoration, and statistical analysis. By early August, Mr. Weixelman will complete the Phase 2 data analysis, which will include the success of plant reduction by plant groups (annual grasses, annual herbs, and perennial herbs), the top species for effective control, and other potential species trends that will help to inform the NID IVM Program efforts moving forward.

Phase 3

Based on the initial data and information collected in Phase 2, NID intends to incorporate the top-performing alternatives into its IVM Program plan for 2020 by utilizing and monitoring those specific alternatives along a greater area of the berm. In addition, NID will utilize the information learned through Phases 1 and 2 to better inform the continued evaluation and development of the NID IVM Program.