

RECLAMATION

Managing Water in the West

Final Report ST-2014-6688-01

Nuisance Aquatic Plant Control in Water Delivery Systems



U.S. Department of the Interior
Bureau of Reclamation
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Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Executive Summary

The growth of nuisance aquatic vegetation (NAP) in canals severely impacts water delivery systems and distribution of water for irrigation. Chemical treatments and/or mechanical removal to control NAP are becoming increasingly costly and difficult to implement. The goal of this scoping project was to assemble a team of resource specialist and managers to identify comprehensive control solutions. The team found that the primary need for more efficient and effective control of NAP was to identify optimum schedules and prescriptions for treatments. Out of these findings, a 3-year study was proposed that would focus on understanding the life history of NAP and develop methods for mapping aquatic vegetation biomass. This information would be applied in scheduling treatment for optimal time and location, thereby reducing the amount of herbicide used and dead plant material that must be mechanically/physically removed.

Main Report

Introduction

The western United States is highly dependent on a network of reservoirs and delivery canals for agricultural water distribution. Wide-spread growth of NAP in these water delivery systems greatly reduces or completely obstructs the flow of irrigation water. In addition, NAP can impair the performance of intake structures and pumps or otherwise cause serious damage to structures and equipment. In order to maintain adequate flows and avoid damage, canal operators and irrigation districts must employ physical labor to remove plant material from the systems and/or purchase and apply aquatic herbicides. These NAP control efforts are becoming increasingly costly and difficult to implement. Physical methods have short-term effectiveness and are typically used to keep chemical treatments to a minimum. Chemical methods themselves are not always effective in eliminating NAP. NAP remains within and spreads throughout the systems, requiring ever increasing control effort.

Study Objectives

This scoping study sought to acquire adequate information to prepare a research study to investigate conditions that influence the presence of NAP. Although not fully understood, local physical characteristics of canals and water quality seem to be factors that influence the growth and distribution of NAP. An understanding of these factors may lead to identifying modifiable conditions that, if manipulated, could discourage the growth of NAP. Modifying the growth-environment could translate to reduced mechanical and chemical control costs. A team of resource specialists and managers who have practical experience with NAP issues and are representative of Reclamation's broad geographic extent was assembled to outline a research study.

Study Results

A team of resource specialists and managers representing irrigation entities within the Mid-Pacific, Pacific Northwest, Lower Colorado, Upper Colorado, and Great Plains Regions met with the S&T project lead and Reclamation collaborator. The team discussed the current state of NAP control and a research strategy to address issues surrounding NAP control.

The primary need expressed by the team was having adequate information to plan and schedule herbicidal treatments to make them more effective and efficient. It was agreed that collecting field data to monitor growth and distribution could provide the information to help address that need. The scoping project proposal recommended identifying water quality and physical characteristics of canals that may influence the growth of NAP in water delivery systems. It was proposed that managing the underlying influences that promote and/or discourage the growth of NAP could be used as alternative or complimentary control measures to herbicidal treatments. Several studies similar or related to the original study objectives were reviewed. These previously published investigations show that though relationships between environmental variables and proliferation of NAP can be made, translating these findings into cost-effective and practical methods for controlling NAP is problematic. The team decided that tracking and mapping NAP growth in water delivery systems would provide more useable information that could be directly applied to improving NAP control.

Another aspect of the study that was discussed was how to collect the data. The original proposal recommended ArcGIS Online (AGOL). Not all prospective partners had GIS capabilities so it was decided that simple spreadsheets to record data and KMLs to display data (on Google Earth) was a practical working solution.

Discussion/Conclusion

This scoping project had focused on identifying alternative and/or complementary solutions to mechanical and/or herbicidal treatments for controlling NAP. Based on the results of the project, the team decided that future work should instead focus on making current treatment methods more efficient and effective. A practical first-step in controlling treatment costs would be to develop tools that can help managers make treatments more effective and efficient. Tools to monitor growth and distribution of NAP within a system will provide the required information for more targeted and timely applications. Anticipated benefits are to reduce quantities of herbicides applied and the amount of vegetative biomass needed to be removed from the system.

