RITA-14-8781 Final Report

Grantee Name: Clearwater Resource Council

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Funding:

Total Project Cost	$13,237.30
Grant Award	$ 5,000.00
Grant	RITA-14-8781

2. Introduction

A. A brief history of the problem

Aquatic invasive plants like Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP) lead to a degradation of water quality through increased nutrient loading, depletion of dissolved oxygen and increases in the amount of decaying organic matter. They also lead to severely reduced species diversity by outcompeting desirable native plants and by decreasing the amount of desirable habitat or food for aquatic invertebrates, amphibians, fish and birds. Researchers have found that fragments of invasive plants as small as an inch can colonize new areas.

Zebra and quagga mussels are introduced invasive species that rapidly colonize new water bodies, creating large monocultures and drastically changing the aquatic systems they invade. They are filter feeders and can remove substantial amounts of phytoplankton, which increases water clarity and light penetration, resulting in flushes of aquatic vegetation. Mussel production can also result in massive amounts of organic material that consumes oxygen as it decomposes. Zebra and quagga mussels may rapidly colonize hard surfaces such as pipes, screens and pump parts and other structures, causing major economic damage by clogging facilities such as water treatment facilities, dams, water intake systems and irrigation systems.

Options available for management of AIS after they have fully established in a water body are severely limited and expensive. Prevention and early detection are the most effective actions we can take to preserve and protect our healthy aquatic systems.

The Clearwater Watershed has no known infestations of these AIS, yet high levels of transient human use, proximity to existing invasive plant infestations in surrounding watersheds, and a large project area make the threat of invasion very real.

We recruited local volunteers from homeowners, fishermen, boaters and the businesses that rely on and value healthy aquatic systems to monitor our lakes. By developing, training and supporting a committed group of volunteer watershed stewards, we encouraged local citizens to take ownership of their natural resources and broadened our environmentally engaged community.

In 2011, the Clearwater Resource Council (CRC) developed protocols to sample lakes by means of plankton net tows and to properly prepare and preserve the samples for microscopic analysis. Our protocols are an expansion of those provided by MTFWP. The protocols were reviewed by Eileen Ryce, director of the AIS program for MTFWP. In 2013, the protocols were augmented to include sample preparation for eDNA, in consultation with Dr. Gordon Luikart of the Flathead Lake Biological Station and the University of Montana Genetics Lab. The protocols were field tested by two teams of volunteers.

B. Project Location

Our project area lies in the headwaters of the Columbia River Basin, in the Clearwater River watershed of West-Central Montana. The watershed includes five major (> 250 acre) lakes, several between 50 and 250 acres, and numerous smaller lakes, ponds and wetlands (Figure 1). The lakes are important natural resources for the local community, the region, and the State of Montana. Fisheries, wildlife, recreation and aesthetic values are central to tourism, local lifestyles, and the local and regional economy. The lakes support populations of migratory bull trout (an Endangered Species Act *threatened species*), westslope cutthroat trout, non-native kokanee salmon and brown trout in addition to several non-native warm and cool water species such as largemouth bass and northern pike. Loons and other wildlife such as grizzly bear and bald eagles are also associated with the lakes and connecting riparian and wetlands areas. Seeley Lake serves as the primary water source for the community of Seeley Lake.

Our project was implemented on the six (6) largest and most heavily used lakes, which face the greatest threat of invasion by AIS. These are Lake Alva, Lake Inez, Seeley Lake, Placid Lake, Salmon Lake and Big Sky Lake.

C. Purpose

The objective of our project was to monitor the six largest and most heavily used lakes in the Clearwater Watershed for zebra (Dreissena polymorpha) and quagga (D. rostiformis) mussels and Eurasian watermilfoil (Myriophyllum spicatum). The CRC's AIS Prevention Coordinator recruited, trained and supported volunteers for each lake. Volunteers collected monthly plankton net tow samples throughout the 2014 season. The samples were tested by environmental DNA (eDNA) techniques for zebra and quagga mussels and EWM. Simultaneous samples for microscopic detection of Dreissenid veligers were also collected, preserved, and tested.

Our project also sought to determine whether trained volunteers can properly collect and preserve plankton tow samples for eDNA analysis, increasing the capacity and reducing the cost to monitor AIS statewide.

3. Results and Discussion

A. Project Goals and Objectives

In the 2014 field season, our goal was to monitor each of the six lakes on a monthly basis from mid-May to mid-October, collecting a total of five (5) samples from each lake.

CRC's AIS Prevention Coordinator finalized the protocols, assembled one kit for each lake, and worked with homeowners' associations and public media to recruit volunteers. During the initial round of sampling the Coordinator accompanied each volunteer to provide hands-on training in the volunteers' boats on their lakes.

Following each round of sampling by the volunteers and Coordinator, the Coordinator picked up, logged and transported samples to the lab and recorded subsequent results. Any positive results would have been reported immediately to MTFWP.

Following the final round of samples, the Coordinator held a debriefing session with the volunteers to learn how to improve the process and revise the protocols accordingly and prepared the final report.

i. Completed Tasks
- Finalized the protocol
- Assembled 7 kits (2 teams on Lake Inez)
- Recruited volunteer teams for Placid, Big Sky, Salmon, Inez (2), Alva (shared with CRC)
- Collected one field blank per lake at the beginning of the season
- Provided hands on training for each volunteer team
- Collected 3 – 5 samples on each of the six target lakes
- Simultaneously examined collection sites for presence of EWM (negative)
- 27 samples were sent to MTFWP microscopy lab to test for presence/absence of Dreissenid veligers
- 29 samples were sent to University of Montana Genetics Lab to test for presence/absence of eDNA for Dreissenid mussels and EWM
- All tests results were negative for invasive species (eDNA reports attached)
- Completed visual examination of the complete shorelines of Placid Lake and Lake Alva for the presence of EWM and curly-leaf pondweed (negative)

ii. Project Goals versus Actual Results

The primary discrepancy between the goals and actual results was the failure to collect five rounds of samples on each of the target lakes. Five samples were collected from Lake Inez and Placid Lake, four from Salmon Lake and Big Sky Lake, and three from Seeley Lake and Lake Alva. The project anticipated starting collection in mid-May. Water temperatures didn't reach appropriate temperatures that early and many seasonal resident volunteers hadn't arrived yet. Looking to the future, to minimize cost and the demand on the generous donation of time and labor by our volunteers, we recommend reducing the number of samples per lake to 3 or 4.

A modification to the protocol that was made after the project was approved was to include a field blank for each lake at the beginning of the sampling season, adding six eDNA tests to the expected number of tests.

B. Planning Process

The planning process for this project actually began several years ago when CRC began collecting plankton net tow samples for the detection of Dreissenid veligers by microscopic examination. CRC was working with a few select volunteers to define and refine the process with an eye to developing a process that could be reliably performed by citizen volunteers. Expanding the process to collect and prepare samples for eDNA required stricter adherence to techniques to minimize contamination, and a higher level of sophistication in the entire process. This project sought workable solutions that provided the quality control required for reliable results. CRC worked with the principal investigator and staff of the University of Montana Genetics Lab throughout the season to incorporate appropriate Quality Control samples and practices.

CRC worked with the Missoula County Weed District to avoid duplication of effort in the mapping of aquatic vegetation on the target lakes.

Volunteers will be debriefed prior to planning the next season to revise protocols as needed.

C. Problems and Solutions

CRC has had good success recruiting and retaining dependable volunteers. One reason for that is a system that sets up the volunteers to succeed. Volunteers are rewarded for their efforts by knowing that they are making a valuable and usable contribution to the community. They continue to return season after season.

Initial recruitment is a different picture. Of the several thousand people who live and recreate in this area, only a few dozen volunteer in the variety of citizen science projects the CRC administers. Seeley Lake itself has been the most difficult lake to recruit volunteers for project assistance. We have no idea why, and therefore no solution – except to keep trying.

4. Natural Resources and Public Benefits

The six target lakes within our project area were monitored repeatedly throughout the 2014 season for Dreissenid mussels and Eurasian watermilfoil. A routine for broad-scale, systematic monitoring by volunteers was developed that will continue beyond the funding period. This project increased community awareness and participation in our efforts to protect our lakes and streams from the threat of aquatic invasive species. The continued absence of AIS is important to the economic vitality of the community and the range of natural resource values associated with our lakes and streams.

5. Grant Administration & Project Costs

A. **Work Schedule**

1. The sample collection and sample preservation protocol was completed by the target date of April 1 but was modified throughout the project.
2. Acquired materials and assembled a kit for each lake, 6 kits total by May 15.
3. Recruited volunteers for four of the lakes, with one volunteer team sharing Lake Alva with CRC staff, by May 15.
4. Rounds 1 – 5 Sampling and Testing (monthly beginning late May through early October) Only Placid Lake was actually sampled in late May, with initial samples ranging from June 2 to June 23 on the other lakes. Final samples were collected on all lakes in September due to falling water temperatures and the urging of the labs to submit final samples for testing. Next year, mid-June to mid-September would be a more reasonable schedule.
5. Final report to be shared with all collaborators and cooperators and the public. Final sample results were received in early December. The final report will be shared by the end of 2014.

B. **Budget**

The attached Budget v. Actual table presents the full set of values. Deviations from budget are:

Laboratory Testing: The budget figure of $2250 anticipated 30 samples at $75 per sample. Only 23 actual field samples were collected and tested. The actual value is $1725. Since the project plan did not include testing of field blanks, the costs of those lab tests will be paid by a federal grant.

Time/Salary and Travel: CRC project staff time and travel exceeded initial budget expectations. These increased costs were offset by the decreased lab costs, all within the 20% limit for revision of line item costs.

C. **Matching Funds**

Montana Fish, Wildlife and Parks provided plankton tow nets, sample bottles, preservative (95% nondenatured ethanol), and cross-polar microscopic testing.

University of Montana Genetics Lab provided gloves, preservative (95% nondenatured ethanol), deionized water, and sample tubes.

United States Forest Service provided grant funds that purchased additional materials and paid for eDNA testing of the field blanks.

Volunteers provided time and boats. The largest discrepancy between budget and actual for In-Kind matching is the boat rental. Several teams sampled with canoes, greatly decreasing the expected contribution.

6. Project Completion and Certification

Project Sponsor's Certificate of Compliance is attached.