



**Montana Fish,
Wildlife & Parks**

**2012 Report on
Aquatic Invasive Species Monitoring**

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Aquatic Invasive Species Program

Montana Fish, Wildlife & Parks

The Montana Fish, Wildlife & Parks (FWP) Aquatic Invasive Species (AIS) Program works to implement the AIS Management Plan through coordination and collaboration, prevention of new AIS introductions, early detection and monitoring, control and eradication, and outreach and education. The goal of the AIS Management Plan is to minimize the harmful impacts of AIS through the prevention and management of AIS into, within and from Montana. The report for the Early Detection and Monitoring program for 2012 follows.

Early Detection and Monitoring – Background

Montana's Aquatic Invasive Species (AIS) early detection and monitoring program has been in place since 2004. Early detection allows Montana Fish, Wildlife & Parks (FWP) biologists to locate small or source AIS populations, while monitoring allows FWP to study current population trends. FWP monitors for all aquatic invasive species, including, but not limited to: zebra/quagga mussels (ZM/QM), New Zealand mudsnails (NZMS), and Eurasian watermilfoil (EWM). Plankton sampling for ZM, QM, and Asian clam veligers (microscopic larvae) has increased each year, in part due to an increase in volunteer sampling efforts. To aid in AIS monitoring, FWP employees – including fish health staff and regional biologists – have been given training in AIS species identification. FWP staff are often sampling high risk waters for other purposes, and additional AIS sampling increases overall efforts with less travel cost for AIS staff in Helena. Overall monitoring and early detection efforts have increased steadily over the years.

Methods

FWP assesses the risk for AIS introductions to waterbodies annually. Variables used in determining risk are constantly evolving. Sites are prioritized based upon the previous years' work conducted by FWP, available calcium and water quality data, angler/boater pressure, boater movement data from watercraft inspection stations, monitoring conducted by other state and federal agencies, surface-water hydrology of the system, and other assorted variables.

Montana utilizes a variety of techniques in monitoring for AIS species. Plankton sampling involves the collection of microscopic organisms in the water column using specialized, fine mesh nets and analyzing those samples at the FWP Dreissenid lab in Helena. Cross-polarized light microscopy is the method utilized by the lab to detect the larvae of invasive bivalves such as zebra mussels and Asian clams. Invertebrate sampling involves the use of kick nets and rock picking to search for invasive species while identifying native species and noting population densities. FWP also conducts macrophyte (plant) sampling to assist the Department of Agriculture (MDA; All macrophyte findings are reported to MDA and are included in this report. Polymerase

Chain Reaction (PCR) testing or the amplification of environmental deoxyribonucleic acid (eDNA) is used as a confirmation of microscopy findings for verification, if necessary. Fish pathogens, such as whirling disease, are considered AIS and therefore FWP conducts pathogen testing in fish in conjunction with other AIS monitoring. All of Montana's monitoring protocols have been scientifically reviewed, are updated annually, and are coordinated with neighboring states.

The movement of fish could also be a substantial vector for transferring AIS. FWP moves large numbers of fish through both its hatchery and wild fish transfer programs. Montana inspects all federal, state and commercial hatcheries annually as well as source waterbodies for any wild fish transfer. These AIS inspections include both on-site AIS surveys and disease/pathogen testing in fish. Hatcheries cannot receive certification to sell or move fish without passing an AIS inspection.

2012 Results

In 2012, a total of 123 waterbodies and 249 different sites were inspected in Montana. **No new AIS populations were found during these surveys.** Table 1 on page 6 provides a complete listing of 2012 monitoring sites which includes AIS species observed (sites positive in previous years), as well as sites where no AIS were detected. Note that this table only shows the results for 2012 monitoring conducted by FWP, not previous years' results or results from surveys conducted by other agencies or organizations. Findings include the following:

- New Zealand mudsnails continue to persist at Darlington Ditch, Hauser Lake, and the Missouri River.
- No adult populations of ZM/QM or Asian clams were detected this year or in previous years.
- No zebra/quagga mussels or Asian clams (*Dreissena spp.* or *Corbicula spp.*, respectively) veligers were detected in the plankton samples processed by the FWP Dreissenid Lab in Helena in 2012 or in previous years.
- Eurasian watermilfoil continues to persist at Fort Peck Reservoir.
- Curly leaf pondweed remains on the Bitterroot River, Canyon Ferry Reservoir, Hauser Lake, Hebgen Lake, Holter Lake, Lake Helena, and Post Creek.

Figure 1 illustrates AIS monitoring sites over the past eight years, while Figure 2 illustrates sites monitored in 2012. All high risk sites are inspected annually at a minimum, while lower risk sites are surveyed less frequently. The program goal is to comprehensively monitor the state every year, and all types of waterbodies (lakes,

reservoirs, ponds, creeks, rivers, etc.) are included. This statewide emphasis is illustrated in Figures 1 and 2.

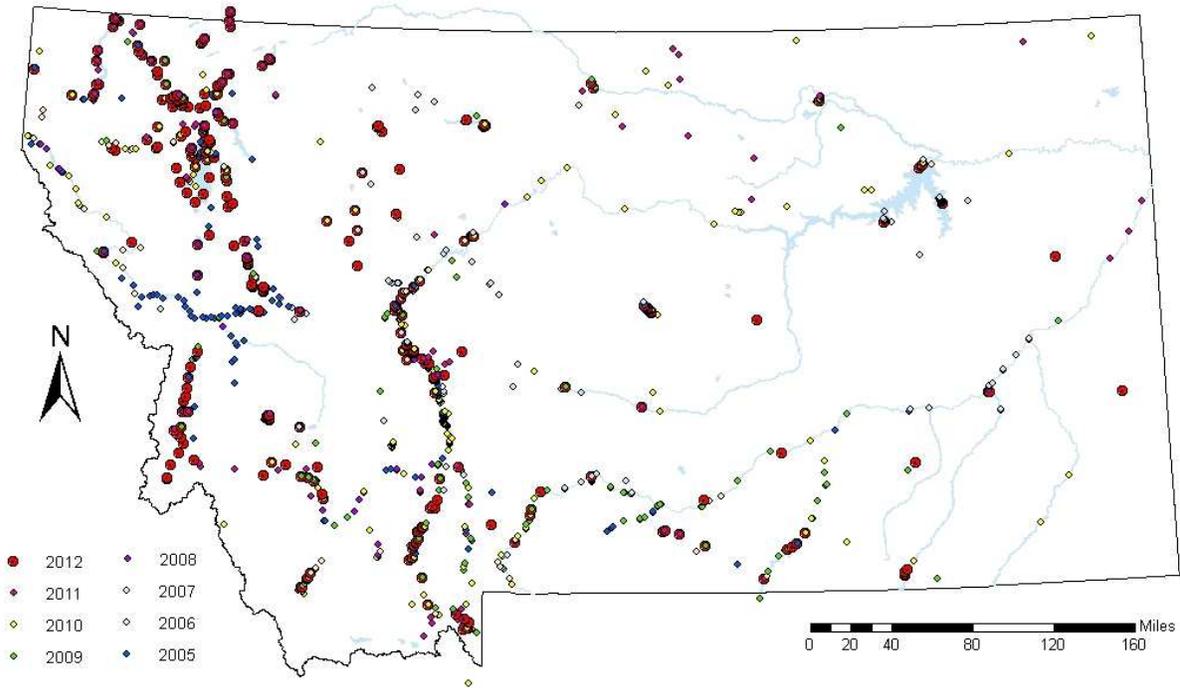


Figure 1: Map of AIS sampling locations, 2005-2012

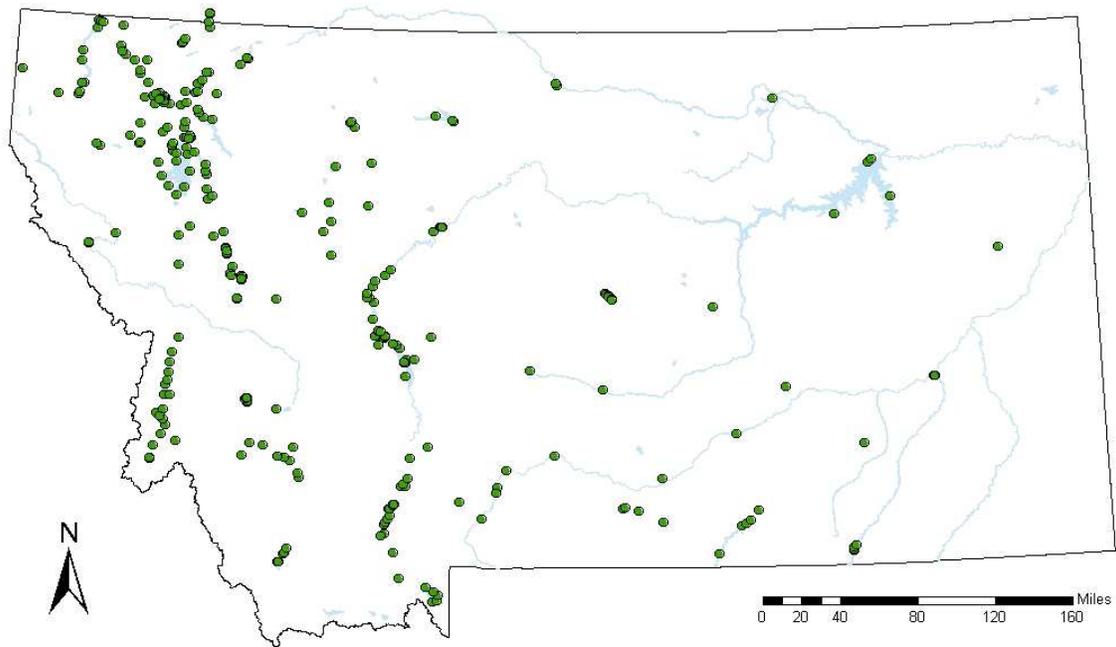


Figure 2: Map of AIS Sampling Locations, 2012

Figure 3 illustrates trends in AIS monitoring over the past eight years. Numerous variables contributed to the fluctuations in the data. The 2005 field season was hot and dry; therefore the sampling season was extended. Funding and staff was limited until 2009 when monitoring expanded. In 2010 and 2011, volunteer efforts were substantially increased by private organizations and other state and federal agencies concerned about the potential introduction of Dreissenid mussels. However, these years had short field seasons due to high water levels and cold water temperatures late into the summer. The 2012 field season yielded more average flows and an increase in staff; however, monitoring was delayed due to the opening of multiple new watercraft inspection stations. Efforts were again augmented by volunteers and contractors.

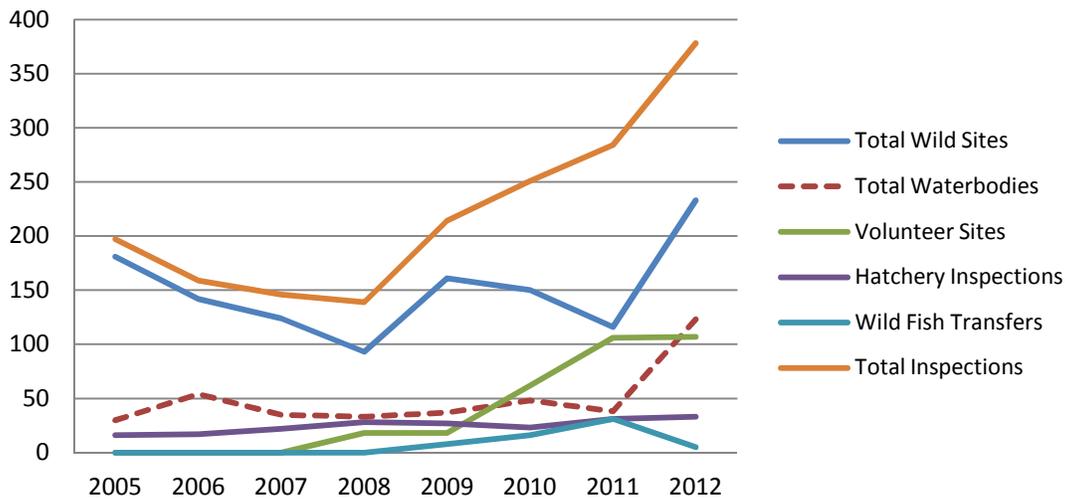


Figure 3: Annual AIS Monitoring (2005-2012)

Dreissenid Laboratory

The FWP Dreissenid lab is located in Helena, MT. It currently processes plankton samples for the Missouri River Basin, including Kansas, Nebraska, Missouri, North Dakota, South Dakota, Wyoming, and Montana. It is in Montana's best interest to know what AIS may exist downstream, and as such, samples are processed for partner states as an in-kind service. Figures 4 and 5 illustrate the volume of samples handled by the lab each year. The base funding for this lab is provided by the U.S. Fish and Wildlife Service, and average turnaround time for samples is approximately two weeks. The lab has discovered new populations of *Dreissena spp.* veligers as well as *Corbicula spp.* (Asian clam) veligers for multiple downstream states. The lab undergoes routine quality control testing by other states and has participated in a community double-blind round robin study on the reliability of early detection methods (Frischer et al, 2011). **In 2012, no veligers for either genus were found in any Montana samples processed by the FWP Dreissenid lab in Helena.**

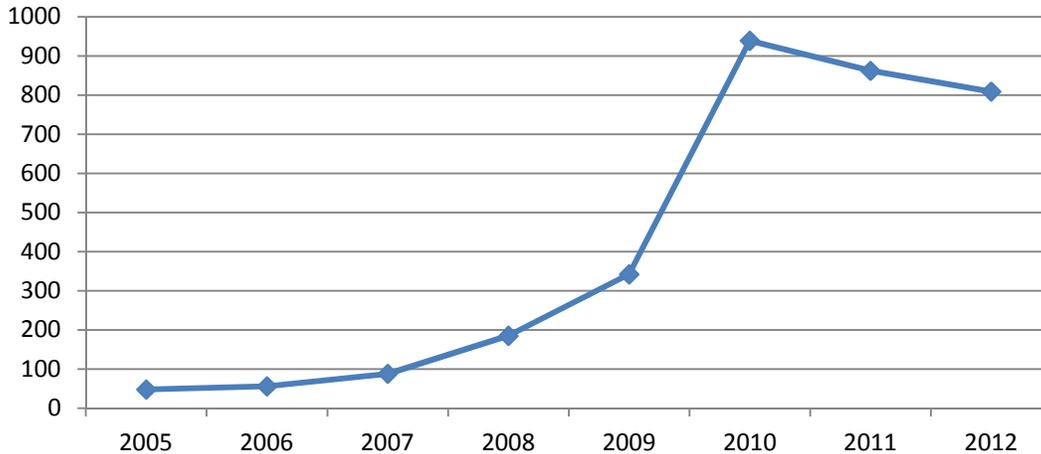


Figure 4: Number of samples processed by lab each year

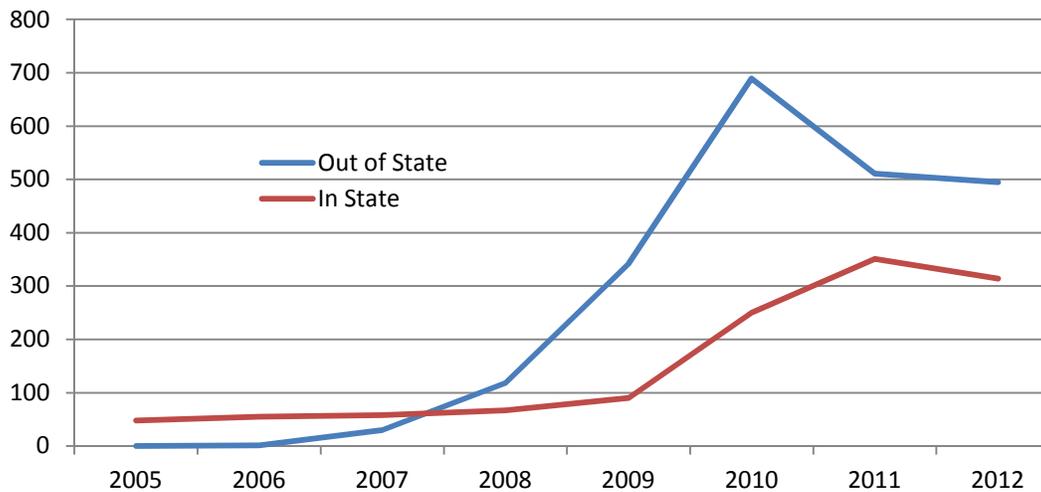


Figure 5: Number of plankton samples processed by lab per year: in state vs. out-of-state

Future Needs

Statewide monitoring efforts by FWP, private sector and government entities are continually improving and expanding. These efforts are critical to the early detection and monitoring of invasive species, and are an important aspect of the AIS program and statewide AIS Management Plan. While these efforts do not guarantee discovery of all AIS species as they are introduced, they do significantly increase the potential to discover new populations before they become established. Limiting the establishment of AIS allows for research to be conducted into control and eradication methods, and allows for greater efficiency in monitoring and early detection methods. These advances will ultimately save the state time and money protecting its aquatic resources and infrastructure.

Table 1: 2012 AIS Monitoring Locations

Waterbody	Site	Macrophyte Sampling	Invert Sampling	Plankton Sampling	Type	Sampling Frequency (per year)	AIS Occurrences
Artesian Well on Private Property	1	Yes	Yes	Yes	Troubleshooting	N/A	
Aspen Springs Trout Farm	1	Yes	Yes	Yes	Hatchery	1	
Bailey	1	No	No	Yes	Wild	1	
Bean Lake	1	Yes	Yes	Yes	Wild	1	
Beaver	1	No	No	Yes	Wild	1	
Beaverhead River	3	Yes	Yes	Yes	Wild	1	
Beck's Bait	1	Yes	Yes	Yes	Hatchery	1	
Big Hole River	7	Yes	Yes	Yes	Wild	1	
Big Sky (Fish) Lake	1	No	No	Yes	Wild	1	
Big Spring Creek	4	Yes	Yes	Yes	Wild	1	
Big Springs Trout Hatchery	2	Yes	Yes	Yes	Hatchery	1	
Big Therriault	1	No	No	Yes	Wild	1	
Bighorn Canyon	1	No	No	Yes	Wild	1	
Bighorn Lake	1	Yes	Yes	Yes	Wild	1	
Bighorn River	4	Yes	Yes	Yes	Wild	1	
Bitterroot Fish Hatchery	1	Yes	Yes	Yes	Hatchery	1	
Bitterroot River	10	Yes	Yes	Yes	Wild	1	CLP
Blackfoot River	2	Yes	Yes	Yes	Wild	1	
Blaine	1	No	No	Yes	Wild	1	
Blanchard Lake	1	No	No	Yes	Wild	1	
Bluewater Springs Trout Hatchery	1	Yes	Yes	Yes	Hatchery	1	
Bowman Lake	4	No	No	Yes	Wild	1	
Browns Lake	1	Yes	Yes	Yes	Wild	1	
Bynum Reservoir	1	Yes	Yes	Yes	Wild	1	
Canyon Ferry Reservoir	6	Yes	Yes	Yes	Wild	1	CLP
Castle Rock Reservoir, Colstrip	1	Yes	Yes	Yes	Wild	1	
Clark Canyon Reservoir	2	Yes	Yes	Yes	Wild	1	
Clark Fork River	2	Yes	Yes	Yes	Wild	1	
Como Lake	3	Yes	Yes	Yes	Wild	1	
Cooney Reservoir	2	Yes	Yes	Yes	Wild	1	
Crystal Lakes Hatchery	1	Yes	Yes	Yes	Wild	1	
Darlington Ditch	1	Yes	Yes	Yes	Wild	1	NZMS
Deadman's Basin	1	Yes	Yes	Yes	Wild	1	
Dickey	1	No	No	Yes	Wild	1	
Dollar	1	No	No	Yes	Wild	1	
East Fork Bitterroot River	1	Yes	Yes	Yes	Wild	1	
Ennis Lake	3	Yes	Yes	Yes	Wild	1	
Ennis National Fish Hatchery	1	Yes	Yes	Yes	Hatchery	1	
Eyraud Lake	1	Yes	Yes	Yes	Wild	1	
Fish	1	No	No	Yes	Wild	1	
Flathead Lake	7	Yes	Yes	Yes	Wild	1	
Flathead Lake Salmon Hatchery	1	Yes	Yes	Yes	Hatchery	1	
Flathead River	2	Yes	Yes	Yes	Wild	1	
Fort Peck Hatchery	2	Yes	Yes	Yes	Hatchery	1	
Fort Peck Reservoir	4	Yes	Yes	Yes	Wild	1	EWM

Waterbody	Site	Macrophyte Sampling	Invert Sampling	Plankton Sampling	Type	Sampling Frequency (per year)	AIS Occurrences
Freezeout Lake	1	Yes	Yes	Yes	WFT	1	
Fresno Reservoir	2	Yes	Yes	Yes	Wild	1	
Gallatin River	1	Yes	Yes	Yes	Wild	1	
Georgetown Lake	5	Yes	Yes	Yes	Wild	1	
Giant Springs Trout Hatchery	2	Yes	Yes	Yes	Hatchery	1	
Gibson Reservoir	1	Yes	Yes	Yes	Wild	1	
Glen	1	No	No	Yes	Wild	1	
Hanson Doyle	1	No	No	Yes	Wild	1	
Harriman Trout Co.	1	Yes	Yes	Yes	Hatchery	1	
Hauser Lake	5	Yes	Yes	Yes	Wild	1	CLP, NZMS
Hebgen Lake	5	Yes	Yes	Yes	Wild	1	CLP
Helena Valley Regulating Reservoir	1	Yes	Yes	Yes	Wild	1	
Holland Lake	1	Yes	Yes	Yes	Wild	1	
Holter Lake	3	Yes	Yes	Yes	Wild	1	CLP
Hungry Horse Reservoir	4	Yes	Yes	Yes	Wild	1	
Hyalite Reservoir	1	Yes	Yes	Yes	Wild	1	
Luloff Pond	1	Yes	Yes	Yes	Hatchery	1	
Jocko River Hatchery	1	Yes	Yes	Yes	Hatchery	1	
Johnson Reservoir	1	Yes	Yes	Yes	WFT	N/A	
Kootenai River	2	Yes	Yes	Yes	Wild	1	
Lake Alva	1	Yes	Yes	No	Wild	1	
Lake Frances	3	Yes	Yes	Yes	Wild	1	
Lake Helena	2	Yes	Yes	Yes	Wild	1	CLP
Lake Inez	1	Yes	Yes	Yes	Wild	1	
Lake Koocanusa	6	Yes	Yes	Yes	Wild	1	
Lake McDonald	5	No	No	Yes	Wild	1	
Lake of the Woods	1	No	No	Yes	Wild	1	
Lindbergh Lake	1	Yes	Yes	No	Wild	1	
Loon	1	No	No	Yes	Wild	1	
Lost Coon	1	No	No	Yes	Wild	1	
Lower Stillwater	1	No	No	Yes	Wild	1	
Lower Thompson Lake	1	Yes	Yes	Yes	Wild	1	
Madison River	11	Yes	Yes	Yes	Wild	1	
McGilvray	1	No	No	Yes	Wild	1	
Middle Thompson Lake	1	Yes	Yes	Yes	Wild	1	
Miles City Fish Hatchery	1	Yes	Yes	Yes	Hatchery	1	
Missouri River	7	Yes	Yes	Yes	Wild	1	NZMS
Murphy	1	No	No	Yes	Wild	1	
Murray	1	No	No	Yes	Wild	1	
Murray Springs Hatchery	1	Yes	Yes	Yes	Hatchery	1	
Mussellshell River	1	Yes	Yes	Yes	Wild	1	
Nelson Reservoir	2	Yes	Yes	Yes	Wild	1	
Nelson's Spring Creek Ranch	2	Yes	Yes	Yes	Hatchery	1	
Nilan Reservoir	1	Yes	Yes	Yes	Wild	1	
Painted Rocks Reservoir	3	Yes	Yes	Yes	Wild	1	
Petrolia Lake	1	Yes	Yes	Yes	Wild	1	
Pishkun Reservoir	1	Yes	Yes	Yes	Wild	1	
Placid Lake	1	No	No	Yes	Wild	1	
Post Creek	1	Yes	Yes	Yes	Hatchery	1	
Rainbow Springs Trout Farm	1	Yes	Yes	Yes	Hatchery	1	
Rogers Lake	1	No	No	Yes	Wild	1	

Waterbody	Site	Macrophyte Sampling	Invert Sampling	Plankton Sampling	Type	Sampling Frequency (per year)	AIS Occurrences
S Fk of N Fk Divide Creek	1	Yes	Yes	Yes	WFT	N/A	
Salmon Lake	2	Yes	Yes	Yes	Wild	1	
Seeley Lake	1	Yes	Yes	Yes	Wild	1	
Skyles	1	No	No	Yes	Wild	1	
Sophie	1	No	No	Yes	Wild	1	
South Sandstone Reservoir	1	Yes	Yes	Yes	WFT	N/A	
Squaw Creek (Big Hole)	1	Yes	Yes	Yes	WFT	N/A	
St. Mary Lake	4	No	No	Yes	Wild	1	
St. Regis River	1	Yes	Yes	Yes	Wild	1	
Swan Lake	2	Yes	Yes	Yes	Wild	1	
Swan River	4	Yes	Yes	Yes	Wild	1	
Tetrault	1	No	No	Yes	Wild	1	
Tiber Reservoir	3	Yes	Yes	Yes	Wild	1	
Tongue River	1	Yes	Yes	Yes	Wild	1	
Tongue River Reservoir	4	Yes	Yes	Yes	Wild	1	
Upper Stillwater Lake	1	No	No	Yes	Wild	1	
Van Lake	2	Yes	Yes	Yes	Wild	1	
Washoe Park Trout Hatchery	1	Yes	Yes	Yes	Hatchery	1	
Waterton Lake	6	No	No	Yes	Wild	1	
West Fork Bitterroot River	2	Yes	Yes	Yes	Wild	1	
Westslope Trout Co.	1	Yes	Yes	Yes	Hatchery	1	
Whitefish Lake	2	Yes	Yes	Yes	Wild	1	
Whitefish River	1	Yes	Yes	Yes	Wild	1	
Willow Creek Reservoir, Augusta	1	Yes	Yes	Yes	Wild	1	
Yaak River	1	Yes	Yes	Yes	Wild	1	
Yellowstone River	3	Yes	Yes	Yes	Wild	1	
Yellowstone River Trout Hatchery	1	Yes	Yes	Yes	Hatchery	1	
TOTALS - 123	249						12

Literature Cited

Frischer, M.E., Nierzwicki-Bauer, S.A., Kelly, K.L. 2011. Reliability of Early Detection of *Dreissena* spp. Larvae by Cross Polarized Light Microscopy, Image Flow Cytometry, and Polymerase Chain Reaction Assays: Results of a Community Double-Blind Round Robin Study (Round Robin Study Phase II).
[http://www.musselmonitoring.com/Reports/RRII%20Final%20Report%20\(2010\).pdf](http://www.musselmonitoring.com/Reports/RRII%20Final%20Report%20(2010).pdf).