

Aquatic Invasive Species Early Detection and Monitoring Program



Monitoring Report 2020

Authors:

Craig McLane,
AIS Early Detection and Monitoring Coordinator
Stacy Schmidt,
AIS Environmental Specialist
Aquatic Invasive Species Bureau

Abstract:

Annual report of aquatic invasive species sampling effort by Montana Fish, Wildlife, & Parks and partners for the 2020 sampling season



Table of Contents

Table of Contents	2
I. Early Detection and Monitoring – Background	2
II. News for 2020	2
<i>AIS Early Detection and Monitoring During the COVID-19 Pandemic</i>	2
<i>Monitoring Dashboard</i>	3
III. Early Detection and Monitoring Methods	4
<i>Risk Assessment</i>	4
<i>Sampling Methods</i>	5
<i>AIS Sampling Prior to Fish Transfers</i>	6
<i>Investigate Public Reporting of AIS</i>	6
IV. 2020 AIS Sampling Results.....	7
<i>New Detections in 2020</i>	7
<i>Statewide Sampling Efforts</i>	7
<i>Aquatic Invasive Species Laboratory</i>	13
<i>Sample Prioritization and Lab Process Turn-around Time</i>	14
Mussel Response at Tiber Reservoir	15
AIS Control Efforts	17
<i>New Zealand mudsnail Eradication at Bluewater Fish Hatchery</i>	17
<i>Beaver Lake Eurasian Watermilfoil Eradication</i>	18
<i>Slip-and-Slide Creek Ponds Curlyleaf Pondweed Eradication</i>	18
<i>Lake Elmo Asian Clam Eradication</i>	19
V. Looking Forward	19
VI. Bibliography	20
Appendix A. Map of invasive mollusks in Montana.....	A1
Appendix B. Map of invasive plants in Montana	A2
Appendix C. Mussel response sampling events on Tiber Reservoir	A3

The Montana Fish, Wildlife & Parks (FWP) Aquatic Invasive Species (AIS) Bureau implements an 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.

I. Early Detection and Monitoring – Background

Early detection and monitoring are essential aspects of any effective aquatic invasive species program. Montana Fish, Wildlife, & Parks (FWP) implemented a statewide Aquatic Invasive Species (AIS) Early Detection and Monitoring Program in 2004. Early detection allows FWP biologists to locate small or source AIS populations, while monitoring allows FWP to study existing population trends and investigate suspect findings. FWP monitors for all aquatic invasive species, including zebra/quagga mussels, Asian clams, New Zealand mudsnails, faucet snails, Eurasian watermilfoil, flowering rush, curlyleaf pondweed, fragrant waterlily. All past reports, Sampling Standard Operating Procedures, and Management Plans can be found under the “Resources & Reports” sections at <https://cleandraindry.mt.gov/>.

II. News for 2020

AIS Early Detection and Monitoring During the COVID-19 Pandemic

The Early Detection and Monitoring Program was impacted by the COVID-19 Pandemic and had to adjust to prevent sampling work from getting halted or delayed. Changes included:

- Ethanol, which is used to preserve plankton samples, was diverted by suppliers to COVID-19 research and the medical field causing some delays in acquiring it for the program’s sampling efforts.
- Early in the season many camping facilities used by sampling staff were closed. Special permission or alternate locations were used. In addition, some recreation sites were closed and access was prohibited including access to perform AIS surveys. By June most of those recreation

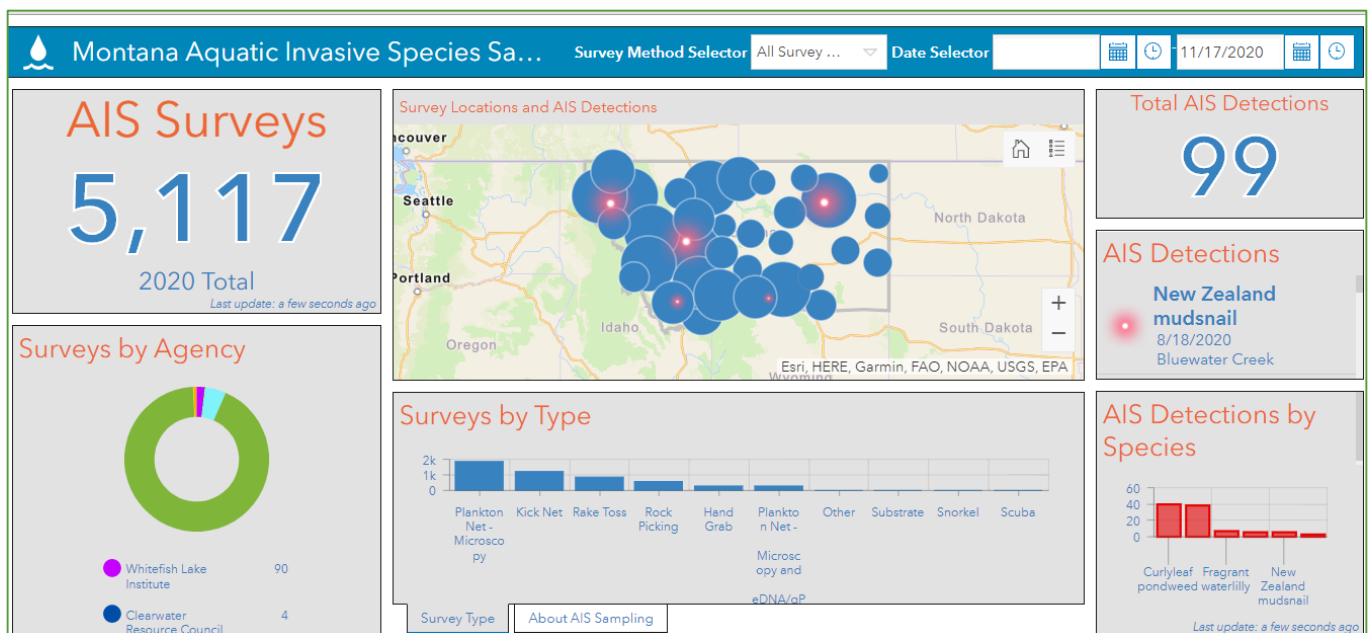


Figure 1. The Monitoring Dashboard on CleanDrainDry.mt.gov shows the current year's sampling efforts in Montana.

FWP 2020 Report on Aquatic Invasive Species Monitoring

sites were open or special permission was granted to access those sites. Masks and sanitation procedures were used when traveling with partners or while interacting with anyone.

Monitoring Dashboard

During 2020, MTFWP introduced a near real-time status of monitoring efforts occurring across the state. This ArcGIS Online-based application helps partners and interested parties see what waters have been sampled across the state in the current year (Figure 1). This application is available under the “Sampling Dashboard” tab at <https://cleandraindry.mt.gov/>. If partners or interested parties would like to download the data for use, it can be viewed and downloaded in multiple formats at FWP’s data portal at <https://gis-mtftp.opendata.arcgis.com/>. FWP officially initiated its dive team in 2020 with agency personnel to help combat aquatic invasive species (Figure 2). Historically, FWP has used SCUBA diving as a confirmatory tool in aquatic invasive species detection using non-departmental dive teams that must be brought in and deployed. Typically, they are used for an urgent response to a new detection. While these partners, such as the United States Fish and Wildlife Service (USFWS), perform valuable work and will continue to be utilized extensively, they may not always be available, which can lead to delays in response. This newly created team provides an additional resource for state needs including rapid response, AIS control, confirmatory searches, and special projects. The FWP Dive Team completed its first operational dive in July, 2020, at Beaver Lake near Whitefish. During that work they continued eradication efforts of Eurasian watermilfoil.



Figure 2. Members of FWP's newly created dive team following a training dive at McGregor Lake.

III. Early Detection and Monitoring Methods

Risk Assessment

FWP assesses risk for AIS introductions to waterbodies annually to maximize sampling efforts. Annual plans are developed in the winter for the following season. They are dynamic due to constantly evolving variables used in determining risk. Sites are prioritized based upon variables such as previous years sampling efforts and finds, water calcium levels, water quality data and information collected by FWP including, angler/boater pressure, boater movement data from watercraft inspection stations, monitoring conducted by other state and federal agencies, surface-water hydrology, and other assorted variables. Other regional coordination groups such as the 100th Meridian Initiative Columbia River Basin AIS Team also are working currently on water body prioritization analyses. These additional efforts as well as other partners' efforts will only further the State's ability to prioritize sampling efforts with finite budgets.



Figure 3. Paul Bramblett, FWP AIS Sampling Technician sampling from a boat, which often occur in less than ideal conditions.



Figure 4. Jayden Duckworth, FWP AIS Early Detection Specialist works to train AIS Monitoring Technicians, Scott Freeman and Eleanor Harrigan, at Hauser Lake, 2020.

Sampling Methods

Montana utilizes a variety of techniques for monitoring AIS populations. FWP routinely monitors for a variety of taxa while conducting standard dreissenid monitoring. Since there are a variety of aquatic invasive species, different sampling techniques are used to increase the likelihood of early detection of each of these species. Sampling methods (Figure 3) include the use of plankton nets, kick nets, ponar dredges, benthic sleds, plant rakes, shoreline visual surveys, visual surveys, artificial substrate samplers, rock picking, mussel detection dogs, eDNA, snorkeling, and SCUBA diving. All of Montana’s monitoring methods are described in the monitoring standard operating procedures (Montana Fish, Wildlife, & Parks, 2018) and have been scientifically reviewed, updated annually as needed, and are coordinated with partners and neighboring states. Seasonal AIS technicians spend a week in Helena (Figure 4) training on sampling methods and species identification prior to going to their respective areas of responsibility.

FWP 2020 Report on Aquatic Invasive Species Monitoring

AIS Sampling Prior to Fish Transfers

The movement of fish can be a vector for transferring AIS including species of plants, snails, clams, mussels and pathogens. FWP moves large numbers of fish through both its hatchery and wild fish transfer programs. Hatcheries cannot receive certification to sell or move fish without passing an AIS inspection and fish health inspection. To accomplish this, the FWP Fish Health Laboratory and the Aquatic Invasive Species Laboratories' staff work closely together to inspect all federal, state, and commercial hatcheries annually as well as waterbodies that fish biologists use for wild fish stock transfers. AIS inspections include both on-site AIS surveys and disease/pathogen testing in fish as discussed above. AIS program protocols include monitoring for all aquatic invasive species taxa whenever possible. Specifics about pathogen results can be obtained by contacting the Fish Health Coordinator, Ken Staigmiller (kstaigmiller@mt.gov).

Due to recent findings of New Zealand mudsnails in out-of-state hatcheries, FWP conducted a review of hatchery sampling protocols and reviewed standard operating procedures for each individual facility to ensure the highest probability of detection of new populations of invasive species. This effort began during the 2020 field season and will continue into 2021. Early results show these efforts are paying off as FWP found New Zealand mudsnails within the MTFWP's Bluewater Fish Hatchery. Detail of those control efforts can be found in the Control Efforts section of this report.

Investigate Public Reporting of AIS

FWP investigates reports of invasive species. FWP offices often receive calls when a member of the public or other sampling entity finds an unusual or unknown organism. AIS sightings can be reported online at <http://cleandraindry.mt.gov/reportais>. Samples are often brought to offices where regional staff will either identify them or send them to the AIS staff in Helena. If an organism can't be identified or verified, FWP staff will travel to the location to investigate the report.

A recent example includes a public report on December 7 of red-rimmed melania (*Melanoides tuberculata*) (Figure 5) at Big Bend Fishing Access Site on the Missouri River near Great Falls. Photos of dead snails were provided by the person reporting the species. Follow up surveys by FWP staff did not find any specimens. FWP will perform additional surveys for this species at this site during 2021 field season. It is believed that these snails were introduced through an aquarium dump. This example and others such as faucet snail reports in 2018 are great examples how the public can help detect new AIS populations and prevent their spread.



Figure 5. *Red-rimmed melania* (*Melanoides tuberculata*) Photo Credit - Bill Frank - Jacksonville, Florida (<http://www.jaxshells.org/>)

IV. 2020 AIS Sampling Results

In 2020, FWP sampled approximately 400 waterbodies in Montana. Most of these waters received all-taxa AIS surveys. For more specific information on individual waters or areas, send a specific information request to Craig McLane (cmclane@mt.gov) or download the survey data through FWP's GIS data page at <http://gis-mtffwp.opendata.arcgis.com/datasets?q=AIS>.

New Detections in 2020

In 2020, new detections of AIS included the following locations:

- New Zealand Mudsnails
 - *Bluewater Fish Hatchery – Bridger, MT*
 - *Marias River – below Tiber Dam*
 - *Missouri River near Loma, MT*
 - *Spring Meadow Lake – Helena, MT*
- Faucet Snail
 - *Lost Coon Lake (Lost Loon Lake) – Whitefish, MT*
 - *Smith Lake – Whitefish, MT*
- Curlyleaf pondweed
 - *Lower Glaston Reservoir – North of Big Timber, MT*
 - *Deadman's Basin – Harlowtown, MT*
- *Spiny waternymph (Figure 6)*
 - *Frenchtown Pond – Frenchtown, MT*
 - *Private pond near Frenchtown Pond – Frenchtown, MT*



Figure 6. Spiny waternymph (Najas marina L.).
Photo credit - US Geological Survey.

Statewide Sampling Efforts

Figure 7 depicts MT samples received and processed by the FWP lab in 2020. Samples are collected and submitted by FWP staff and partner entities. FWP is dedicated to working closely with partners around the state and developing new partnerships to encourage AIS sampling on a local level. Figure 8 illustrates the statewide emphasis on AIS monitoring, including sites for 2020. Most sampling sites include plankton sampling as well as all-taxa surveys looking for invasive plants, snails, crayfish, and other invertebrates. FWP surveys all high risk sites annually, with more frequent samples collected at highest risk sites. Lower risk sites are visited less frequently depending on risk of AIS introduction. Figure 9 shows mussel veliger sampling effort of partners in 2020. The program goal is to comprehensively monitor the state every year, which includes all types of waterbodies (lakes, reservoirs, ponds, creeks, rivers, etc.) and for all taxa.

Plankton sampling for Dreissenid mussel and Asian clam veligers (microscopic larvae) has increased each year by FWP and volunteers but nearly tripled in recent years with the positive detection of mussel

FWP 2020 Report on Aquatic Invasive Species Monitoring

veligers in Tiber Reservoir and a suspect veliger detection in Canyon Ferry Reservoir. Partners are increasing efforts in invasive species detection as well in portions of the state.

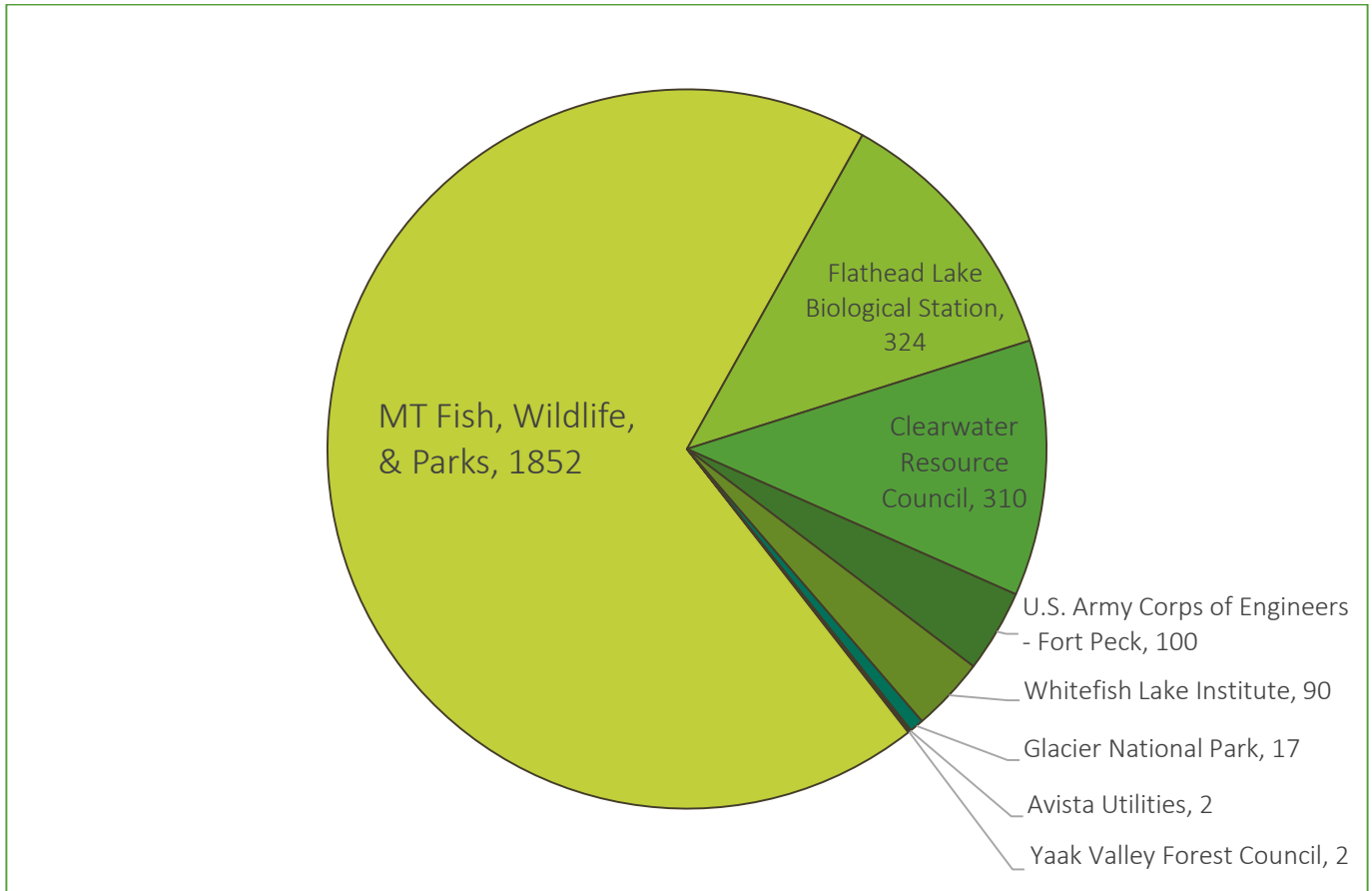


Figure 7. 2020 Aquatic Invasive Species Plankton Sampling Effort by All Reported Entities

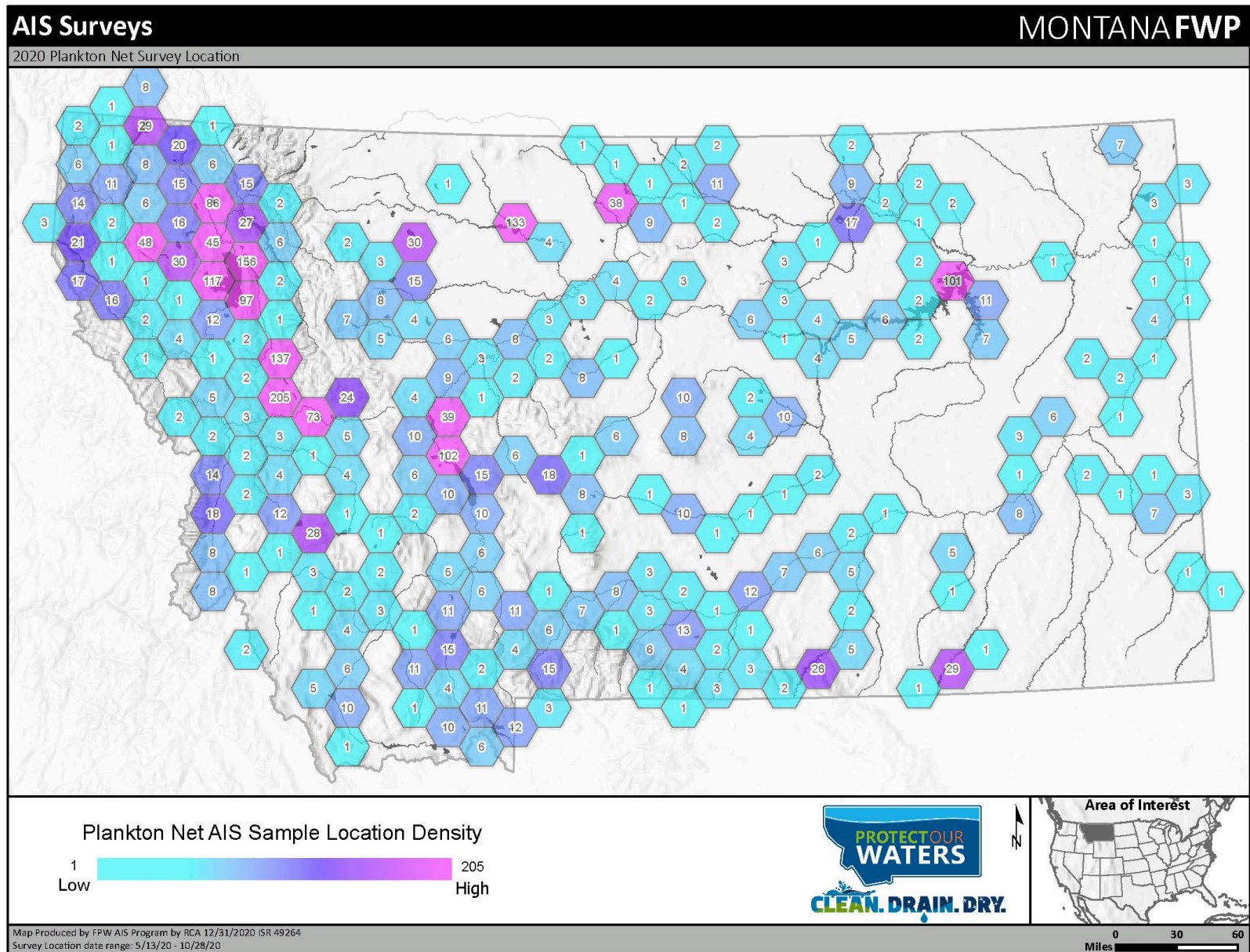


Figure 8. Map of AIS plankton sampling intensity, 2020

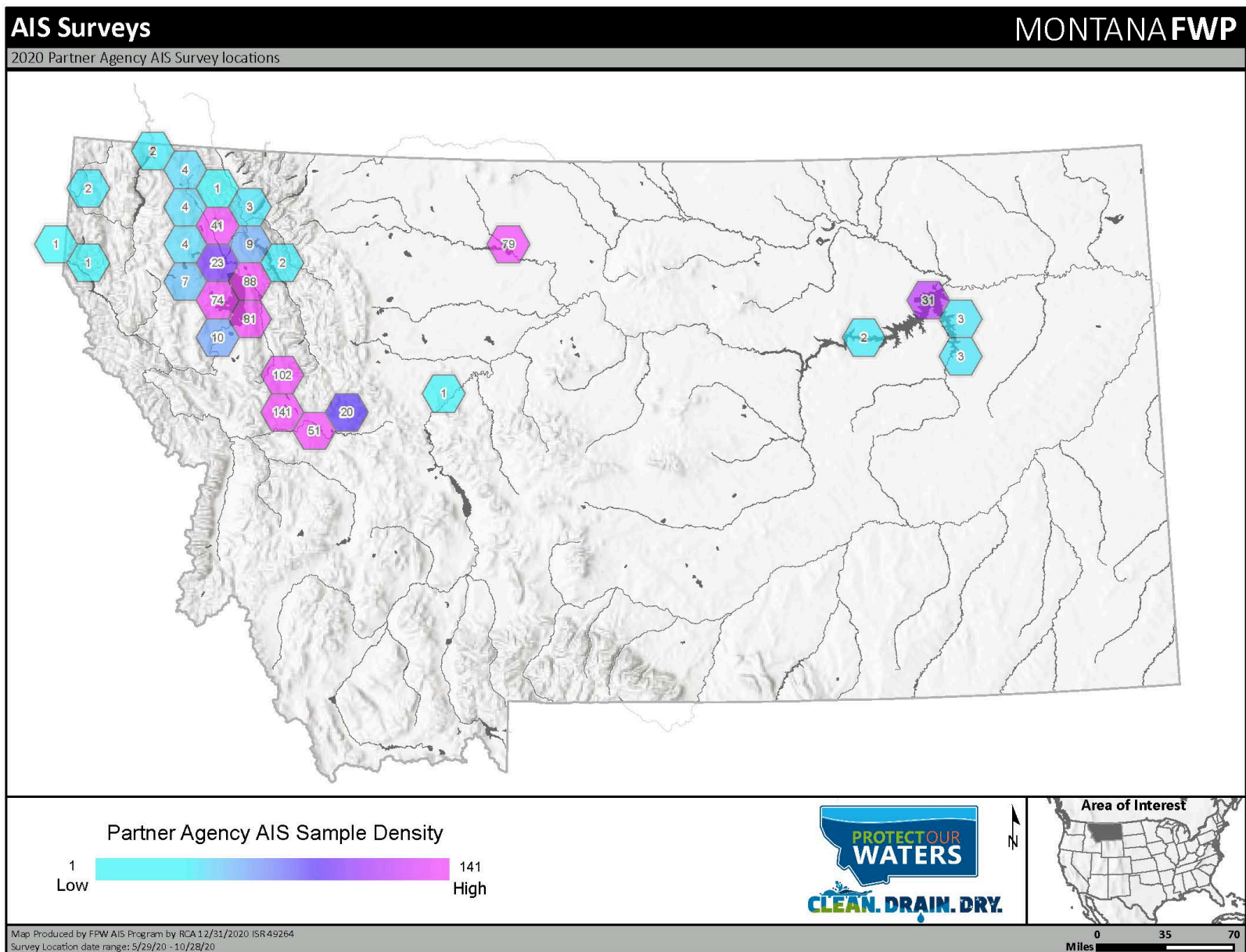


Figure 9. Mussel veliger sampling effort by partners in 2020.

FWP 2020 Report on Aquatic Invasive Species Monitoring

The following tables show the locations of known AIS and the results from monitoring of those waters. Waters with no observations for a species in 2020 does not indicate that those lakes no longer have those species, but that none of that species were collected during sampling efforts. These lack of observations could indicate reduced species abundances, the species was missed by sampling crews, or samplers focused on a different area of the waterbody where the species isn't prevalent or present. Map depictions of AIS locations in MT can be found in Appendix A and Appendix B.

Dreissenid Mussels (Zebra mussels (Dreissena polymorpha) and Quagga Mussels (Dreissena bugensis)) and Asian Clam (Corbicula fluminea)

	Adult Dreissenid Mussels	Dreissenid Mussel Larvae (Plankton Sampling)	Dreissenid mussel eDNA	Adult Asian Clam	Asian Clam Larvae (Plankton Sampling)
Tiber Reservoir	NO	NO	NO	NO	NO
Other Statewide Locations	NO	NO (Processing still ongoing)	NO	Yes (Lake Elmo)	Yes (Lake Elmo)

Asian Clam (Corbicula fluminea)

Water body where previously found	Observed during 2020 Sampling Efforts
Lake Elmo	YES

New Zealand mudsnails (Potamopyrgus antipodarum)

Water body where previously found	Observed during 2020 Sampling Efforts
Beaverhead River	NO
Bighorn River	YES
Bluewater Creek	YES
Clark Canyon Reservoir	NO
Darlington Ditch 1	NO
Ennis Lake	NO
Gardner River	NO
Hauser Reservoir	YES
Jefferson River	NO
Madison River	YES
Marias River (Below Tiber Dam) *	YES
Missouri River (below Holter)	YES

Water body where previously found	Observed during 2020 Sampling Efforts
Nelson Spring Cr	Not Sampled
Odell Creek	Not Sampled
Private Pond NE of Dillon *	YES
Private Pond SW of Dillon *	YES
Poindexter Slough	Not Sampled
Quake Lake	NO
Rainbow Dam Reservoir	YES
Ruby River	NO
Spring Meadow Lake *	Yes
Upper Holter Lake	NO
Yellowstone River	NO

* = New find in 2020

Faucet snail (Bithynia tentaculata)

Water body where previously found	Observed during 2020 Sampling Efforts
Browns Lake	NO
Georgetown Lake	YES
Lake Frances	NO
Lost Coon Lake (Lost Loon Lake) *	YES

Water body where previously found	Observed during 2020 Sampling Efforts
McWenegar Slough	YES
Upsata Lake	YES
Smith Lake *	YES

* = New find in 2020

FWP 2020 Report on Aquatic Invasive Species Monitoring

Eurasian watermilfoil (Myriophyllum spicatum)

Water body where previously found	Observed during 2020 Sampling Efforts
Beaver Lake	YES
Cabinet Gorge Reservoir	YES
Clark Fork River (below Thompson Falls Reservoir)	YES
Fort Peck Dredge Cuts	YES
Fort Peck Lake	YES
Fort Peck Trout Pond *	YES
Jefferson River	YES
Jefferson Slough	YES

Water body where previously found	Observed during 2020 Sampling Efforts
Madison River (downstream of I-90)	YES
Missouri River (upstream of Canyon Ferry Res.)	YES
Missouri River (Downstream of Fort Peck Dam)	YES
Nelson Dredge	YES
Noxon Rapids Reservoir	YES
Pond 4 - Canyon Ferry	NO

* = New find in 2020

Curlyleaf Pondweed (Potamogeton crispus)

Water body where previously found	Observed during 2020 Sampling Efforts
Beaverhead River	NO
Bitterroot River	YES
Blackfoot River	NO
Bozeman Creek	Not Sampled
Cabinet Gorge Reservoir	YES
Canyon Ferry Lake	YES
Clark Canyon Reservoir	YES
Clark Fork River	YES
Darlington Ditch	YES
Deadman's Basin *	YES
East Gallatin River	NO
Ennis Lake	YES
Ester Lake	YES
Flathead Lake	YES
Flathead River	YES
Fort Peck Lake	NO
Gallatin River	YES
Hauser Reservoir	YES
Hebgen Lake	NO
Helena Valley Regulating Reservoir	YES
Holter Reservoir	YES

Water body where previously found	Observed during 2020 Sampling Efforts
Jefferson River	YES
Kicking Horse Reservoir	Not Sampled
Kootenai River	YES
Lake Helena	YES
Lower Glaston Reservoir *	YES
Madison River	YES
Marias River	NO
Missouri River	YES
Musselshell River *	YES
Newlan Reservoir	NO
Noxon Rapids Reservoir	YES
Pablo Reservoir	Not Sampled
Pond 2 – Canyon Ferry	YES
Pond 4 - Canyon Ferry	YES
Post Creek	YES
Quake Lake	NO
Rainbow Dam Reservoir	YES
Smith River	YES
Tiber Reservoir	NO
Thompson Falls Reservoir	YES
Upper Holter Lake	YES
Wayne Edsall Pond	YES

* = New find in 2020

FWP 2020 Report on Aquatic Invasive Species Monitoring

Flowering Rush (Butomus umbellatus)

Water body where previously found	Observed during 2020 Sampling Efforts
Cabinet Gorge Reservoir	YES
Clark Fork River	YES
Flathead Lake	YES

Water body where previously found	Observed during 2020 Sampling Efforts
Flathead River	YES
Noxon Rapids Reservoir	YES
Thompson Falls Reservoir	YES

Fragrant waterlily (Nymphaea odorata)

Water body where previously found	Observed during 2020 Sampling Efforts
Beaver Lake	NO
Blanchard Lake	YES
Browns Lake	NO
Clearwater River	YES
Duck Lake (in NW MT)	NO
Elbow Lake	Not Sampled
Holland Lake	YES
Lake Alva	YES
Lake Inez	YES
Lake Mary Ronan	NO

Water body where previously found	Observed during 2020 Sampling Efforts
Loon Lake	YES
Placid Lake	YES
Private Pond near Frenchtown *	YES
Private Pond S. of Hamilton *	YES
Private Pond N. of Victor *	YES
Salmon Lake	YES
Savage Lake	YES
Seeley Lake	YES
Swan Lake	NO
Upsata Lake	YES

* = New find in 2020

Aquatic Invasive Species Laboratory
 FWP operates an Aquatic Invasive Species Laboratory in Helena, MT (Figure 10) with a satellite lab in Kalispell, MT. These labs process plankton samples for FWP crews, Montana partners and Missouri River Basin (MRB) states. The lab also processes samples from outside the basin as a confirmatory service for other labs. Figure 11 illustrates the volume of samples handled by the lab each year. The lab has discovered new populations of *Dreissena spp.* veligers as well as *Corbicula sp.* (Asian clam) veligers for multiple downstream states. The lab undergoes routine internal and external quality control testing.

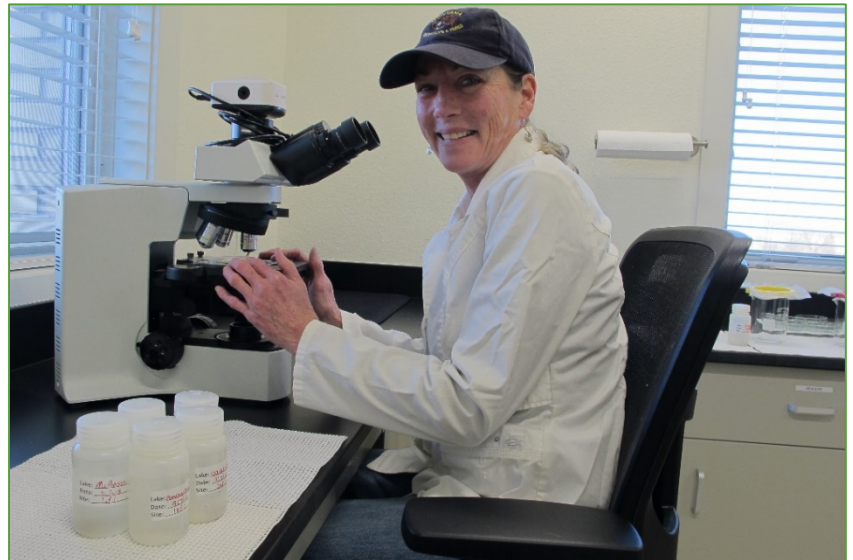


Figure 10. Gail Johnson processes plankton samples in the FWP AIS Lab in Helena, MT. The lab looks for the larval stages of invasive Dreissenid species (zebra & quagga mussel) and Corbicula species (Asian clam).

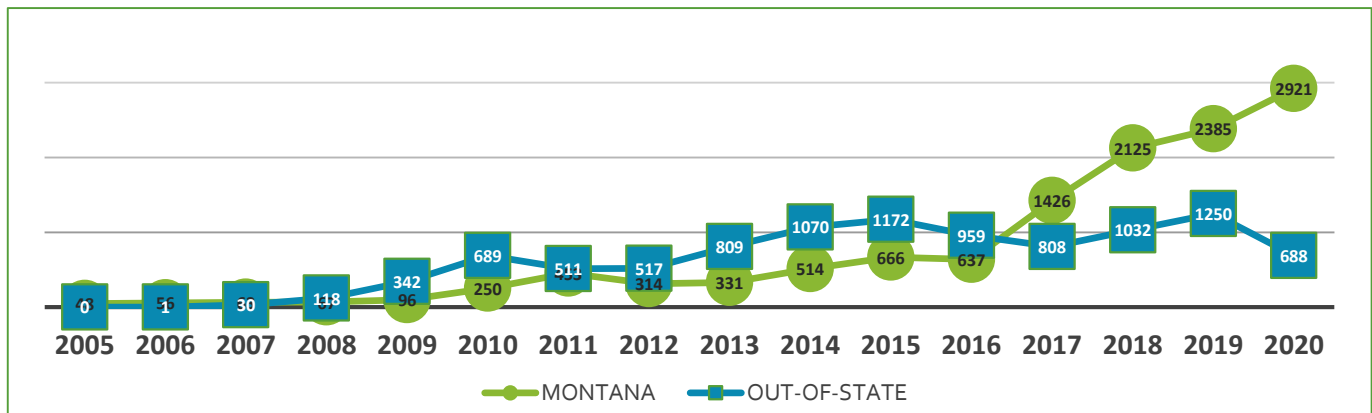


Figure 11. Number of plankton samples processed by year: in-state (FWP and partners) vs. out-of-state.

Sample Prioritization and Lab Process Turn-around Time

Due to staffing shortages and issues arising from the Covid-19 pandemic sample processing took longer than usual for both the Helena AIS lab and the Kalispell AIS lab. In 2020, the lab received a total of 3609 samples (2,921 MT, 688 MRB). In 2019, the lab implemented a new risk categorization system to improve turnaround time on high priority samples, ensuring samples from the highest risk locations are analyzed rapidly. This technique proved successful in 2019 and 2020. The FWP AIS laboratories continue to work on methods to improve sample processing time with annual increases in quantity of samples. New for 2021, the lab is proposing putting a cap on numbers of samples different entities can submit to the lab in order to function efficiently. These number caps have already been proposed for partner MRB state and the same will be done for partner entities within Montana. This will ensure all samples can be completed in a timely manner based on available staff, equipment and lab space. Sample processing concluded on February 10th, and Table 1 shows to status of sample processing and turnaround times.

Table 1 shows the average turnaround times for each risk priority.

Priority (5- high; 1- low)	Rank	Turnaround Time (Average Days)	Total # Samples
Risk 5 and Hatcheries	5	8	228
Risk 4	4	9	790
Risk 3 Lake	3a	60	1,056
Risk 3 River	3b	74	128
Out-of-State	3c	135	688
Risk 2	2	52	400
Risk 1	1	51	160
Totals			3609



Figure 12. Crews used a benthic sled for the first time in Tiber Reservoir in 2020. Besides sampling the sediment for invasive mussels, unexpected benefits included snagging submerged substrates, such as these Christmas trees placed for fish habitat, that allowed for additional surveys on suitable habitat.

Mussel Response at Tiber Reservoir

After the declaration of a statewide natural resource emergency in the fall of 2016 following the first detection of larval Dreissenid mussels within the state, Montana stepped up its fight against invasive species significantly. These efforts included plankton tow sampling, shoreline searches, artificial substrate sampling, ponar dredge sampling, benthic sleds (Figure 12), underwater inspections using scuba divers (Figure 13) and snorkelers, eDNA sampling, mussel detection dogs (Figure 14). Due to scheduling conflicts, the U.S. Fish and Wildlife Service conducted their mussel searches at two



Figure 13. U.S. Fish and Wildlife Service Divers prepare to dive in search of adult mussels in Tiber Reservoir in September, 2020. Photo Credit – U.S. Fish and Wildlife Service.

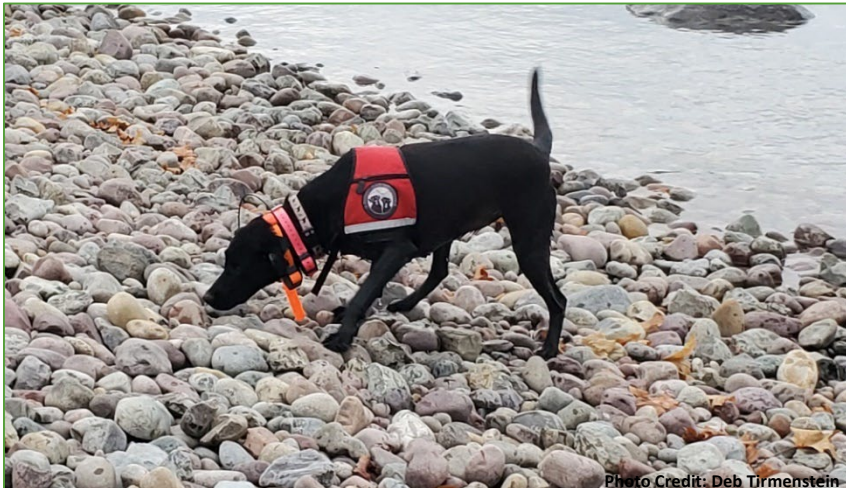


Figure 14. Ismay, a detection dog from Montana Black Dog Services, works to try and find adult dreissenid mussels.

mussel early detection, Flathead Lake Biological Station with support from MT FWP and the U.S. Bureau of Reclamation to collect (Figure 15) and process eDNA samples during two sampling events from Tiber Reservoir in July and September. No Dreissenid mussel DNA was detected in the 75 samples collected through these efforts in 2020.

FWP is continually evaluating and adapting the early detection and monitoring program based on best available science. FWP will continue to improve coordination of sampling efforts with partners while also encouraging recruitment of others. Additional sampling details for Tiber Reservoir are available in Appendix C.

locations on the reservoir without FWP being present to support those efforts.

This year, FWP processed 111 plankton tow samples from Tiber with microscopy for the presence of invasive mussel larvae. No adult mussels or larvae were found with all sampling efforts.

In an effort to find adult Dreissenid mussels and to further the development of eDNA for Dreissenid



Figure 15. eDNA collection occurs on Tiber Reservoir by Flathead Biological Station with support from MT Fish, Wildlife, and Parks, and the U.S. Bureau of Reclamation.

AIS Control Efforts

New Zealand mudsnail Eradication at Bluewater Fish Hatchery

New Zealand mudsnails were detected at Montana Fish, Wildlife & Parks' Bluewater Fish Hatchery on Tuesday, Aug. 18. This is the first time FWP has detected mudsnails in a state fish hatchery.

The Bluewater Fish Hatchery, located near Bridger in southcentral Montana, is a trout hatchery and is the third largest production facility in the state. Its primary purpose is stocking sport fish into urban ponds, reservoirs and other public waters.

New Zealand mudsnails were identified directly downstream of the hatchery in 2013. It is believed that erosion around the hatchery discharge pipes allowed the snails to enter the facility.



Figure 16. AIS Bureau staff working to decontaminate upper raceways at MT Fish, Wildlife, and Parks' Bluewater Fish Hatchery.

Because of the detection, all fish were destroyed and hatchery staff drained the facility completely. Hatchery and AIS Bureau staff decontaminated the entire facility, with high temperature water (Figure 16, Figure 17). A 30-day dry time was implemented following the decontamination and a follow-up inspection in early November found no evidence of live mudsnails in the facility. The hatchery was then allowed to bring in fish eggs to begin fish rearing efforts. No fish will be able to leave the hatchery until the hatchery passes an additional inspection in 2021. The hatchery continues to mitigate risk by only using infrastructure where New Zealand mudsnails were not found, allowing areas with the invasive snail a longer dry/freeze time.

As a result of potential spread of the snails to waters that received fish from this hatchery, FWP began systematically surveying those waters in the fall of 2020. Efforts continued until the weather turned and ice formed on many of those waters. These efforts will continue in 2021 and in subsequent years.



Figure 17. Stacy Schmidt, AIS Detection Specialist, pauses from decontamination efforts to get a photo taken.

Beaver Lake Eurasian Watermilfoil Eradication

In 2019, FWP partnered with Whitefish Lake Institute to continue work on eradicating Eurasian watermilfoil in Beaver Lake. Eurasian watermilfoil was found in Beaver Lake in 2011, and the city of Whitefish and Whitefish Lake Institute has worked since then to eradicate the population with divers hand pulling the plants. Divers spent two days doing survey work, placing benthic barriers to cover some patches, and hand pulling individual plants (Figure 18). FWP will continue to focus on this population in subsequent years to ensure it is eradicated.



Figure 18. The FWP Dive Team prepares for a survey dive at Beaver Lake near Whitefish on July 13, 2020.

Slip-and-Slide Creek Ponds Curlyleaf Pondweed Eradication

The US Forest Service (USFS) recently acquired some land with three small reservoirs located in the Slip and Slide Creek drainage, a tributary of the Yellowstone River near Gardner, MT. The USFS was worried that some of the plants might be invasive species so FWP surveyed the reservoirs in 2019 and found well established curlyleaf pondweed populations in all three of them. There are no reported populations of curlyleaf pondweed within the Yellowstone River Drainage in MT, so this population is particularly alarming with its location so high up in the drainage. In addition, the dams are considered high-hazard in the event of a dam failure. In 2020, the USFS drained the three ponds to mitigate the high-hazard dams and to eradicate the curlyleaf pondweed populations (Figure 19). Subsequent sampling on the stream and adjacent beaver ponds in 2021 may lead to additional control measures. This effort will reduce the risk of curlyleaf pondweed from spreading into the Yellowstone River.



Figure 19. The upper Slip-and-Slide Creek pond on USFS land near Gardner, MT.



Figure 20. Benthic sled that is dragged behind the boat to sample for Asian clam at Lake Elmo. It will let sediment through while trapping anything larger than 1/8".



Figure 21: Live adult Asian clams found in Lake Elmo, 2020

Lake Elmo Asian Clam Eradication

There were no confirmed populations of Asian clams in Montana until FWP staff found them in Lake Elmo during an AIS monitoring workshop in June, 2019. Additional population delineation surveys in 2020 with a benthic sled (Figure 20) show the population within the lake seems well established with multiple age classes including reproductive adults (Figure 21) throughout the lake. FWP Region 5 and AIS Bureau staff are working on a plan to eradicate this population. Current plans include a partial drawdown during the 2020/2021 winter to reduce populations to reduce risk of spread into other waters. In the fall of 2021 FWP plans to completely drain the reservoir and leave it dewatered until Spring 2022. This drying and freezing process should kill off all Asian clams. During this dewatered time, fisheries biologists and state park managers plan to take advantage of access to the lake bed to implement fisheries and state park improvements.

V. Looking Forward

Fish, Wildlife, & Parks is constantly evaluating the AIS Early Detection and Monitoring Program to identify opportunities to improve efficacy and efficiency. These improvements lead to more reliable sampling efforts, data collection, sampling handling, and AIS control efforts. Plans to improve FWP's monitoring program in 2021 include:

- Help partners improve their all-taxa AIS monitoring efforts through trainings and technical expertise. This was done virtually this year due to the COVID-19 pandemic. Hopefully, we can return to several in-person classroom and field technique workshops.
- Survey for AIS in known geothermal areas. Time constraints prevented this from occurring in 2020. FWP plans to begin this project in 2021.

FWP 2020 Report on Aquatic Invasive Species Monitoring

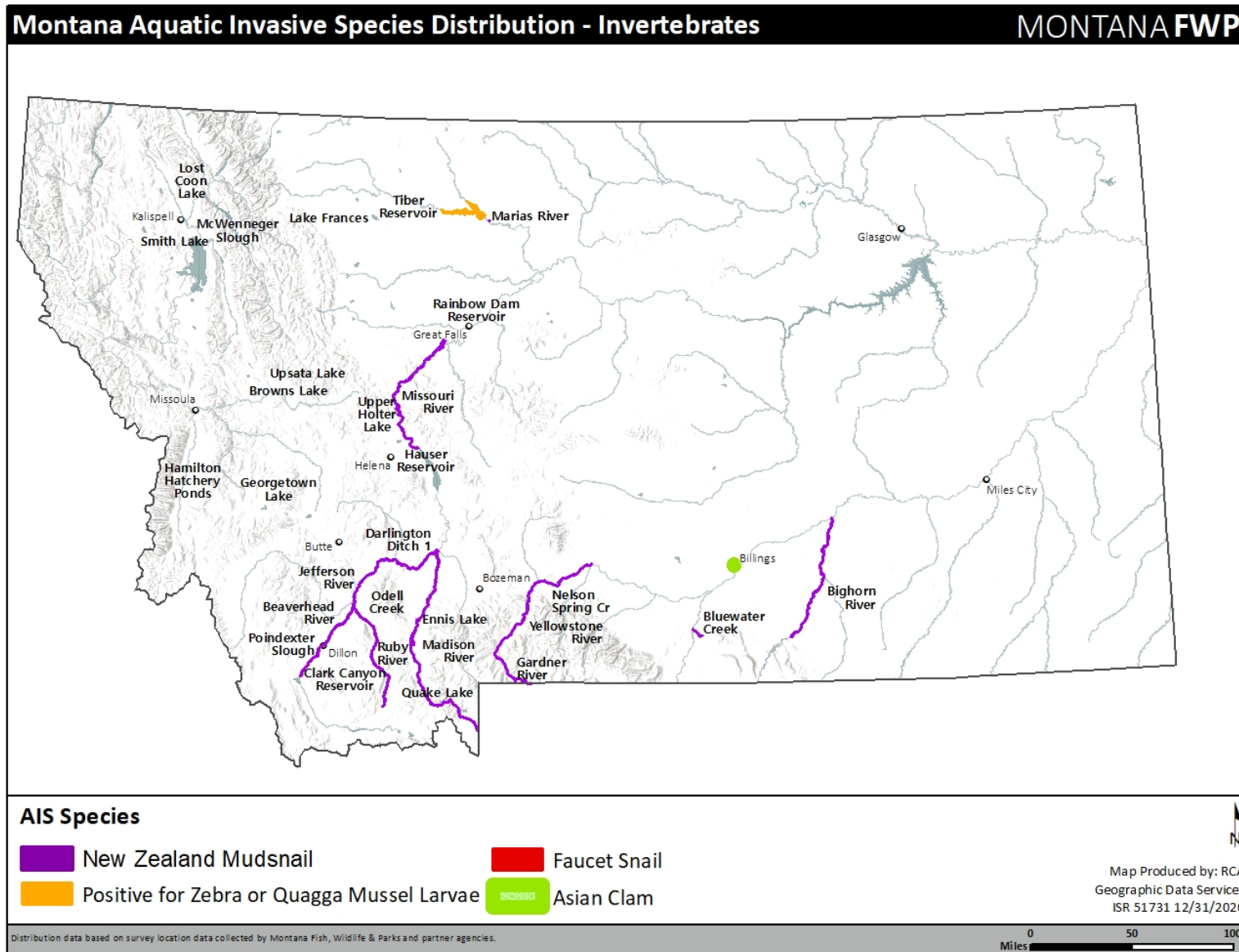
- Expand partner involvement with early detection survey and the use of the AIS Survey Mobile Data Collection App.
- Continue to lead state and regional AIS monitoring coordination with state and regional partners.
- Advertise and increase use of the “Reporting AIS Sightings” efforts.

Statewide monitoring efforts by FWP and partners continues to become more effective and expand capacity within the state to detect new AIS populations, slow the spread of existing populations, and eradicate some populations where feasible. These efforts are critical to the early detection and monitoring of invasive species and are an important aspect of the AIS program and the statewide AIS Management Plan. While these efforts do not guarantee discovery of all AIS species as they are introduced, they significantly increase the potential to discover new populations before they become established or spread beyond their current boundaries. Limiting the establishment or spread of AIS allows time for new research in control and eradication methods emerge and allows for greater efficiency in monitoring and early detection methods. These advances will ultimately save the State of Montana time and money while protecting its aquatic resources and infrastructure.

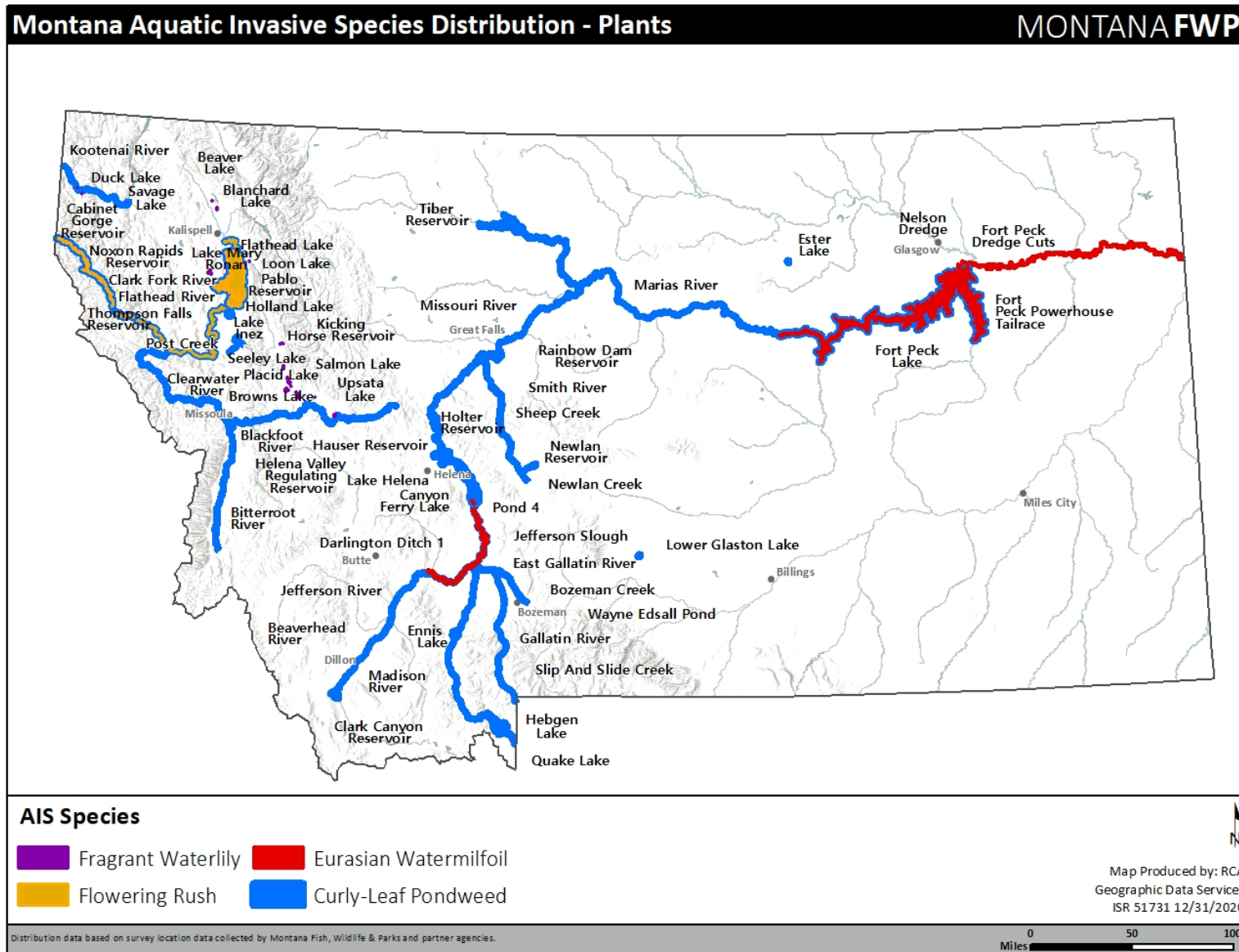
VI. Bibliography

Montana Fish, Wildlife, & Parks. (2019). *Aquatic Invasive Species Management Program Field Sampling and Laboratory Standard Operating Procedures*. MT Fish, Wildlife, & Parks, Aquatic Invasive Species Bureau, Helena.

Appendix A. Map of invasive mollusks in Montana



Appendix B. Map of invasive plants in Montana



Appendix C. Mussel response sampling events on Tiber Reservoir

