2018

Itasca SWCD Aquatic Invasive Species Control & Monitoring

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Itasca SWCD - AIS

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Preface

This publication represents the 12th seasonal report of the Aquatic Invasive Species Control Program in Itasca County. The Turtle Lake Association in Marcell, MN began The Purple Loosestrife Control Program in 2007 in cooperation with the Itasca County Land Department. In 2015, the focus of the program expanded to the control and monitoring of all Aquatic Invasive Species as it joined forces with the Itasca SWCD and the Itasca County AIS Program.

We would like to give thanks to Itasca County, The MN DNR, The U.S. Forest Service, The University of Minnesota Extension, Itasca Waters, ICOLA, and all the seasonal staff which truly have been the backbone in making this program as successful as it has been year after year.

Thank You

Chris Evans
Itasca SWCD – AIS Division
December 2018

Itasca SWCD
AIS Monitoring & Control

-Lake Survey Protocol-

Zebra Mussels / Quagga Mussels / Faucet snails

- Set veliger settlement sampler in an inconspicuous location near public access.
    - 3-8 Feet of water; Foam Float suspended 2-3 Feet below water surface.
- Scour the shoreline throughout entire littoral zone for snail and mussel shells, using aqua viewers, flipping over rocks and driftwood, and inspecting vegetation for attached invertebrates.
- Take multiple substrate samples along the shore in a grid pattern working from shallow water to as deep as is reachable.
    - Sift out samples in a strainer and key out any suspicious shells.
    - ○ Bag and label any suspicious shells and bring to MN DNR- AIS Specialist for ID confirmation.

Eurasian Water Milfoil /Curly Leaf Pondweed/ Starry Stonewort

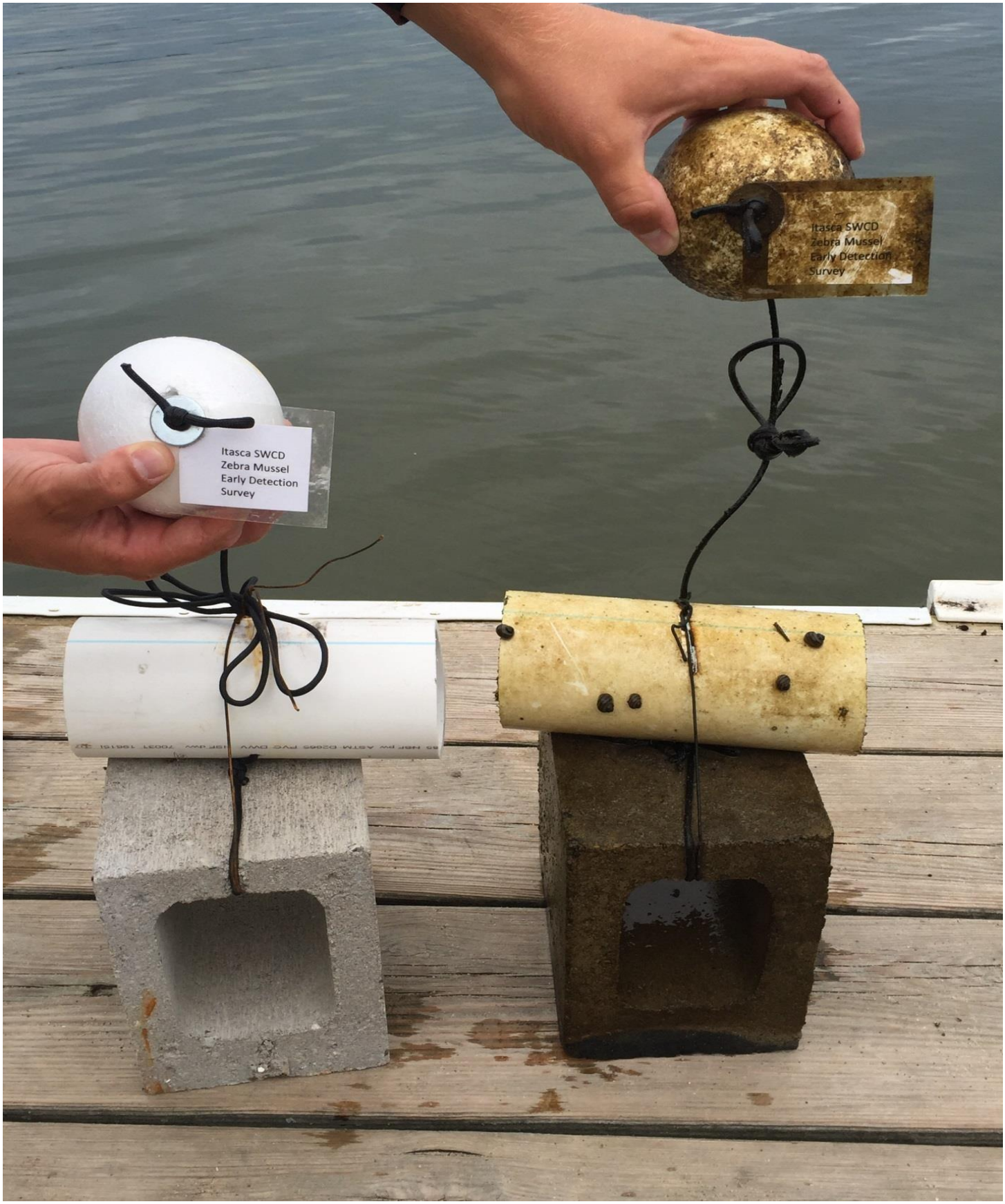
- Travel the perimeter of the lakeshore searching for dense mats of weeds and anything that may resemble EWM and CLP. Take samples using a double-sided weed rake and key out/identify all plants present in the samples. Document infested area, density, and location on the lake.

Flowering Rush/ Purple Loosestrife

- Mid-July through rest of the season. Travel the perimeter of the lake as close to shore as possible, searching for the showy pinkish purple flowers. Document infested area, density, and location on the lake.

Spiny Water Fleas / Fishhook Fleas

- Drag multiple transects around the lake and across areas of deep water; using a heavy weight and high-test lead core fishing line at a slow speed. Pull up the line occasionally checking for gelatinous masses of fleas that collect on the line. Collect any suspicious samples for further identification.



Zebra Mussel Veliger Settlement Sampler. (Right: 4 Months Submerged Under Dock at King's Landing; Pokegama Lake. Native Snails Attached.)

Zebra Mussel Early Detection Samplers

70 Early detection samplers were deployed on these 60 Itasca County lakes and waterways for the early detection of Zebra Mussels, Quagga Mussels, and Faucet Snails. (Any Samplers Containing an Invasive Species are Highlighted in *RED)

Ball Club-31081200
Bass – 31057600
Bigfork River
Bello - 31072600
Blackwater- 31056100
Blandin Res.-31053300; ZM
Bluewater-31039500
Bowstring-31081300
Buck Lake-31006900
Busties - 31053000
Caribou-31062000
Clear- 31084500
Clubhouse- 31054000
Coon/Sandwick- 31052400
Cutfoot Sioux-31085700; ZM
Deer - 31071900
Dixon- 31092100
Dunbar- 31090400
Eagle - 31045400
Fawn - 31060900
Grave- 31062400
Hart- 31002000
Holman- 31022700
Island- 31091300
Jay Gould-31056500
Jessie- 31078600
Larson- 31031700
Little Ball Club - 31082200
Little Bowstring-31075800
Little Jay Gould-31056600
Little Jessie- 31078400
Little Trout - 31039400
Little Turtle- 31077900
Little White Oak – 31074000
Little Winnie - 31085000
Maple - 31077300
Moose- 31072200
Mississippi River
Napoleon- 31029000
Noma- 31083700
Prairie - 31038400
Pokegama- 31053200
Round- 31026800
Round- 31089600
Ruby- 31042200
Rush Island- 31083200
Shallow- 31084000
Sissebakwet- 31055400
Spider- 31053800
Split hand- 31035300
Sturgeon - 31000300
Swan- 31006700
Thistledew - 31015800
Trout- 31021600
Trout- 31041000
Turtle- 31072500
Twin – 31039100
Wabana- 31039200
Whitefish- 31084300
White Oak - 31077600

Complete Lake Surveys – AIS Infestations Found

In Alphabetical Order

All lakes are surveyed as described in the *Lake Survey Protocol* for: Eurasian Water Milfoil (EWM), Curly Leaf Pondweed (CLP), Purple Loosestrife (PL), Flowering Rush (FR), Zebra Mussels (ZM), Quagga Mussels (QM), Faucet Snails (FS), Starry Stonewort (SSW), Spiny Water Fleas (SWF), and Fish Hook Fleas (FHF).

Bass Lake - 31057600 - PL
We have been implementing a Purple Loosestrife management project on Bass Lake since 2012 which consists of annual herbicide applications to all Purple Loosestrife found via back-pack sprayer. The PL population is mostly located within the SW bay of the lake and has gone from roughly 150 mature plants in 2012 to around 12 mature plants and a few seedlings this season.

Bass Lake will be revisited in 2019 to survey for all Aquatic Invasive Species and to continue control efforts on the Purple Loosestrife population.

Biauswah Lake – 31086200 – PL
There was one mature Purple Loosestrife plant located late this season in the middle portion of Biauswah Lake along the West shore. The plant had already seeded out; no control action was taken. Our crew will revisit Biauswah in 2019 to implement chemical control measures on the PL population and to search for any new introductions of AIS.

Blackwater Lake – 31056100 - *ZM, CLP, FS
Our AIS crew has been mapping the Curly Leaf Pondweed in Blackwater Lake since 2015. The CLP population does not seem to change much from year to year; it can be found in dense patches throughout the bay near the public access and in areas of low-flow following the Mississippi River channel.

Faucet snails can be found in most sediment samples throughout the lake.

Although Zebra Mussels have not yet been found in Blackwater Lake, there is a ZM colony spreading down the Mississippi River and the last ZM was located about 5.3 miles upstream of Blackwater lake.

In future seasons we can expect to see Zebra Mussels infiltrating Blackwater, Jay Gould, Little Jay Gould, and Pokegama Lakes, as well as, continue working their way down the Mississippi River.

Our crew will revisit Blackwater Lake in 2019 to monitor the spread of the Zebra Mussel population, note any changes in the CLP population, and to survey for any new AIS introductions.

Blandin Reservoir – 31053300 – *ZM, PL, CLP
When we retrieved our Zebra Mussel Veliger Settlement Sampler from under the Sylvan Bay Access Dock, there were 2 juvenile Zebra Mussels attached. A more intensive search revealed a sparse ZM population throughout the bays along the South shore and only a couple adult ZM's along the North shore. We then tracked this Zebra Mussel population downstream through the Mississippi River and the last Zebra Mussel was located just downstream of the Cty Rd 91 bridge near Blackberry, MN.

Our AIS crews have been monitoring the Curly Leaf Pondweed population on Blandin Reservoir since 2015 and have been implementing a Purple Loosestrife management plan there since 2016.

There is dense Curly Leaf Pondweed population that fluctuates slightly from year to year, but we have seen no dramatic increases in area or density compared to our first survey in 2015.

Our Purple Loosestrife management plan integrates both biological and chemical control methods and has resulted in a major decline in the PL population at both sites on Blandin Reservoir. We have released 9,103 Galerucella Beetles on Blandin Reservoir for the bio-control of PL since 2016.

Blind - 31041800 – PL
Our Purple Loosestrife management plan on Blind Lake has been in implementation since 2012. At the time of our first survey, there were over 100 mature PL plants along the North shore near the U.S. Forest Service campsite.

We released 2,290 Galerucella beetles throughout the invasive plant population in 2013-2014 and have been making herbicide applications each year to any PL plants that seem untouched by the bio-control. The PL population has now decreased to around 10 seedlings emerging from the residual seed bank; mostly found to the East of the dispersed campsite.

Bower – 31005200 - PL
A population of Purple Loosestrife was located by our crew in the NW corner of Bower Lake in 2016; there were 4 large patches consisting of around 40 plants total. Herbicide was applied to all PL found on Bower in 2016 to prevent seed dispersal.

The herbicide treatment in 2016 and 2017 made an obvious decrease in PL density; this season we located 2 flowering plants in the same location. All PL plants found were treated with herbicide. Bower Lake will be revisited in 2019 to survey for all Aquatic Invasive Species and to implement PL control efforts if needed.

Bowstring – 31081300 - PL, FS
Our crews, in cooperation with the MN DNR, have been implementing a Purple Loosestrife control plan on Bowstring Lake which integrates both biological and chemical control methods.

The PL population on Bowstring is very dense in areas and the species can be found throughout a majority of the shoreline.

Since 2009 we have dispersed 100,154 Galerucella Beetles throughout the entire shoreline of Bowstring Lake as well as along the South Access road and within the vast wetland complex in the SW corner of the lake. Annually, any Loosestrife found with no evidence of a beetle population receives an herbicide application to reduce seed dispersal.

Despite the heavy recreational boat traffic and the very close proximity to the Zebra Mussel infested Sand Lake, we failed to locate any Zebra mussels in Bowstring Lake

We will return in 2018 to survey for all Aquatic Invasive Species, add beetles to the bio-control population, and apply herbicide to any PL plants that lie outside of the bio-control areas.

Bray – 31014700 – PL
We have been implementing a Purple Loosestrife management plan on Bray lake since 2016 which, due to the sparse population of plants, consists strictly of chemical control.

In the first year there were 11 mature PL plants found, mostly near the culvert on the south end of the lake. The herbicide applications in 2016 and 2017 have resulted in a decline in PL plants and there were only 5 seedlings found near the culvert in 2018.

We will return to Bray Lake in 2019 to survey for all Aquatic Invasive Species and to further work towards the eradication of Purple Loosestrife

Clubhouse – 31054000 - PL
There has been a Purple Loosestrife management plan in place on Clubhouse and Mike's Lakes since 2009 when we discovered roughly 100 mature plants between the two lakes. Since the PL population was sparse, we decided to implement chemical control methods.

The annual herbicide applications have resulted in there being about 15 Purple Loosestrife plants found between the two lakes. There was one new PL seedling found near the Public Access that had never been there before.

We will return in 2019 to survey for all Aquatic Invasive Species, evaluate the results of our Purple Loosestrife control efforts, and to make additional herbicide applications if necessary.

Coon/ Sandwick – 31052400 - EWM
Despite control efforts contracted out by the DNR in 2017, Eurasian Watermilfoil is found to be abundant throughout a majority of the littoral zone of Coon Lake. Since our first AIS survey in 2015, the Milfoil has crept through the channel into Sandwick Lake where smaller patches have now been newly established along the West Shore.

Our crew will return to Coon & Sandwick Lakes in 2019 to survey for all Aquatic Invasive Species and to further monitor the spread of Eurasian Watermilfoil.

Crooked – 31019300 - PL
There has been a Purple Loosestrife management plan on Crooked Lake since 2012 which has exclusively involved herbicide application.

At the time of discovery, there were roughly 30 mature PL plants found to the East and West of the public access.

There has been a dramatic decline in the PL population each season and this year there was only one seedling found emerging from the residual seed bank located just East of the access ramp.

We will revisit Crooked Lake in 2019 to survey for all Aquatic Invasive Species and to make an herbicide application to any Purple Loosestrife found emerging near the Public Access.

Crystal/Ice – 31037200 - EWM, PL
Our AIS crew has been monitoring the Eurasian Milfoil population on Crystal Lake since 2015 and implementing biological and chemical control measures for Purple Loosestrife since 2009.

The EWM has maintained a stable population since our first survey in 2015 with only a slightly increased density along the South and East shores. The EWM can be found throughout 90% of the littoral zone in 6-12 feet of water.

Our PL management plan on Crystal is centered around biological control. We have added 1,955 Galerucella Beetles to the existing population that has been present since the early 2000's. We implement annual chemical control measures to the PL in areas where the bio-control is insufficient. If the bio-control species continues to reproduce poorly, we may begin to take a more aggressive approach with herbicide applications.

We will return in 2019 to survey for all Aquatic Invasive Species, evaluate the progress of our bio-control site, implement chemical control measures where needed, and to monitor any changes in the Eurasian Watermilfoil population.

Cut Foot Sioux – 31085700 - PL, FS
Our AIS crew has been implementing a Purple Loosestrife management plan on Cutfoot Sioux since 2012. At the time of discovery, there were 12 mature PL plants and hundreds of seedlings just East of the Hwy 46 Bridge.

Since this was the only patch of Purple Loosestrife found on the entire waterbody, we decided that chemical control was our best option. Due to six seasons of herbicide applications, the PL population has decreased dramatically and, this season, there were only 5 seedlings found sporadically throughout a 30-yard stretch of tall grass.

In 2015, Zebra Mussels were known to be in low numbers in Lake Winnibigoshish but they had not yet been discovered in Cut Foot Sioux Lake. In 2017, the ZM population had noticeably spread into Cutfoot from Winnie and we had found them attached to every Veliger settlement sampler that we placed in the lake.

We plan to revisit Cutfoot Sioux Lake in 2019 to survey for all Aquatic Invasive Species, to monitor the advancements of Zebra Mussels throughout the Lake, and to apply herbicide to any Purple Loosestrife seedlings to further work toward eradication.

Deer - 31071900 – PL, CLP

Our crew first surveyed Deer Lake and began integrating both chemical and biological control methods for Purple Loosestrife in 2012. At that time, Loosestrife was densely growing on over 80% of the South Shore, 30% of the North Shore, and was abundant on the WMA islands near the East Shore. We have revisited Deer Lake every year since, adding beetles to the densest areas of Loosestrife and applying herbicide to all PL plants found outside of the bio-control areas. From 2012-2018, we have released 29,267 Galerucella beetles throughout the shores of Deer Lake.

There are areas of the North shore of Deer Lake where our herbicide applications have resulted in a dramatic decline in the Purple Loosestrife population. There are other areas of the lake where the Loosestrife seems to be spreading rapidly due to poor reproduction of our bio-control species.

We plan to continue adding to the Galerucella beetle population in the densest areas of PL. If the insect population doesn't reproduce to the point of plant control, we will likely become more aggressive with our chemical control efforts.

In 2017, we hand-pulled three small patches of Curly Leaf Pondweed near the Public access dock. Our crews did not locate any CLP in Deer Lake this season (2018).

We will revisit Deer Lake again in 2019 to conduct a full-lake survey for all AIS, to implement biological and chemical control on the PL population and to hand-pull CLP if there is any found.

Deer River – PL

Our crews have been implementing a Purple Loosestrife management plan on the Deer River since 2014 which involves both biological and chemical control methods.

Our management plan covers, roughly, the first mile and a half of river, West of County Road 142. The Purple Loosestrife is found in dense patches throughout many of the river bends and is found sparsely along the straightaways.

We have released 5000 Galerucella Beetles in the densest patches of PL and have made annual herbicide applications to the individual plants outside of the bio-control areas since 2014.

We have noticed a dramatic decline in the Purple Loosestrife population throughout the areas where herbicide has been applied; The bio-conrtrol areas show less of a result but there is good evidence of beetle reproduction.

We plan to maintain the current PL management plan on the Deer River in future seasons as well as survey this stretch of river for the presence of any new AIS infestations.

Dora – 31088200 - ZM

Dora Lake is the Headwaters for the Bigfork River. In 2016, a full lake survey was conducted for all Aquatic Invasive Species in Dora Lake and despite Dora being downstream of a known Zebra Mussel Infestation (Sand Lake Chain), no Zebra Mussels were present in 2016.

In 2017, the Zebra Mussel population was found to be spreading from Rice Lake of the Sand Lake Chain. We tracked them downstream of Rice Lake, finding large mature mussels attached to rocks and woody debris at the Shogren Dam. We then jumped approximately 4 miles downstream to Dora Lake finding ZM's attached to the boulders underneath the County Road 29 Bridge. The ZM's were quite small, suggesting that they are the young of the year that had been carried through the current of the Bowstring River coming from Rice Lake. From Dora Lake, we tracked the Zebra Mussel population spreading into the Bigfork River and eventually found our last mussel approximately 9.5 Miles downstream of Dora.

This year (2018) the Zebra Mussel population has not significantly increased in density. There is still a sparse population attached to the boulders under the Hwy 29 Bridge, but we also found a few ZM's in a location where they weren't found last year, attached to the wooden pilings along the North side of Hwy 29, East of the bridge. When searching the Bigfork river in 2018, we did not find any Zebra Mussels.

Although the Zebra Mussel population hasn't exploded in density this season, they are spreading throughout the lake. In just a couple short seasons we may see their numbers greatly increase and begin to dominate the lake.

Dunbar - 31090400 – PL

Itasca SWCD has had a Purple Loosestrife management plan in place on Dunbar lake since 2015 which integrates both biological and chemical control methods. There are 3 separate areas of the lake that have a sparse, yet consistent, Purple Loosestrife population.

The 2 locations along the West shore are very reachable by canoe and on foot with a back-pack sprayer so we plan to make annual herbicide applications for the control of those sites.

The Purple Loosestrife along the east shore is bit denser and more widespread throughout some boggy shoreline. There is a bio-control population established at this site. We plan to add Galerucella Beetles to the densest areas annually as well as apply herbicide to all PL plants that appear to be unaffected by the bio-control species.

We will conduct another full lake survey of Dunbar Lake in 2019 for all Aquatic Invasive Species and to monitor the results of our Purple Loosestrife control efforts.

Eagle – 31045400 – PL
Our AIS Crew has been implementing a Purple Loosestrife management plan on Eagle Lake since 2013 which integrates both biological and chemical control methods.

The goal of our current management plan is to attempt to isolate the Purple Loosestrife to the southern-most bay of the lake. At the time of discovery, there was a sparsely scattered population throughout 80% of the entire lakeshore and 2 areas in the south bay that had a very dense population throughout some very boggy type wetlands.

Since 2013, we have introduced 16,584 Galerucella beetles throughout the 2 densest PL areas and their reproduction has been very successful.
We have made annual herbicide applications to all Purple Loosestrife that was found outside of the two bio-control areas and have seen a dramatic reduction in the total area infested with Purple loosestrife.

Our goal is to keep adding Galerucella Beetles to the bio-control areas until the insect population reaches the point of providing 100% plant control, meanwhile maintaining chemical control on any PL seedlings that emerge from the residual seed bank outside of the bio-control areas.

We will revisit Eagle Lake in 2019 to survey the lake for all AIS and to implement Purple Loosestrife control measures as needed.

East Smith – 31061600 - PL
Historically, there has not been Purple Loosestrife on East Smith Lake although neighboring Smith Lake, to the north, has had a widespread PL population for well over a decade.

In 2016-17, Purple Loosestrife was located in 3 small patches along the North shore.

Given the very low density and ease of access to the Purple Loosestrife sites, we have decided our strategy will be to make annual herbicide applications to the three PL sites to prevent seed dispersal and to work toward eradicating the species from East Smith Lake.

We will conduct another full lake survey of East Smith Lake in 2019 to search for all Aquatic Invasive Species and to monitor our PL control efforts.

Forest - 31037400 - PL
Our crews have been implementing a Purple Loosestrife management plan on Forest Lake since 2012 which integrates both biological and chemical control strategies.

Annually, it is our goal to add Galerucella Beetles to the existing bio-control population which has spread well throughout the lakeshore. Since 2012 we have added 5,135 beetles between the beach area in SE corner of the lake and the Boggy wetland area in the NW corner.

We typically return mid-summer to evaluate the bio-control population and to make herbicide applications to any PL plants that appear to be unaffected by the bio-control species.

We will revisit Forest lake in 2019 to survey for the presence of AIS and to further implement biological and chemical control efforts on the Purple loosestrife population.

Hale – 31037300 - EWM, PL

In 2012, our crew first surveyed and mapped the Purple Loosestrife population on Hale Lake. At that time, there was a continuous population of PL around most of the shoreline. We designated the densest PL location on the West end of the lake as the central location of our bio-control efforts in future seasons.

Since 2012 we have released 11,907 Galerucella Beetles mostly along the shoreline in the western half of the lake. Over the years we have noticed their population spread to almost every portion of the lake.

In order to assist the bio-control species, we make annual herbicide applications to all PL plants that show no sign of the insect population.

We have been mapping the changes in the Eurasian Watermilfoil population in Hale Lake since 2015. At that time, there were small scattered patches along the South and East shores. Since then we have witnessed the EWM population slightly increase in density along the isolated patches in the South. The littoral zone of the bays on the East end of the lake is now dominated by EWM.

We will revisit Hale Lake in 2019 to implement biological and chemical control efforts on the PL population, map the EWM population, and to survey the entire lake for any new AIS infestations.

Hart – 31002000 - FR

Our AIS crew has been mapping the changes in the Flowering Rush population on Hart Lake since 2015. At the time of our first survey, Flowering Rush was found in approximately 40 separate patches throughout the littoral zone along the South and West shores.

From 2015 to 2018, the density of the Flowering Rush gradually increased throughout the infested sites and there are now 10 or more new FR sites near the North Public Access and along the North Shore.

There is approximately 4500 linear feet of shoreline on Hart Lake infested with flowering rush which extends throughout the littoral zone.

We will revisit Hart Lake in 2019 to complete another survey for all Aquatic Invasive Species and to monitor any changes in area or density within the Flowering Rush population.

Hartley – 31015400 - PL
Our program has been implementing a Purple Loosestrife management plan near the Hartley Lake public access since 2012.

At the time of our first survey there were 5 mature plants found in the "Native Planting" to the southeast of the fish ladder project. We had made an herbicide application to all PL found and it did not return until 2016 when three seedlings emerged from the residual seed bank.

Herbicide was applied to PL seedlings at this site in 2017; no Purple Loosestrife was found in 2018.

Hartley Lake will be revisited in 2019 to survey for all Aquatic Invasive Species and to further work towards eradicating Purple Loosestrife from this location.

Holman – 31022700 - FR, PL
Our crew has been mapping the Flowering Rush population since 2015 and implementing a Purple Loosestrife management plan on Holman Lake since 2012 which integrates both biological and chemical control methods.

At the time of our first survey PL was densely scattered among approximately 50% of the entire shoreline, being most-dense in the North and South extremities of the Lake as well as on the island directly west of the Public Access.

There was an existing Galerucella Beetle colony and about half of the plants showed insect damage to some degree. Herbicide was applied to all plants that were flowering to assist the bio-control in seed reduction in 2012.

Our crew has released 9,275 Galerucella beetles throughout all of Holman Lake since 2013. The reproduction of the bio-control species has been minimal over recent years but had greatly improved during the 2017 season; every PL plant found had insect damage to some extent with many plants being reduced to an unrecognizable brown stalk.

At the time of our first Flowering Rush survey in 2015 there were only 3 separate locations found within the lake. The FR population has steadily increased over the past 3 seasons and Flowering Rush has now become established throughout many areas of the lake.

Our AIS crew will revisit Holman Lake in 2019 to survey for new introductions of AIS and to maintain control of the PL population. We will also attempt to team up with the MN DNR to develop a FR management plan for Holman Lake.

Jay Gould – 31056500 – CLP, *ZM
Due to the colony of Zebra Mussels spreading from Lake Winnibigoshish through the Mississippi River, Jay Gould Lake has now been added to the Infested Waters list along with Blackwater, Little Jay Gould, and Pokegama Lake. As of this 2018 season, there has NOT yet been any Zebra Mussels found in these lakes. We will continue to search for Zebra Mussels in these waters in future seasons to track their spread from the Mississippi River.

Our Crew has been mapping the Curly Leaf Pondweed in Jay Gould Lake since 2015.
Each year we find a stable population of CLP in the channel coming from Blackwater Lake as well as in the channel going to Little Jay Gould Lake. The CLP density at these sites vary from year to year.

Little Jay Gould has a dense population of CLP in the SW section of the lake heading through the flowage to Pokegama Lake; this is the apparent source of the CLP in Pokegama.

Our crew will revisit the Jay Gould Lakes in 2019 to monitor the spread of CLP and to search for all other Aquatic Invasive Species.

Johnson – 31058600 – PL
Our crew began implementing a Purple Loosestrife management plan on Johnson Lake this season in 2018. Last year, we discovered two separate patches of Purple Loosestrife seed head along the West shore, but it was late in the fall and the plants had gone dormant for the year.

Our 2018 AIS survey revealed PL in 3 separate areas, the densest PL population being along the residential area in the SW corner of the lake.

Herbicide was applied to all Purple loosestrife found n 2018. We will revisit Johnson Lake in 2019 to evaluate the results of our chemical control efforts, to implement more control if needed, and to survey the entire lake for new introductions of AIS.

Leighton – 31073900 – PL
Our AIS crew has been implementing a Purple Loosestrife management program on Leighton Lake since 2012 which incorporates biological and chemical control methods.

At the time of our first survey there were over 200 mature Purple Loosestrife plants found within an approximate 80-yard stretch near the Public Access. Herbicide was applied to all PL plants in 2012 to knock back the population and reduce the seed output.

Our 2013 survey showed that the herbicide treatment had reduced the population to approximately 100 PL plants.

From 2013 to 2015, we had decided to designate Leighton Lake as a bio-control site and released 7,500 Galerucella beetles throughout the 80-yard stretch. No herbicide applications were made during this 3-year period.

In 2016, we found no evidence of an existing Galerucella Beetle population and there were still 100+ plants present at the site. At this point we decided to abandon all bio-control efforts and focus on chemically controlling the Purple Loosestrife.

The herbicide applications in 2016 and 2017 have now reduced the PL population to approximately 20 seedlings emerging from the residual seed bank.

We will revisit this site on Leighton Lake in 2019 to follow-up with our chemical control efforts and to survey the entire lake for any new AIS introductions.

Lilly – 31037500 - PL

We have been implementing a Purple Loosestrife management plan on Lily Lake since 2015. During our first survey of Lily, we found about 100 Purple Loosestrife plants throughout the cattails and tall grass along the west shore. There was minimal evidence of an existing Galerucella Beetle population; we applied herbicide to all PL that seemed untouched by the bio-control population.

Although we find evidence of their residency, the bio-control species does not seem to be reproducing to the level of PL plant control. The Loosestrife population has become more and more widespread each season.

This year we located about 15 separate areas on Lily Lake that had dense clumps of PL; mostly along the South and West shores. Herbicide was applied to all PL found to get a handle on the increasingly invasive population. Due to the lack of reproduction at this site, we will likely abandon all bio-control efforts and focus on chemical control in future seasons.
We will revisit Lily Lake in 2019 to implement chemical control efforts on all PL present and to survey the entire Lake for new AIS introductions.

Little Drum – 31074100 - PL

The Itasca AIS crew has been implementing a Purple Loosestrife management plan on Little Drum Lake since 2016 which integrates both biological and chemical control efforts.

At the time of our first survey in 2016, two separate dense patches of Purple Loosestrife were discovered on floating bog portions of the shoreline on opposite sides of the lake (east and west). Herbicide was applied to the PL plants that were accessible from the water to reduce the seed dispersal throughout the lake. These areas were then designated as biological control sites for future seasons.

In 2017, we released 448 Galerucella Beetles throughout the 2 Purple Loosestrife sites on Little Drum Lake. When we returned to survey for all Aquatic Invasive Species and to monitor the Loosestrife control efforts, the water level was so low we could not even get a canoe in the lake. The water was again too low in 2018 at the time of our attempted survey.

We will attempt to return in 2019 to survey for all AIS and to add to the Galerucella Beetle population.

Little Jay Gould – 31056600 - *ZM, CLP
See the description of Little Jay Gould Lake under the section for *Jay Gould*

Little Long – 31061300 - PL
Our crew has been implementing a Purple Loosestrife management plan on Little Long Lake since 2012 which integrates both biological and chemical control.

Our first survey in 2012 revealed a steady population of Purple Loosestrife in the south half of the lake which is very dense among the boggy type bays. We applied herbicide in 2012 to all accessible PL plants in order to prevent seed dispersal throughout the lake.

From 2013 to 2017, we released 18,020 Galerucella Beetles among the densest populations of PL and they appear to be reproducing very well and have provided great plant control in most areas. Each season, herbicide is applied to all PL plants found outside of the bio-control sites which has made a major reduction in the PL population throughout the lake.

We will return to Little Long Lake in 2019 to conduct a survey for all Aquatic Invasive species and continue our control efforts on the Purple Loosestrife population.

Little Sand – 31085300 - ZM
We did not visit Little Sand Lake this season. There is a known Zebra Mussel infestation that has spread downstream from Sand Lake. Our future efforts will be focused on monitoring the spread of the Zebra Mussel population from Little Sand through the Bowstring River to Dora Lake and the Bigfork River. More details on the spread of this Zebra Mussel population are described under *Dora Lake*.

Little Turtle – 31077900 - PL
Our invasive species program has been implementing a Purple Loosestrife management plan on Little Turtle Lake since 2007 which integrates both biological and chemical control methods.

At the time of our first survey, PL was confined to the SW corner of the lake throughout the emergent vegetation, as well as, in the wetland across Hwy 286. Herbicide was applied to all PL plants found from 2007-2013 to work toward the depletion of the residual seed bank.

From 2014 to 2017, there were 8,963 Galerucella Beetles released throughout the infested areas. Herbicide has been applied annually to the Loosestrife on the extreme ends of the infestation in order to confine it to the designated biological control area.

The Galerucella Beetle population is now reproducing very well in the SW corner of Little Turtle Lake with a majority of the Purple Loosestrife plants showing strong evidence of the insect colony. The PL population on the south side of Hwy 286, however, had no evidence of biocontrol and herbicide was applied to all PL plants found in 2018.

Little Turtle Lake will be revisited in 2019 to survey for all Aquatic Invasive Species, to monitor the results of our Purple Loosestrife control efforts, and to implement control efforts as needed.

Little White Oak – 31074000 - PL

In 2016, we discovered 8 mature Purple Loosestrife plants scattered through the tall grass and emergent vegetation near the public access of Little White Oak Lake. Herbicide was applied to all PL found. There was no Purple Loosestrife found at this site in 2017 or 2018.

We will revisit Little White Oak in 2018 to survey for all Aquatic Invasive Species and to conduct control efforts on any Purple Loosestrife found sprouting from a residual seed bank, if needed.

Little Winnibigoshish – 31085000 - ZM

In 2017, while deploying our ZM sampler at the Little Winnie Resort, we found a soda can in the water with 2 small Zebra Mussels on it. We went directly to the Winnie Dam and found that ZM's were densely populated on the rocks below the dam. In the following days, we assisted Rich Rezenka of the MN DNR in a full-lake survey of Little Winnie. There were adult ZM located throughout Little Winnie Lake and were found to have spread approximately 17.5 miles downstream through the Mississippi River past the confluence of the Leech River.

In 2018, we tracked the spread of this Zebra Mussel population down to the bridge on Hwy 6 South.

I project that in future seasons we will be seeing this ZM population spread into the Blackwater, Jay Gould, Little Jay Gould, and Pokegama Lakes, as well as, continue their way through the Mississippi River.

We will revisit Little Winnibigoshish in 2019 to monitor the density of the ZM population within the lake and to survey for the introduction of any new AIS.
More detail on the spreading Zebra Mussel colony can be found under: *Mississippi River, Blackwater, Jay Gould, Little Jay Gould, Pokegama.*

Long – 31057000 - PL
Our AIS crew has been implementing a Purple Loosestrife management plan on Long Lake since 2010 which integrates both biological and chemical control methods. Purple Loosestrife is found only in the East Bay near the access and along the south side of Hwy 63.

Since 2012, we have released 7,100 Galerucella Beetles throughout the entire infested area, but the reproduction of the insect species is minimal and has not reached the point of controlling the Loosestrife. Each season, herbicide has been applied to all PL plants that lacked evidence of the bio-control species to reduce seed production and dispersal.

Long Lake will be revisited in 2019 to survey for all Aquatic Invasive Species, and to implement control measures on the PL population where needed.

Loon – 31057100 - PL
Our crew has been implementing a Purple Loosestrife management plan on Loon Lake since 2010. Our original survey revealed approximately 25 Purple Loosestrife plants to the west of the Public Access. The PL seed was obviously coming through the culvert from Long lake.

Annual herbicide applications have eliminated the resident population of PL on Loon Lake but seed continues to come through the culvert from the South and new seedlings appear each year.

We will continue to visit Loon Lake annually to make herbicide applications to any Purple Loosestrife found emerging from the residual seed bank and to survey the entire lake for any new introductions of Aquatic Invasive Species.

Lower Balsam – 31024700 - PL
Our AIS crew has been implementing a Purple Loosestrife management plan on Lower Balsam Lake since 2016 which integrates both biological and chemical control methods.

Purple Loosestrife was discovered on Little Balsam Lake in 2016, found in scattered dense patches periodically throughout the lakeshore. Herbicide was applied to all PL found in 2016 and the density of these patches came back in 2017 about 25% of what they were before the treatment.

In 2017 and 2018 we released a total of 5,806 Galerucella beetles throughout the PL along the East shore where the PL is most abundant. The Galerucella Beetle population appears to be reproducing very well and there is obvious insect damage to most of the PL along the east shore.

Any PL found with no insect damage was treated with herbicide to assist the biological control in the reduction of seed output. We will revisit Lower Balsam Lake in 2019 to survey for all Aquatic Invasive Species and to monitor the populations of both the Purple Loosestrife and the Galerucella Beetles.

Lower Lawrence – 31023800 - PL
Our crews have been implementing a Purple Loosestrife management plan on Lower Lawrence Lake since 2009 which focuses solely on chemical control due to the low plant density and accessibility of the PL population.

Our annual herbicide applications had reduced the PL population at this site form the original 10 mature plants in 2009 to 2 seedlings in 2017.

There was no PL found at this original PL site on the North end of the lake in 2018, however, one mature plant was discovered along the South shore; herbicide was applied to the one plant. We will revisit Lower Lawrence Lake in 2019 to survey the entire lake for any new introductions of Aquatic Invasive Species and to perform chemical control measures on any PL found.

Maple - 31077300 - PL
Our AIS crew has been implementing a Purple Loosestrife management plan on Maple Lake since 2008 which focuses on chemical control.

We have reduced the PL population from the original 25 mature plants in 2008 to 1-2 seedlings each year that emerge from the residual seed bank.

This season we found 2 seedlings at the PL site along the west shore, as well as, 1 mature plant at the very Northern tip of the lake. Herbicide was applied to all PL found.

We will return to Maple Lake in 2019 to implement control measures on any PL found and to survey the entire lake for new introductions of AIS.

McKinney - 31037000 - EWM, PL
Our AIS crew has been implementing a Purple Loosestrife management plan on McKinney Lake since 2012 which integrates both biological and chemical control methods. We have also been mapping the Eurasian Watermilfoil since 2015.

There is a continuous dense stand of Purple Loosestrife that can be found throughout a majority of the shoreline being the densest in the NW corner of the Lake and throughout the cattails along Hwy 38.

Since 2013, we have released 8,429 Galerucella Beetles throughout the entire shoreline of McKinney. Annual Herbicide applications have been made to all PL plants found that lack evidence of the bio-control species in order to reduce seed production and dispersal.

Eurasian Watermilfoil can be found in a continuous ring around the lake in 6-12 feet of water. The DNR, in cooperation with the Itasca AIS program, has a plan to chemically treat the Milfoil in 2019.

We plan to revisit McKinney Lake in 2019 to survey for all AIS, implement biological and chemical control efforts on the PL population, and to evaluate the success of the EWM control project.

Mike's (Clubhouse Chain) - 31096600 - PL

The Itasca AIS crew has been implementing a Purple Loosestrife management plan on the Clubhouse Chain of Lakes since 2009 which focuses on chemical control because of the low density and accessibility of the Purple loosestrife.

At the time of our first survey, there were approximately 30 PL plants among a 40-yard stretch on the South shore of Mike's Lake. We have applied herbicide to all PL plants found on Mike's lake every season since 2009 to work towards the depletion of the residual seed bank.

During our 2018 survey, there were 5 PL plants found among the SE shoreline.
Mike's Lake will be revisited in 2019 to implement control measures on the PL population and to survey the entire chain of lakes for new introductions of AIS.

Mississippi River – ZM, PL, CLP

In the 2017 season, our crew tracked the spread of Zebra mussels for 17.5 miles from the Winnie Dam, through Little Winnie Lake, and downstream through the Mississippi River to the confluence of the Leech River. We did not find any ZM's downstream of the Leech River confluence at that point although it is likely they had made it further.

This season, we tracked the spread of the Zebra Mussels another 20 miles downstream to the bridge at Hwy 6 South. The 2 Mussels we found here were very small, just millimeters in length, which likely means they were the young of the year.

In future seasons we can expect to see Zebra Mussels infiltrate into the nearby lakes connected to the Mississippi river; Blackwater, Jay Gould, Little Jay Gould, and Pokegama.

We did locate a seemingly separate Zebra Mussel colony in the Blandin Reservoir and downstream through the lower portion of the Mississippi River. Although the mussels found here were full size adults, there were no Zebra Mussels located upstream between the Hwy 6 bridge and the Pokegama Dam (14 miles of river). The Upstream population will likely connect with the Blandin Reservoir population in 2019.

Curly Leaf Pondweed and Purple Loosestrife are also present in the stretch of the Mississippi river between Blackwater Lake and The Prairie River confluence. Both species have populations that fluctuate from year to year depending on water levels.

Our crew has released 31,889 Galerucella Beetles between the River Road bridge and the Prairie River confluence for the biological control of Purple Loosestrife between the years of 2012 and 2017. Herbicide has been applied annually to all PL that showed a lack of a bio-control population.

Starry Stonewort is currently known to be invading Winnibigoshish Lake but has not yet been discovered in the Mississippi River downstream.

Our crew will survey multiple stretches of the Mississippi River in 2019 to implement control measures on the PL population, monitor the spread of Zebra Mussels and Curly Leaf Pondweed, and to detect any new introductions of AIS.

Moose – 31072200 - PL, CLP
Our crew has been implementing a Purple Loosestrife management plan on Moose lake since 2010 which integrates biological and chemical control. We have been managing the Curly Leaf Pondweed on Moose Lake since 2016 via mechanical control (hand-pulling).

In 2016, we located an approximate 40 square foot patch of Curly Leaf Pondweed along the cattails, just west of the South public access. After 3 short sessions of hand-pulling, we had removed all the CLP. There was no Curly Leaf found in Moose Lake in 2017 or 2018.
We will continue to revisit this site annually to remove any CLP if it happens to come back.

As of 2018, the Purple Loosestrife population has been isolated to the bio-control areas on the NW shore in front of the Moose Lake Resort and within the creek that flows between Moose Lake and Deer lake.

Herbicide is applied annually to all Purple Loosestrife found on Moose Lake that lacks evidence of the bio-control population.

We will revisit Moose Lake in 2019 to implement control measures on the PL and CLP and to survey the entire lake for new introductions of AIS.

Napoleon - 31029000 -PL
Our crew has been implementing a Purple Loosestrife management plan on Napoleon lake since 2013 which integrates biological and chemical control methods.

In 2013, we had found dense patches of PL throughout a majority of the shoreline. Herbicide was applied to all PL found in 2013 and 2014 to knock back the dense vegetation and to reduce the seed output and dispersal.

In 2015, we began introducing Galerucella Beetles to three areas of Napoleon Lake where the PL was the densest; we have released 3,086 Galerucella Beetles throughout Napoleon lake since 2015. Herbicide has been applied annually to all PL found outside of these bio-control areas.

This year, Purple Loosestrife was only found in the bio-control areas except one small patch in the NW corner of the lake.

We will revisit Napoleon Lake in 2019 to add Galerucella Beetles to the bio-control population, apply herbicide to all PL found outside of the bio-control areas, and to survey the entire lake for new introductions AIS.

Northstar – 31065300 - ZM
In 2017, a shore land owner had discovered a Zebra Mussel population while removing their dock / boat lift from the lake.

In 2018, the Zebra Mussel colony is fairly abundant along the East shore of the main lake but less frequent among the rest of the lake. There are many areas of Northstar where the sediment is clay; we did not find any Zebra Mussels in these areas.

We plan to visit Northstar Lake again in 2019 to document any changes occurring in the Zebra Mussel population, as well as, to survey for the presence of all other Aquatic Invasive Species.

O'brien – 31003200 –PL
Our Crew has been implementing a Purple Loosestrife management plan on O'brien Lake since 2016 when we discovered 17 separate PL locations throughout the lake.

Our herbicide applications had confined the Purple Loosestrife to 9 locations in 2017 and there were only 5 individual plants found on the entire lake this season in 2018.

We will revisit O'brien Lake in 2019 to implement PL control measures and to survey the entire lake for new introductions of AIS.

Pokegama - 31053200 - *ZM, PL, CLP
The Itasca AIS program has been implementing a Purple Loosestrife management plan on Pokegama Lake since 2012 which integrates biological and chemical control methods.

We released 6,800 Galerucella Beetles in a stand of dense PL on the West shore of Sherry's Arm in 2013; the biological control species has reproduced very well and have reduced the PL population dramatically at that site.

There are other various PL sites around Pokegama Lake. The Invasive plant has been eliminated form many of the sites yet there are new PL discoveries each season.

CLP is present along the shallow flat area of Tioga bay and into the channel connected to Little Jay Gould Lake where Curly Leaf Pondweed is abundant. In 2017, we discovered a couple new patches of CLP just inside the harbor leading to the Pickled Loon Saloon.

Although there have been no Zebra Mussels located in Pokegama, it has been placed on the MN DNR's Infested Waters List because of its connectedness to the Mississippi River which has a Zebra Mussel colony infiltrating downstream from Lake Winnibigoshish. Blackwater, Jay Gould, and Little Jay Gould Lakes are also now on the infested Waters List.

We will revisit Pokegama lake in 2019 to implement control measures on the Purple Loosestrife population, monitor any changes in the Curly Leaf Pondweed population, and to survey the entire lake for new introductions of AIS.

Portage – 31082400 – PL

Our crew has been integrating biological and chemical control methods on the Purple Loosestrife population of Portage Lake since 2009. When discovered, the Purple Loosestrife population was present throughout 80% of the entire shoreline with the most-dense population found along the western residential shoreline. There have been 38,317 Galerucella beetles released on the shores of Portage since 2009 and the success of their reproduction varies from year to year.

This season, the bio-control population seemed to struggle so our crew applied herbicide to all PL found that showed minimal damage from the insects.

Due to the direct connection to Sand Lake, Portage Lake is now also infested with a Zebra Mussel population. The mussels are not extremely over populated, and it was tough to find any throughout the littoral zone during our survey this season.

Our crew will revisit Portage Lake in 2019 to survey for all Aquatic Invasive Species, monitor any changes in the Zebra Mussel population, and to implement control measures on the Purple Loosestrife population.

Prairie - 31038400 – CLP

Our crew has mapped the Curly Leaf Pondweed population on Prairie Lake since 2015. The population has become more widespread between 2015 and 2018, increasing from 3 original sites to around 15 sites throughout the lake.

Most of the patches discovered in 2015 were less than 10ft X 10ft in area except for the site in the far SE end of the lake near the dam where there was a solid patch of CLP around 20 acres in size.

This season all the CLP patches that were found in 2015 had increased slightly in area to around 15ft X 15ft; the CLP near the dam still covered about 21 acres of water.

We will return to Prairie Lake in 2019 to search for new introductions of AIS and to map the existing Curly Leaf Pondweed population.

Prairie River – PL

In 2016, there was 1 Purple Loosestrife plant found growing under the Hwy 169 Bridge; herbicide was applied to that one plant. There has been no Purple Loosestrife found at that location since. We will survey the Prairie River in 2019 for the presence of any Aquatic Invasive Species and to apply herbicide to any Purple Loosestrife found.

Rice – 31087600 - ZM
See description for *Sand Lake Chain*

Rush Island – 31083200 - PL
Our AIS crew discovered 1 mature flowering Purple Loosestrife plant just East of the Rush Island public access in 2015. Herbicide was applied to this one plant and PL has not been found since.

We will survey Rush Island again in 2019 to search for any new introduction of AIS and to apply herbicide to any PL, if found.

Sand Lake Chain - 31082600 - ZM, PL
Our AIS crew has been implementing a Purple Loosestrife management plan on Sand Lake since 2009 which integrates both biological and chemical control methods.

The PL has historically been found scattered among the southern bays in sparse patches except for the SW bay that the Bowstring River flows into; the PL is abundant throughout the boggy shoreline of the Bowstring River.

There have been over 100,000 Galerucella Beetles released throughout the SW bay of Sand Lake, the Bowstring River, and Bowstring Lake since 2007; the success of the bio-control population fluctuates from year to year. Herbicide has been applied annually to all Purple Loosestrife found in areas that lie outside of the bio-control areas.

Although Zebra Mussels are still abundant in Sand Lake, their population has seemed to decrease in certain areas. The thick sheets of ice that form in the winter reach the bottom of the lake out to about 3-4 feet of water. This freezes the ZM's solid and gives the appearance of a declining population. The mussels in deeper water are unaffected by the ice and are still flourishing.

As discovered in 2017, The Zebra Mussel population from Sand Lake have spread North through the Bowstring River in to Dora Lake and the Bigfork River.
For More information on the spread of this Zebra Mussel colony, see the description for *Dora Lake*.

We will revisit Sand lake in 2019 to implement control measures on the Purple Loosestrife population, monitor any changes in the Zebra Mussel colony, and to search for new introductions of AIS.

Sand – 31043800 – PL
Our crew has been implementing a Purple Loosestrife management plan on Sand Lake since 2010 which focuses solely on chemical control. At the time of our first survey there were over 100 mature PL plants within a 150-yard stretch along the South shore, West of the landing. There was also one plant found in the NW corner of the lake.

There has been a steady decline in the density of PL on Sand Lake due to the annual herbicide applications and this season there were only 6 seedlings found emerging from the residual seed bank.
We will return to sand Lake in 2019 to maintain control of the Purple Loosestrife population and to survey the entire lake for new introductions of Aquatic Invasive Species.

Smith – 31065000 - CLP, PL
The Itasca AIS crew has been implementing a Purple Loosestrife management plan on Smith Lake since 2007 which integrates both biological and chemical control methods.

At the time of our original 2007 survey, PL was found to be abundant along a majority of the shoreline, being most-dense in the boggy bay portions of the lake. Historically, Galerucella Beetles have been released in areas where PL is the densest and herbicide has been applied to all PL plants found outside of the bio-control sites

The bio-control insects do not reproduce very well in the areas where they have been released and were not slowing down the spread of the Purple Loosestrife, so we began applying herbicide to all PL in 2012. Since 2012 we have seen a major decline in the PL around the lake although there is still an abundant seed bank in the boggy sections on the south shore.

In 2016, we located a small patch of Curly Leaf Pondweed just out from the landing, but it is too deep for our crew to hand-pull.

We will revisit Smith Lake in 2019 to implement control measures on the Purple Loosestrife population, monitor any changes in the Curly Leaf Pondweed population, and to search for any new introduction of Aquatic Invasive Species.

Snaptail - 31025500 – PL
The Itasca AIS crew has been implementing a Purple Loosestrife management plan on Snaptail Lake since 2012 which integrates both biological and chemical control methods.

The Purple Loosestrife is very abundant among approximately 80% of the shoreline of Snaptail Lake. Since 2012, we have released 20,750 Galerucella Beetles throughout the densest PL stands on the lake and applied herbicide to all PL that was found outside of the bio-control areas.

The population of Galerucella Beetles has increased significantly over the last 3 seasons and has reached the point of causing extreme damage to the Purple Loosestrife along the western and northern shores. Although there is significant beetle damage along the eastern and southern shores as well, there are still PL plants in those areas that show minimal beetle damage. Herbicide is applied annually to all PL that shows minimal evidence of the bio-control population.

Snaptail Lake will be revisited in 2019 to implement control measures on the Purple Loosestrife population and to search for any new introductions of Aquatic Invasive Species.

South Sturgeon/Little Sturgeon – PL **31000300/69129000**
Our AIS crew has been implementing a Purple Loosestrife management plan on the Sturgeon Chain of Lakes since 2017 when there was 1 PL plant located on the south side of the channel, east of the County Road 473 Bridge. This 1 PL plant looked as if it was imported with the soil used for the construction of the new bridge.

There was no Purple Loosestrife found in 2018 at this site or anywhere else in the entire chain of lakes.

We will revisit the Sturgeon Chain of Lakes in 2019 to implement control efforts on any Purple Loosestrife found and to search for any new introductions of Aquatic Invasive Species.

South Sugar – 31055500 – PL
The Itasca AIS crew has been implementing a Purple Loosestrife management plan on South Sugar Lake since 2013 which focuses solely on chemical control.

At the time of discovery there were about 15 mature PL plants within a 30-yard stretch along a residential portion of the North Shore.

There have consistently been fewer PL plants sprouting from the seed bank each season due to our annual herbicide applications. There were just 2 plants found this season emerging from the residual seed bank. The reduction in Purple Loosestrife at this site has resulted in a the emergence of multiple Showy Lady Slippers that had displaced by the invasive plant population.

Our crew will revisit South Sugar lake in 2019 to implement Control measures on the Purple Loosestrife population, if needed, and to search the lake for any new introductions of Aquatic Invasive Species.

Spider - 31053800 – FR
Our AIS Control & Monitoring crew has been implementing a Flowering Rush control project on Spider Lake since 2015 which consists solely of hand-pulling the plants.

At the time of discovery, there were 2 patches of Flowering Rush near the public access totaling about 140 sq. ft. in size.

Each season the density and infested area of the Flowering rush patch has dramatically been reduced due to our control efforts.

This season, there were about 12 small FR plants located, uprooted, and removed from the lake.

We will return to Spider Lake in 2019 to implement control measures on the Flowering Rush population and to survey the entire lake for any new introductions of Aquatic Invasive Species.

Swan – 31006700 - CLP, PL
Our AIS Control & Monitoring crew has been implementing a Purple Loosestrife management plan on Swan Lake since 2010 which consists solely of chemical control methods.

There are two areas of Swan Lake that have consistently had a sparse PL population. There have also been a couple random single plants located throughout the lake over the past 9 seasons.

Herbicide has been applied to all PL plants found during our annual lake surveys and there has been a major reduction in the number of plants that emerge from the seed bank each year.

We began surveying for all Aquatic Invasive Species and mapping the Curly Leaf Pondweed on Swan Lake in 2015, and since then, we have witnessed the Curly Leaf Pondweed explode in population density throughout the Western portion of the lake. There are large dense patches reaching the surface in much of the West Bay, inhibiting the normal recreational use of the lake.

The CLP is further spreading into the East basin of the lake to the north and south. One small patch of CLP was located on the very northern tip of the East basin in 2017.

We will revisit Swan Lake in 2019 to maintain control of the Purple Loosestrife population, map any changes in the Curly Leaf Pondweed population, and survey the entire lake for new introductions of Aquatic Invasive Species.

Trout - 31021600 - PL, FR
Our crew has been implementing management plans on Trout Lake for Purple Loosestrife since 2013 and Flowering Rush since 2015.

The PL has historically been located in the drainage ditch, east of the North Public Access and the Flowering Rush site is located just out from the boat ramp at the same access.

There has been no Purple Loosestrife or flowering Rush found within Trout Lake since 2016 due to our control efforts. If Trout Lake remains void of Flowering Rush until 2020, it may be removed from the MN DNR's Infested Waters List.

We will revisit Trout Lake in 2019 to ensure the eradication of Flowering Rush and Purple Loosestrife and to conduct another full-lake survey for all Aquatic Invasive Species.

Trout – 31041000 - PL
Our AIS Control & Monitoring Crew has been implementing a Purple Loosestrife management plan on Trout Lake, and the entire Wabana Lake chain since 2009 which consist solely of chemical control.

At the time of discovery, there was a continuous stand of Purple Loosestrife on the North end of the lake spanning from the Public Access to the creek in the NE corner. There was also 1 small patch of PL located on the West Shore.

Due to 10 seasons of herbicide applications, the Purple Loosestrife population has been dramatically reduced each season and this year there was only 1 PL plant located about 100 yards to the East of the Public Access.

Our Crew will revisit Trout Lake, and the entire Wabana Lake Chain, in 2019 to implement control measures on the PL population, if needed, and to search for any new introductions of Aquatic Invasive Species.

Turtle – 31072500 - PL
Our AIS Control & Monitoring crew has been implementing a Purple Loosestrife management plan on Turtle Lake since 2007 which integrates both biological and chemical control methods.

At the time of our first survey, Purple Loosestrife was found to be very abundant throughout the Western arm of the lake; the East half of the lake only had one PL location.

Since 2007 there have been 67,649 Galerucella Beetles released among 4 bio-control areas on Turtle Lake; those sites are the areas where Purple Loosestrife is still densely populated. Herbicide has been applied annually to all Purple Loosestrife located outside of the bio-control area. A great majority of the chemical control sites now have no PL present.

Our crews will visit Turtle Lake again in 2019 to implement control efforts on the Purple Loosestrife population and to survey the entire lake for any new introductions of Aquatic Invasive Species.

Twin - 31002600 – PL
The Itasca AIS Control & Monitoring crew has been implementing a Purple Loosestrife management plan on Twin Lake in Pengilly, MN since 2014 which integrates both biological and chemical control methods.

At the time of our first survey of Twin Lake, Purple Loosestrife was found to be abundant throughout the shoreline of the East basin and there was a 40-yard stretch of shore in the center basin of the lake that had a sparse PL population.

Since 2015, there has been 5,594 Galerucella Beetles released throughout the East basin of the lake where the Purple Loosestrife is the densest. Some bio-control areas appear to be very conducive to the reproduction of the bio-control insect; other areas show no evidence of the insect species.

Herbicide has been applied annually to all Purple Loosestrife located on Twin Lake that showed no sign of the bio-control species to prevent seed production and dispersal.

Our crew will revisit Twin Lake in 2019 to implement control measures on the PL population and to survey the entire lake for any new introductions of Aquatic Invasive Species.

Twin – 31039100 - FR, EWM, PL
Our AIS Control & Monitoring crew has been mapping the Purple Loosestrife on Twin Lakes since 2012 and mapping the Flowering Rush and Eurasian Milfoil since 2015.

The stand of Purple Loosestrife on the North shore has supported great beetle reproduction year after year and this site has supplied a large portion of the bio-control insects that we have dispersed throughout Itasca County. The beetle population seems to be lower than past years but that is likely due to the number of beetles we have collected in the past 7 seasons as well as the slightly higher water level.

At the time of our first survey, FR was found in scattered dense patches in North Twin Lake and there were 2 small patches located in South Twin.

Since 2015, we have witnessed the Flowering Rush density increase dramatically to the point where there is now a continuous population of it around most of the lake in about 5 feet of water or less. Despite chemical control efforts that had been contracted by the MN DNR, the Flowering Rush is well on its way to dominating the littoral zone of Twin Lakes. We may attempt to collaborate with the DNR to create a more intensive FR management plan in the future to lessen the ecological impact of the invasive plant.

Eurasian Watermilfoil is scattered, mostly along the eastern shore, in low density populations and have not changed much since our initial 2015 survey. There are two large patches of the native species Northern Watermilfoil that have been increasing in area every season. When the native plants explode in population like this, it usually means there is an excess of nutrients entering the lake in that area.

We will return in 2019 to monitor the Galerucella beetle population and collect some if the population will support it. We will also map any spread of the Eurasian Watermilfoil and Flowering Rush as well as, search for any new introductions of Aquatic Invasive Species while we conduct our survey.

Wasson – 31028100 – PL
Our AIS Control & Monitoring crew has been implementing a Purple Loosestrife management plan on Wasson Lake since 2016 which focuses solely on the use of chemical control methods.

Our annual herbicide applications have reduced the PL population at this site from 6 Large flowering PL bushes to just a few seedlings that sprout from the residual seed bank each season. This season there were 4 PL plants found which were treated with herbicide.

Our crew will revisit Wasson Lake in 2019 to maintain control of the Purple Loosestrife population and to search for any new introductions of Aquatic Invasive Species.

Winnibigoshish - 31014700 - ***(North shore from Plughat Landing to West Winnie Landing)*** ***ZM*****, FS, PL, SSW**

Our crew began mapping the populations of Zebra Mussels, Starry Stonewort, Faucet Snails and Purple Loosestrife in Lake Winnibigoshish in 2016.

We have been applying herbicide to the Purple Loosestrife population at the mouth of Raven Creek since 2016 when we located 8 mature flowering plants. This is the only PL location that we could find on Winnibigoshish Lake.

For the past 2 seasons, there have only been a few seedlings emerging from the residual seed bank in this location, although they are a bit more widespread than our original survey. The PL plants seem to be isolated near duck blinds along this point.

Over the last three seasons, our crew has witnessed the Starry Stonewort population explode from being only sparsely found near the West Winnie Public Access to the point now where it blankets the bottom of the lake in much of the shallow areas along the West and East shores. SSW is also found in a dense monoculture covering the 10-15 ft drop off in most places that we had sampled.

Over this same period (2016-2018), we have witnessed the Zebra Mussel population dominate the lake. Zebra Mussels can be found attached to pretty much every hard surface throughout Winnibigoshish and have spread through Cutfoot Sioux, Little Winnibigoshish, and the Mississippi River.

Faucet Snails have been present in Winnibigoshish for well over a decade. We take note when we find them in samples, but they truly are not a species of concern for our Control & Monitoring crew.

Our crews will visit Winnibigoshish Lake again in 2019 to maintain control of the Purple Loosestrife population, map any changes in the Starry Stonewort population, and search for any introductions of new Aquatic Invasive Species to the lake.

Itasca County Lakes Surveyed to Date - No AIS Present

-Organized by Year of Survey-

2015

Arrowhead-31080500
Balsam-31025900
Bello-31072600
Beauty-31002800
Bluewater-31039500
Burnt Shanty-31042400
Caribou-31062000
Cavanaugh-31057201
Cottonwood-31059400
Day-31063700
Dixon-31092100
Forest-31066300
Grave-31062400
Guile-31056900
Hay-31040700
Holland-31080400
Island-31091300
Island-31040600
Jessie-31078600
King-31025800
Lammon Aid-31009600
Little Bass-31057500
Little Deer-31075100
Little Moose-31061000
Little Sand-31009300
Little Splithand-31034100
Long-31000100
Loon-31010400
Lower Panasa-31011200
New-31070000
North Star-31065300
O'Leary-31070000
Pancake-31016000
Pughole-31060200
Reed-31074000
Round-31089600
Ruby-31042200
Siseebakwet-31055400
Smith-31054700
Splithand-31035300
Stingy-31051000
Tank/Helen-31023000
Tioga Pit-31094600
Trestle-31080300
Wabana-31039200
Whitefish-31084300
Woodtick-3103570

2016

Antler -31034900
Ball Club-31081200
Barwise/Cedar-31027800
Batson-31070400
Battle-31019700
Bear-31015700
Beatrice - 31005800
Beaver-31026100
Big Island-31067100
Big McCarthy-31012000
Big Ole-31067000
Big Sucker-31012400
Big Too Much-31079300
Birdseye-31083400
Black Island-31041600
Blind Pete-31028500
Bosely-31040300
Brown-31042500
Buck-31006900
Burns-31065400
Burrows-31041300
Busties-31053000
Button Box-31017500
Cad-31065500
Cameron-31054400
Canisteo Pit-31128200
Carlson-31036600
Charlie-31041900
Chase-31074900
Clear-31084500
Clearwater-31040200
Cowhorn-31035600
Cresent-31029400
Dead Horse-31062200
Decker-31093400
Deer-31033400
Dinner Pail-31055100
Dock-31064900
Dollar-31013900
Dora-31088200
East-31046000
Elbow-31032800
Grass-31072700
Greeley-31086300
Gunderson-31078200
Gunn-31048000
Gunny Sack-31026700
Hale-31037300
Hatch-31077100
Highland-31048100
Island-31021700
Island-31075400
Jack the Horse-31065700
Johnson-31068700
Johnson-31058600
Kelly-31029900
Klingenpiel-31019400

2016 Cont'd

Kremer-31064500
Larson-31031700
Lawrence-31023100
Little Ball Club-31082200
Little Bass-31054100
Little Bear-31015600
Little Bowstring-31075800
Little Cowhorn-31019800
Little Island-31002200
Little Jessie-31078400
Little McKewen-31068300
Little Ole-31067600
Little Rice-31071600
Little Siseebakwet-31073300
Little Smith-31067900
Little Wabana-31039900
Long-31026601
Long-31060500
Long-31078100
Lost-31028900
Lost Moose-31043200
Lower Pigeon-31089300
Maple-31055200
McAvity-31058500
McGuire-31013200
McKewen-31068200
Middle Hansen-31039600
Middle Pigeon-31089200
Mink-31045500
Mirror-31016000
Moose-31089800
Moose-31019200
Nickel-31047000
Noma-31083700
Nose-31041700
Orange-31058700
O'Reilly-31021900
Owen-31025200
Oxhide-31010600
Peterson-31079100
Pickerel-31033900
Pickle-31029100
Pine-31047800
Raddison - 31028400
Rice - 31071700
Round - 31026800
Rush Island - 31083200
Sand - 31082000
Scooty - 31015000
Shallow - 31084000
Shamrock - 31021800
Snowball - 31010800
Someman - 31027600
Spring - 31078900
Thistledew - 31015800
Tuttle - 31072500
West Smith - 31068000
Wilson - 31032000
Willow - 31077500
Wolf - 31015200

2017

Bass – 31031600
Bass - 31083300
Biauswah -31086200
Big Rose - 31076800
Birch - 31026300
Bluebill - 31026500
Buckman - 31027200
Carpenter - 31064100
Cutaway – 31042900
Duck - 31031400
Elbow - 31078300
Erskine-31031100
Farley - 31090200
Fawn – 31060900
Five Island - 31028300
Fox - 31046300
Gale - 31051300
Gauze – 31028800
Ghost - 31066200
Johnson - 31005900
Lake of the Isles - 31050600
Little Cottonwood-31059500
Little Moose -31016200
Little Whitefish - 31083600
Minisogama -31093000
Morph – 31092900
Mosomo - 31086100
Pear - 31067500
Pigeon River Flowage-31089400
Roosevelt - 31124700
Section 11 - 31006000
Shallow Pond - 31091000
Sioux - 31090700
Spruce - 31084900
Sucker - 31031200
Trout Coleraine - 31021600
Wagner - 31091200
Wilderness - 31090100
Wirt - 31084800

2018

We decided that our time was best spent revisiting High Priority/High Risk Lakes in 2018 rather than new lakes with very low risk of AIS infestation. Most Lakes on the following list had already been Surveyed between 2015-2017.

NEW Little Pokegama Lake
NEW Prairie River (Hwy 65 to Wolf Lake)
Siseebakwet – 31055400
Little Jessie – 31078400
Jessie – 31078600
Caribou – 31062000
Long – 31060500
Grave – 31062400
Burrows – 31041300
Ruby – 31042200
Lost Moose – 31043200
Little Island – 31002200
Wabana – 31039200
Bluewater - 31039500
Little Trout – 31039400
Dollar – 31013900
Little Moose – 31061000
Splithand – 31035300
Smith – 31054700
Deer – 31033400
Pickerel – 31033900
Five Island – 31018300

Biological Control of Purple Loosestrife

Purple Loosestrife Defoliating Beetles (*Galerucella spp.*) were collected from North Twin Lake (Marble, MN) and Kelly Creek (Kelly Lake, MN) in the 2018 season.

The collected beetles were released throughout known dense stands of Purple Loosestrife in these locations in 2018:

- 5,079 Beetles released along Maple Creek, Moose Bay, and Alex Bay of Turtle Lake
- 2,871 Beetles released North of Hwy 169 East of Bovey; ATV trail through wetland
- 3,041 Beetles released throughout the Southern bays of Deer Lake
- 1,173 Beetles released throughout the creek at the southern tip of Eagle Lake
- 500 Beetles released along the East, South, and West shores of Forest Lake
- 2,000 Beetles released throughout the North shore of Hale Lake (Grand Rapids)
- 7,067 Beetles released East of Hwy 65, South of Swan River
- 1,924 Beetles released along the East shore of Lower Balsam Lake
- 4,908 Beetles released throughout the bays in the NW corner of McKinney Lake
- 2,532 Beetles released in 3 separate areas of Napoleon Lake
- 552 Beetles released along Plum Creek, East of Hwy 6
- 3,031 Beetles released along the entire shore of Portage Lake (Sand Lake Chain)
- 2,840 Beetles released along the entire shore of Snaptail Lake

Total of 37,518 Galerucella Beetles Collected and Relocated in 2017

Due to high water at our beetle collection sites, the Galerucella populations struggled this season and our collection numbers were considerably lower than past seasons.

Complete 2007-2018 Beetle Release Table on next page.

Itasca SWCD - AIS Control Monitoring
2007-2018 Galerucella Beetle Summary

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Site Total
Turtle Lake	4,800	16,100	12,800	1,700	5,600	3,700	0	2,885	4,481	6,004	4,500	5,079	67,649
4th St GR Beaver Pond	0	0	0	0	0	0	0	0	0	3,600	1,900	0	5,500
Blandin Reservoir	0	0	0	0	0	0	0	0	0	0	3,603	0	3,603
Blind Lake	0	0	0	0	0	0	1,500	790	0	0	0	0	2,290
Bovey – ATV Trail	0	0	0	0	0	0	0	0	0	6,261	8,369	2,871	17,501
Bowstring Lake/River	5,500	9,500	6,100	7,500	4,600	25,400	9,200	14,319	13,155	1,650	3,230	0	100,154
Creek/ Deer River	0	0	0	0	0	0	800	200	0	0	0	0	1,000
Crystal/Ice Lake	0	0	0	0	0	0	0	0	455		1,500	0	1,955
Cty RD135 Cass Cty	0	0	0	0	0	0	0	3,685	0	0	0	0	3,685
Deer Lake	0	0	0	0	0	2,300	7,700	2,000	500	10,028	3,698	3,041	29,267
Donated to DNR	0	0	0	0	0	5,500	5,750	6,000	0	3,365	2016	0	22,631
Donated to Leech Tribe	0	0	0	0	0	0	0	0	0	0	2,442	0	2,442
Donovan Pond	0	0	0	0	0	0	0	0	0	5,900	0	0	5,900
Eagle Lake	0	0	0	0	0	0	0	5,095	0	4,316	6,000	1,173	16,584
Forest Lake	0	0	0	0	0	0	1,300	1,100	0	200	2,035	500	5,135
Hale Lake	0	0	0	0	0	0	900	9,007	0	0	0	2,000	11,907
Holman Lake	0	0	0	0	0	0	5,600	0	0		3,675	0	9,275
Hwy 65/Nashwauk	0	0	0	0	0	0	0	0	0	0	1,000	0	1,000
Hwy 65/Swan River	0	0	0	0	0	0	0	0	2,900	6,928	11,614	7,067	28,509
Kelly Creek RD	0	0	0	0	0	0	0	200	0	0	0	0	200
L&M Wetland	0	0	0	0	0	0	0	0	0	2,278	2,015	0	4,293
Leighton Lake	0	0	0	0	0	0	2,000	5,500	0	0	0	0	7,500
Little Drum Lake	0	0	0	0	0	0	0	0	0	0	448	0	448
Little Long Lake	0	0	0	0	0	0	2,300	4,525	7,600	2,845	750	0	18,020
Little Turtle Lake	0	0	0	0	0	0	0	2,563	2,500	1,650	2,250	0	8,963
Long Lake	0	0	0	0	0	500	4,700	1,500	400	0	0	0	7,100
Lower Balsam Lake	0	0	0	0	0	0	0	0	0	0	3,882	1,924	5,806
McKinney Lake	0	0	0	0	0	0	1,100	1,325	630	2,616	0	4,908	10,579
Mississippi River	0	0	0	0	0	11,200	14,000	0	0	0	6,689	0	31,889
Napoleon Lake	0	0	0	0	0	0	0	0	0	1,260	0	2,532	3,792
Orty's Meats	0	0	0	0	0	0	0	0	0	0	6,794	0	6,794
Pelican Lake(Buffalo, MN)	0	0	0	0	0	0	1,100	0	0	0	0	0	1,100
Plum Creek	0	0	0	0	0	0	0	0	8,373	0	2,250	552	11,175
Pokegama	0	0	0	0	0	0	6,800	0	0	0	0	0	6,800
Portage	0	0	7,300	3,000	9,900	6,600	0	0	0	786	10,731	3,031	41,348
Schafer Creek	0	0	0	0	0	0	0	0	0	0	4,000	0	4,000
Serpent	0	0	0	0	0	0	0	2,000	0	0	0	0	2,000
Snaptail	0	0	0	0	0	3,200	2,400	750	6,302	5,258		2,840	20,750
SugarLakeGolfCourse	0	0	0	0	0	0	0	750	0		2,000	0	2,750
The Deer River	0	0	0	0	0	0	0	0	0	0	5,000	0	5,000
Twin Lakes(Pengilly)	0	0	0	0	0	0	0	0	3,783	0	1,811	0	5,594
YMCA Wetland	0	0	0	0	0	0	0	0	0	0	1,500	0	1,500
Yearly Total	10,300	25,600	26,200	12,200	20,100	58,400	67,150	64,194	51,079	64,945	105,702	37,518	543,388

-Purple Loosestrife Eradication-

The following list of lakes have had Purple Loosestrife infestations in past seasons. Due to the control efforts of our AIS Control & Monitoring Crew, Purple Loosestrife has been eradicated from these lakes:

Batson – 31070400
Little Ranier – 31066000
Hatch – 31077100
Trout (Coleraine) – 31021600
Rush Island – 31083200

We will continue to visit these sites periodically to ensure the depletion of the residual seed bank.

-Purple Loosestrife Roadside Management-

Purple Loosestrife is an Aquatic Invasive Species that often spreads into aquatic systems from adjacent roadways. This invasive plant is by far the most widespread Aquatic Invasive Species in the United States, as well as, in Itasca County, MN.

Since 2007, our crew has taken the initiative to locate, document, and implement control efforts on all Purple Loosestrife found as a preventative tactic against its seed dispersal into the pristine waters and wetlands of Itasca County.

There are now approximately 50 roadside wetland sites throughout Itasca County where our crew is currently managing infestations of Purple Loosestrife on an annual basis. There are numerous sites where PL has been discovered and eradicated over the last 12 years, yet new sites are discovered annually.

For further information on the locations of Purple Loosestrife in Itasca County, MN, contact Chris Evans in the Aquatic Invasive Species Division of our office at (218) 280-1547 or chris.evans@itascaswcd.org.

-AIS Location Maps-

If you would like to request an AIS map of a specific body of water, contact Chris Evans in the Aquatic Invasive Species Division of our office at (218) 280-1547 or chris.evans@itascaswcd.org.

-AIS Photos- 2017-

The following collection of photographs were taken by the 2018 Itasca SWCD Aquatic Invasive Species Control & Monitoring Crew.

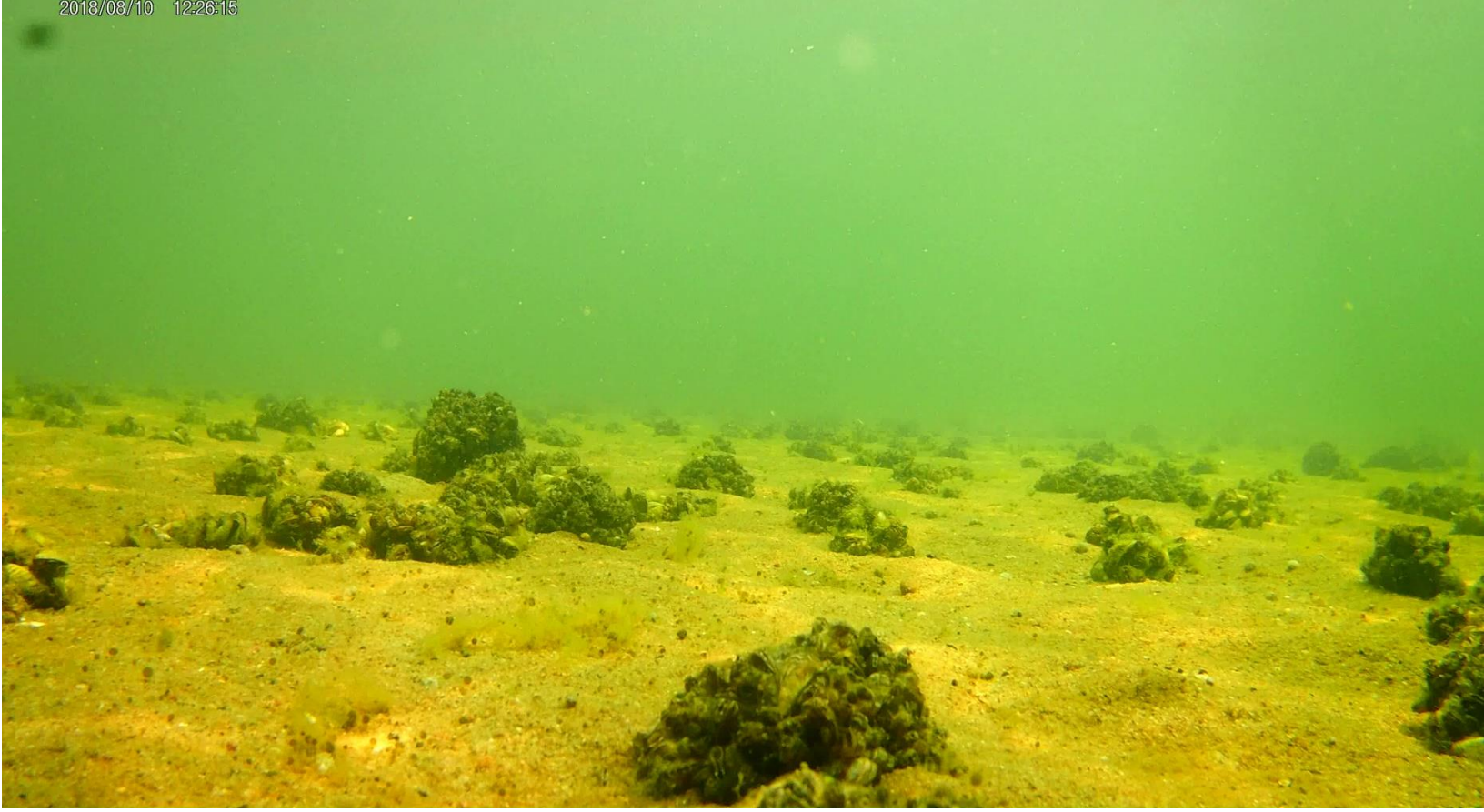
Pictured Below: Young-of-the-Year Zebra Mussels located on Rock Rip-Rap under the Hwy 6 South Bridge, West of Cohasset, MN; Mississippi River

Pictured Right:
Adult Zebra Mussels found attached to Native Mussels; Downstream of Blandin Dam; Mississippi River

Pictured Left:
Zebra Mussel Located on Rock Rip-Rap Under the Blackberry Bridge, Cty. Rd 91; Mississippi River.

Pictured Above: The Native Plant Community; West Shore, Lake Winnibigoshish (Ideal Fish Spawning Habitat)

Pictured Below: Starry Stonewort Infestation; West Shore, Lake Winnibigoshish (Fish Spawning Habitat Blanketed with Thick Vegetation)



Pictured Above: All Solid Surfaces are Encased with Zebra Mussels; Lake Winnibigoshish

Pictured Below: The 1st Zebra Mussel Discovered on Blandin Reservoir, Found Attached to our Early Detection Sampler at Public Access

Pictured Above: Closeup View of Starry Stonewort Bulbils; West Winnie

Pictured Below: Handful of Starry Stonewort Bulbils Found in 1 Sediment Sample; West Winnie Public Access