Aquatic Invasive Species

Prevention Plan

Lake County

Updated 2018

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1.0 Introduction

Aquatic Invasive Species (AIS) are threatening Minnesota waters. These non-native species harm fish populations, water quality and water recreation. This plan outlines the efforts that Lake County will undertake to help prevent the spread of harmful AIS within Lake County.

2.0 Program Priorities and Actions

Program priorities for the Lake County AIS Prevention Program include: (1) outreach and education, (2) early detection and monitoring, (3) watercraft inspections and compliance, (4) management and rapid response, and (5) partnerships. Specific actions are defined under each heading below with a brief description of the programing area.

Program priorities and action steps for Lake County's AIS Prevention Plan were developed with input from partners in the plan's original creation. In 2018, two focus groups were held to determine effective current programming and outline future efforts. At the focus group meetings, outreach and education were highlighted as a priority, specifically: face-to-face interactions such as through watercraft inspections, youth education, and materials such as signs and giveaways. Most boaters in Lake County, demonstrated in the focus groups and 2017 inspection data, utilize small power boats or kayaks/canoes/personal watercraft. Most participants also indicated a willingness to comply with AIS law, or even pay additional fees on fishing licenses for AIS prevention.

The 2018 Plan update also included input from surveys collected at public accesses. Survey results indicated conversations with watercraft inspectors were the primary source of information about AIS while signs at boat launches, regulation and registration materials, and media on TV and radio were secondary sources of information. Conversations with watercraft inspectors were considered the best source of information among those surveyed, indicating a continued need for watercraft inspectors in Lake County. Almost all watercraft users had heard of the impacts zebra mussels cause, but less so other invasive species including spiny waterflea, rusty crayfish, Eurasian watermilfoil, and purple loosestrife. Part of the survey focused on bait practices, and most respondents did use live bait. Most live bait users tossed unused bait in the woods, grass, or back home. Many watercraft users were previously unaware of bait disposal practices, and if aware, they learned about best practices from a watercraft inspector or a boating regulation book.

Although survey and focus group participation was low, programming priorities are guided around provided input from Lake County residents and public water access users where available. In addition to the five programming areas, Lake County's AIS Program will seek to keep information readily available to the public by communicating accomplishments, including through an annual report, and maintaining a strong web presence.

2.1 Outreach and Education

As a County with relatively few inland waterbody infestations compared to some in the state, Lake County is still working toward preventing AIS infestations. Prevention is best accomplished, with regards to the many associated potential vectors for AIS spread and multitude of public accesses in a water-rich region, by individuals changing their behavior to

reflect sustainable AIS prevention habits. Education and outreach are key to facilitating prevention in Lake County and remains a primary focus of programming.

Action	Narrative or Benefit to AIS Prevention
Educate youth on AIS prevention through in-school presentations, partnerships, and summer programming.	Environmental Education principles outline the effectiveness of educating about values and actions at a young age to facilitate sustainable behavior change as an adult. Facilitate education by maintaining cooperative programs with Ely Community Resource, Science Clubs, and 4-H Lake County (Water Watchers Summer Program). Conduct in-classroom presentations to Lake County youth about AIS and water resources.
Develop education curricula to guide AIS prevention specific to the region.	Curriculum development ensures best practices for education are followed. Providing written resources allows for more effective resource sharing among partners and continuity in educational approaches.
Coordinate with national or regional AIS prevention messaging by building upon and distributing existing outreach developed by the MNDNR, Wildlife Forever, the Stop Aquatic Hitchhikers Campaign, and the Minnesota Sea Grant Program.	Consistent messaging such as that from the Stop Aquatic Hitchhikers ads and “Clean, Drain, Dispose/Dry” has been proven an effective means of changing behaviors. Leveraging existing communications materials ensures that the public receives accurate messages about rules and best practices related to AIS prevention.
Develop and distribute targeted education materials for regional needs or specific groups, e.g. youth or schools, buyers and sellers of aquatic plants and animals (Greenhouses and Bait Shops), and lake-related business (home builders and developers).	Targeting AIS prevention messages to activities that may present a risk of AIS spread may be more effective than generic public awareness messages. Some regional infestations differ from national or statewide AIS concerns. Unique materials can be developed by staff or through contractors.
Develop, distribute, or otherwise provide resources on AIS prevention messages to shoreland and riparian landowners who launch watercraft from their own private residential access.	Many watercraft enter lakes and rivers from private residential property and are not reached by education and prevention efforts directed at public accesses and cooperating private non-residential accesses.

Action	Narrative or Benefit to AIS Prevention
Staff and/or host a booth or float focused on AIS outreach at area festivals and farmer's markets.	Locals and tourists attend festivals, events, and farmer's markets, which provide an effective venue for face-to-face conversations and education. Events in or near (and serving County residents) Lake County include: St. Urho's Day, Bay Days, Heritage Days, Blueberry Festival, Harvest Moon Festival, and area Farmer's Markets. Crayfish boils at farmer's markets or events, costumes, and free giveaways (e.g. towels) enrich outreach efforts. Participate in region-wide events serving Lake County residents, including the Home and Boat Shows in Duluth.
Support and ensure local businesses are reducing the risk of AIS spread.	The day-to-day operations of some businesses, whether regulated or not, can pose a risk of AIS spread. Lake Service Providers (LSPs) are required to be certified by the MDDNR. Many lake service providers (LSPs) are already decontaminating boats and can be further supported.
Develop methods and local training sessions to reduce risk of invasive species introduction through government and business operations.	The County will help prevent AIS spread by developing and sharing new risk-reduction methods and by identifying actions and operations that could contribute to AIS spread.
Train County field staff (e.g., zoning, septic system, land department) on practices to avoid spreading invasive species.	County staff can take simple steps to prevent AIS spread or new introductions and can set an example for businesses and individuals in the County.
Train County field staff (e.g., zoning, septic system, land department) on management practices that will maintain and/or create diverse, native landscapes that are resilient to invasive species.	Making the environment more resistant to AIS can help prevention AIS infestation.
Coordinate with the MNDNR to publicize new infestations at access sites, in lake association newsletters, and other local publications.	Timely and accurate notice of new AIS infestations empowers the public to help prevent the further spread of AIS.

2.2 Early Detection and Monitoring

Preventing further infestations through early detection and rapid response: By catching small infestations early, Lake County can better prevent infestations of entire waterbodies. Lake County has collected 3 years of Rusty Crayfish data on select lakes and 2 years of early detection AIS monitoring at over 80 public water accesses. Additional water chemistry, native plant, and historical infestation data from partners aids AIS monitoring. Early detection is an important tool in prevention and a focus of Lake County's AIS program.

Activity	Narrative or Benefit to AIS Prevention
Oversee and implement, with partners, a citizen science-based early detection program.	The AIS Sentry Program serves as the early detection program in the County. The AIS Detectors Program and partnership with the Ely Area Invasives Team are also key to early detection and rapid response. An early detection program ensures new infestations are properly reported and rapid response is deployed, if required.
Encourage County staff, businesses, and individuals to submit samples of suspected AIS to the MNDNR.	The County can support early detection and prevention efforts by helping the MNDNR to quickly confirm new infestations of AIS, either through an early detection program or otherwise. AIS and aquatic plants, if transported, must be brought directly to DNR offices.
Monitor all high-use public accesses in the County each season for new infestations.	Routine monitoring augments volunteer-based early detection. Conducted according to standard protocols and Lake County's AIS monitoring protocols for staff.
Conduct robust aquatic plant inventories on select high-risk lakes.	Plant infestations can sometimes go unnoticed, as aquatic plants are hard to identify. Conduct thorough plant surveys on at least 1 lake per year for aquatic invasive plants.
Conduct, or work with partners and volunteers to conduct, water quality monitoring on select high-risk lakes.	Ensuring a baseline of water quality data informs future infestation risk and monitoring efforts. Compile existing water chemistry data and monitor lakes for missing parameters. Priority parameters for each lake include calcium, alkalinity, pH, and specific conductance.
Monitor for high-risk species as need becomes apparent and according to best protocols, such as adult zebra mussel monitoring.	New AIS risks and infestations are sometimes hard to anticipate and may require responding with a thorough survey unexpectedly. Current monitoring efforts do and should continue to focus on adult zebra mussel and bloody red shrimp monitoring, with partners, where appropriate.
Participate in statewide monitoring efforts as they apply to regional needs or concerns, such as Starry Trek.	Statewide data collection informs local efforts. Partnering with other organizations or government units extends AIS prevention in the County. Lake County participates in Starry Trek in August of each year.
Augment communication and reporting mechanisms for citizen monitoring of lakes and rivers.	Ensuring that local discoveries of AIS are quickly communicated to the right people will maximize prevention efforts related to new infestations.
Cultivate partnerships with organizations to support AIS surveys in water bodies (infested and non-infested) and docks/lifts.	Leveraging the resources of existing organizations will help to find new AIS infestations more efficiently and to prevent further spread of those AIS.
Update, gather and maintain public water access data on infestations, usability, and recreation (including signage parking).	Access data, including parking spaces and ramp access, determine funding from the State of Minnesota for the AIS Prevention Program. Records should be updated annually and reported to the MNDNR.

2.3 Watercraft Inspections and Compliance

Addressing specific pathways of introduction: Lake County anglers and water recreation users are best accessed for education through person-to-person contact. Minnesota's Watercraft Inspection Program (WIP) was created to prevent the spread of invasive species through boater education, watercraft inspections, and watercraft decontaminations at public water accesses. Level 1 Watercraft Inspectors conduct inspections of watercraft and related equipment, and Level 2 Watercraft Inspectors decontaminate equipment. Lake County continues to remain focused on boater education and interaction at public accesses, a primary goal and outcome of the watercraft inspection program. Law enforcement are a key component to maintaining effective AIS law compliance associated with the watercraft inspection program.

Action	Narrative or Benefit to AIS Prevention
Maintain a delegation agreement and appropriate requirements and materials to continue a watercraft inspection program in Lake County.	The WIP allows Lake County to educate watercraft users and anglers about Minnesota AIS laws (Statute 84D). MNDNR training and authorization through a delegation agreement is required to conduct inspections at MNDNR accesses. Approval for continued inspections at Forest Service landings should be maintained with the USFS.
Increase inspections within the County by hiring additional authorized watercraft inspectors.	Watercraft inspectors can help spread accurate messages to boaters, develop connections with users on-site, and prevent the spread of AIS.
Distribute outreach materials to users on site at public accesses through watercraft inspectors.	Take-home materials often aid in reemphasizing an outreach point and memory recall.
Utilize County AIS deputies to patrol roadways near infested lakes to issue compliance checks with AIS laws.	Compliance checks away from boat launches can be effective at communicating the presence of law enforcement and help to educate lake users on the seriousness of AIS laws and the penalties for infractions.
Ensure local authorities are aware of, and peace officers are trained to, enforce state AIS regulations.	This action should aid in extending the capacity of local enforcement to ensure compliance with AIS laws and provide consistent enforcement.
Install traffic counters at select public accesses.	This action will help prioritize resources, including inspector staffing, by quantifying use at water bodies.
Ensure AIS decontamination services are available by purchasing decontamination trailers or partnering with existing organizations. Investigate the cost and feasibility of purchasing decontamination trailers for use in cleaning boats and equipment used in infested lakes within the County.	Decontamination of watercraft is a key tool in preventing AIS spread. Decontamination trailers are expensive and require extensive maintenance, but no decontamination station for boats or equipment remains in Lake County during the open water season. Lake County partners with the MNDNR to conduct decontaminations at high-use accesses. Lake County has partnered with existing businesses, including car washes, to provide boat cleaning prevention services.
Provide additional outreach, inspection, and decontamination services to fishing tournaments.	Fishing tournaments can pose an increased risk to AIS spread. Lake County provides support to the Salmon Classic and should aid in future tournaments, including utilizing “Clean Boats, Clean Tournaments” messaging.

2.4 Management and Rapid Response

Primary infestations of AIS in Lake County include rusty crayfish and spiny waterflea, neither of which have widespread effective existing management strategies in the literature (See Appendix A or MNDNR Infested Waters Map). Purple loosestrife has the next highest density of infestations in inland waters and can be managed through accepted conservation practices and remains a focus of inland management. Lake Superior AIS management is limited at the Lake County level but should be pursued cooperatively where options are available. Rapid response should be employed for future infestations. Effective management of AIS populations may prevent further spread.

Action	Narrative or Benefit to AIS Prevention
Develop rapid response protocols in cooperation with regional partners.	A standardized rapid response protocol creates a plan for infestation situations before they arise and outlines differing organizational responses preemptively.
Respond and communicate efficiently and effectively to reports of new infestations.	Rapid response to invasive species findings can prevent full infestations and limit additional spread. Responding to invasive species reports quickly includes keeping a reliable database of current infestations and reports. Records should be updated on the online database EDDMaps.
Manage purple loosestrife, and other existing infestations, according to jurisdictional agreements and using best conservation practices.	Effective management of existing AIS populations may reduce the likelihood of further spread and impact to existing and future ecosystems. Integrated pest management should be considered for certain high-priority aquatic plant species (e.g. Eurasian watermilfoil, curly-leaf pondweed, flowering rush, purple loosestrife). Rusty crayfish trapping for management should continue in select geographic pinch point locations where effective.
Adopt and implement control plans utilizing safe and cost-effective techniques for new infestations as they arise.	Coordinate with the MNDNR for information on management of AIS. Effective management of AIS populations may improve existing aquatic ecosystems or recreation and prevent further spread.
Contract with private vendors that possess the equipment, knowledge, and expertise to facilitate management of AIS in water bodies the County deems impaired or damaged by aquatic invasive species.	Effective management of existing AIS populations may help prevent further spread. Private vendors may have increased capacity to implement certain management techniques.
Partner with agencies conducting management in Lake Superior and assist management as funding permits.	Lake Superior AIS are at risk of invading inland waters unless controlled (e.g. sea lamprey).

2.5 Partnerships and Resources

Lake County can increase resources available for AIS prevention, education, and management by leveraging partnerships. Many entities facilitate AIS prevention in the Northeast Region, and it is important to coordinate efforts to reduce duplicity. Connected waters in Lake County, especially in the Rainy River Headwaters Watershed along the US-Canada border, necessitate cooperation with many entities, as AIS do not recognize jurisdictional boundaries. Partners range in expertise, resources, and jurisdiction. Growing partnerships can increase Lake County's capacity to implement its AIS prevention plan.

Action	Narrative or Benefit to AIS Prevention
Seek additional funds to implement unfunded actions in County prevention plan.	The effectiveness of AIS prevention actions can be limited by inadequate financial resources.
Assist with funding local outreach and monitoring efforts by entities other than the County.	Overall AIS prevention efforts can be strengthened by supporting the capacity of other local organizations to conduct AIS outreach and monitoring activities.
Develop and maintain contacts with other local organizations, businesses, and government entities.	The participation of local partners is necessary for a County's AIS prevention plan to be effective. Continue to work with Silver Bay Marina, Resorts, and other private or maintained public access managers to conduct outreach and watercraft inspections.
Facilitate the establishment of local organizations such as County Coalitions of Lake Associations to create partners in implementing the County's AIS prevention plan.	Additional partnerships among local organizations will increase the County's capacity to implement its AIS prevention plan.
Establish a grant program to support local efforts to prevent the spread of AIS.	By leveraging existing capacity of other local organizations, the County can maximize the effectiveness of its AIS prevention funds.
Cultivate partnerships with organizations interested in AIS prevention (e.g., lake associations)	Partnership is key to implementation of AIS prevention planning. Actively cultivate and coordinate actions with partners (Appendix B). Continue regular attendance at board meetings, cooperation with, and assistance to the White Iron Chain of Lake Association. Attend regional meetings and conferences with area AIS partners.
Evaluate AIS prevention efforts and cooperative relationships for possible improvements.	Participants at all levels can share input and new ideas to continuously improve the AIS prevention plan for the local area.
Collaborate with other counties, watershed groups, and/or jurisdictions to develop a regional approach to AIS prevention.	Because AIS and the individuals who could transport them do not stay inside County borders, effective coordination is necessary to prevent AIS spread.
Participate in international and regional AIS prevention in the Rainy River Headwaters as relevant and appropriate.	Participate in the AIS IMA-TAC Subcommittee and Rainy River International Conference.
Participate in regional approaches to AIS management for the Lake Superior Watershed as relevant and appropriate.	Attend UMISC or other regional invasive species conferences. Stay connected with Great Lakes partners and attend meetings as needed.

Action	Narrative or Benefit to AIS Prevention
Coordinate with partners to conduct and prioritize necessary research on AIS in the region.	Certain invasive species can only be managed through cutting edge research beyond the scope of County programming. Necessary partners for facilitating needed research in the region include UMD, NRRI, and MAISRC. Research and collaborations are subject to funding availability.

3. 0 Current Lake County Inner Lake and River AIS Infestations

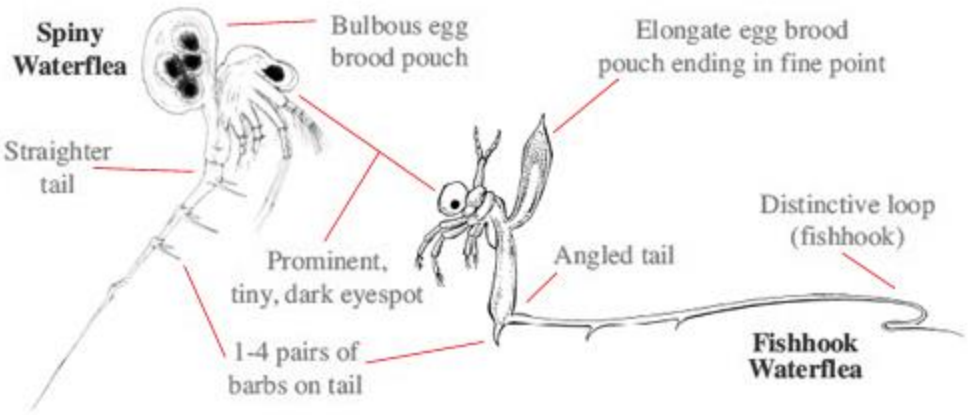
As of the end of the 2018 monitoring season, rusty crayfish, spiny water flea, zebra mussels, narrowleaf cattail, purple loosestrife, and reed canary grass have been found in some of the lakes and rivers in Lake County. A survey of a reported curly leaf pondweed infestation was conducted in 2017 in Thomas Lake, and no samples were found. Zebra mussels have not been found in Lake County since a report in 2016 in Crooked Lake. A description of species found in Lake County and how they are spread are described below. Infestations and species distribution are subject to change. Species appear, generally, in order of priority for Lake County AIS prevention, monitoring, and management. Table 1 in Appendix A presents a summary of the inner lakes and rivers in Lake County with public accesses that are currently infested with AIS.

3.1 Spiny Waterflea (*Bythotrephes longimanus*)

Means of Spread: Spiny waterflea can spread from Lake Superior to inland waters when fishing gear or bilge, bait bucket, or live well water is contaminated with egg-laden females. While females die out of water, under certain conditions they produce eggs that resist drying, remain viable, and can establish a new population. Spiny waterflea eggs remain viable for at least 6 hours out of the water, but the 5-day dry rule of "Clean, Drain, Dry" is generally recommended to reduce spread.

Description: The spiny waterflea is difficult to distinguish without magnification for its total length is only 1/4 - 5/8 in (5-15mm). Clumps of spiny waterfleas look and feel like gelatin or cotton batting with tiny black spots. They prefer deep lakes but can establish in shallow

waterbodies and rivers. They are abundant during summer (June-September), dependent upon water temperatures.



Illustrations: Michigan Sea Grant Program, Ontario Federation of Anglers and Hunters

Spiny waterfleas are small predacious crustaceans that threaten aquatic ecosystems and fishing by competing with native fish for food and fouling gear. Spiny Waterfleas eat native zooplankton which is an important food for native fishes. In some lakes, they caused the decline or elimination of some species of native zooplankton.

Spiny waterflea arrived in ships' ballast water from Eurasia. Spiny waterfleas were discovered in Lake Ontario in 1982, and then spread to all of the Great Lakes and some inland lakes. Anglers often discover new infestations. Waterfleas collect in masses on fishing lines and downrigger cables. These masses can clog the first eyelet of rods, damage a reel's drag system, and prevent fish from being landed. Eradicating established infestations is impossible, but early detection of isolated populations may help slow or prevent the spread.

The first detections of spiny waterfleas in Minnesota inland lakes occurred in 1990 likely due to overland transport. Spiny waterflea infestations exist in northern Lake County lakes, including Fall and Basswood Lakes.

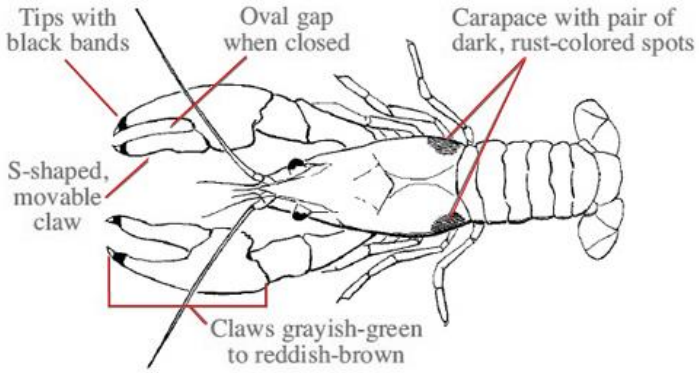
Regulations: Spiny waterfleas are a *Regulated Invasive Species* by the MNDNR, which means introduction into another waterbody is prohibited.

3.2 Rusty Crayfish (*Orconectes rusticus*, also/or *Faxonius rusticus*)

Means of Spread: Rusty crayfish have likely spread through bait bucket release by anglers, aquarium release by hobbyists, activities of commercial harvesters, and live study specimen release by teachers and students who buy them from biological supply houses. Females can carry fertilized eggs or a male's sperm so even the release of a single female could establish a new population.

Description: Adults are generally 3-5 inches (7.5-13 cm) long (nose to tail). Claws larger and smoother than many other crayfish and are usually without wart-like white bumps. Claws have an oval gap when closed and do not have a distinct thin slit or notch present. Rusty crayfish usually have an indicative rusty red spot on the side of the carapace, although coloring is not always a reliable means of identification.

Rusty Crayfish were first detected in southwestern Minnesota in the 1960s. Rusty Crayfish are invasive crustaceans spreading to lakes, rivers, and streams in several areas of North America. They are more aggressive than native crayfish, better able to avoid fish predation, and can harm native fish populations by eating their eggs and young. They can displace native crayfish, hybridize with them, and graze on and eliminate aquatic plants. Native to the Ohio River drainage, Rusty Crayfish have spread to several U.S. states and Ontario.



Eradicating established infestations is very difficult, if not impossible.

Regulations: Rusty crayfish are a *Regulated Invasive Species* by the MNDNR, which means release into the environment is illegal. Licensed anglers may collect any crayfish for use as bait on the same waterbody and may harvest up to 25 pounds of any crayfish for personal consumption. Selling live crayfish for bait or aquarium use is illegal.

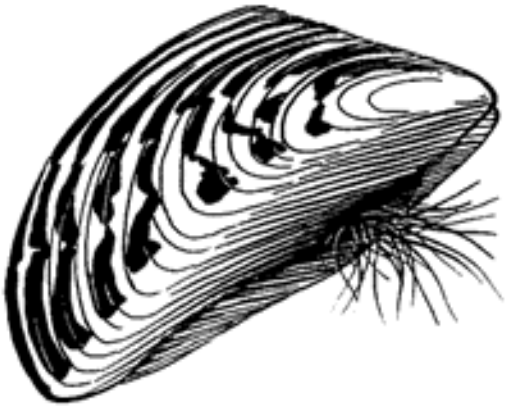
3.3 Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussels (*D. bugensis*)

Means of Spread: Adults can spread by attaching to boats, motors, boat lifts, docks, swim platforms, and aquatic plants. Larvae (veligers) can spread in contaminated water in tanker trucks, bait buckets, and bilges.

Description: Zebra mussels look like small clams with a yellowish or brownish "D"-shaped shell, usually with dark and light-colored stripes (hence the name "zebra"). They can be up to two inches long, but most are under one inch. Zebra mussels usually grow in clusters containing numerous individuals and are generally found in shallow (6-30 feet), algae-rich water. Zebra mussels are the only freshwater mollusk that can firmly attach

itself to solid objects – submerged rocks, dock pilings, boat hulls, water intake pipes, etc. On smooth surfaces, young zebra mussels feel like fine sandpaper. Juveniles are about the size of peppercorns.

Zebra and Quagga Mussels are invasive aquatic animals that cost over $1 billion/year to manage in the U.S. They clog drinking water intakes; foul boat hulls, motors, boat lifts, docks and swim platforms. Their sharp shells litter beaches. They harm native fish by consuming food and often kill native mussels, crayfish, and snails through fouling. They spread from Eurasia to the Great Lakes due to the ballast water discharge of commercial ships in the '80s and '90s. They spread to the Mississippi River via connected waterways and overland by attaching to aquatic plants and recreational watercraft, and possibly in bilge or bait water. Small mussels die out of water, but adults can survive for days. Zebra mussels are somewhat limited in habitat availability by calcium concentrations in waters. Quagga mussels can generally tolerate greater depths and temperature ranges than zebra mussels.



Zebra Mussels were first detected in the Duluth-Superior Harbor in 1989 and in 1991, in the Mississippi River. From the Mississippi, they spread up the St. Croix River to Stillwater. Since 1990, 29 lakes in St. Louis County have become infested in Minnesota likely due to overland transport. Quagga Mussels were first detected in the Duluth-Superior Harbor in 2005 and are found in three locations in the Minnesota waters of the Mississippi River. Both zebra and quagga mussels have recently been confirmed in the Apostle Islands, Lake Superior. They have not spread to any other inland Minnesota waters.

Regulations: Zebra Mussels are a *Prohibited Invasive Species* by the MNDNR. The imports, possession, transport, and introduction into the wild is prohibited.

3.4 Purple Loosestrife *(Lythrum salicaria)*

Means of Spread: Each mature purple loosestrife plant can produce up to 2.7 million seeds annually, and can thus be easily transported in mud, attached to shoes or pants, on the wheels of ATVs or other equipment, and by connected waters. Seeds can also lay dormant for several years before sprouting.

Description: Purple loosestrife has a recognizable square-shaped stem and lance-like opposite leaves. Flower spikes bloom purple from end of July through September. Plants can grow to 6 feet tall. Purple loosestrife was introduced to the United States through decorative ornamental planting (and Great

Lakes ballast water). This wetland plant can overtake habitat and outcompete native aquatic plants, providing unsuitable habitat for animals. The dense root system of purple loosestrife can also alter wetland hydrology. Purple loosestrife has been identified and treated in a few different wetlands and some lakeshore areas in Lake County. Refer to Lake County Environmental Services for more information on purple loosestrife management.

Regulations: Purple loosestrife is listed as an *MDA Prohibited Noxious Weed on the Control List* and as a *prohibited invasive species*, which means import, possession, transport, and introduction into the wild is prohibited.

3.5 Reed Canary Grass (*Phalaris arundinacea)*

Means of Spread: Cattails grow from rhizomes and seeds. Seeds can be spread by the wind or dropping off the stalk. Cattail seeds can also be transported in mud attached to water-or wetland-related equipment.

Description: Minnesota has three species of cattail. Broad-leaved cattail (*Typha latifolia*) is considered native to Minnesota, while Narrowleaf cattail and its hybrid (*Typha X glauca)* are believed to have migrated from the eastern United States 100 years ago. Cattails generally grow to 3 feet or taller along shorelines, in ditches, or in wetland areas. In contrast to broadleaf cattail, native cattail has narrower leaves at 4-10mm which will also stick above the flower spike of a plant. The flowering spike of narrowleaf cattail is separated by a 2-4cm gap, unlike broadleaf cattail which has the male and female portions of the flower spike touching. Narrowleaf and hybrid cattail can dominate wetlands, ditches, and stormwater basins, forming single-species stands. All cattails are recognized to be beneficial in some situations, though dense stands of invasive cattails could interfere with a property owner's ability to recreate, pose navigational hazards especially if a floating cattail mat is formed, and reduce aquatic fish and wildlife habitats. There are a few documented locations of Narrowleaf cattail in Lake County, but spread has not grown significantly in any documented stand.

Regulations: The Minnesota DNR has not classified Narrowleaf cattail as a *non-native*, *Prohibited*, or *Regulated Invasive Species,* thus the species does not have possession or transport limitations associated with those classifications. This limited regulation is due to the benefits cattails pose to many wetlands and shallow lakes for wildlife habitat. Other aquatic management and public waters permitting regulations apply to management, planting, and possession of cattails.

3.6 Narrowleaf Cattail (*Typha angustifolia* & Hybrid (*Typha X glauca*))

Means of Spread: Cattails grow from rhizomes and seeds. Seeds can be spread by the wind or dropping off the stalk. Cattail seeds can also be transported in mud attached to water-or wetland-related equipment.

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3.7 Yellow Iris (*Iris pseudacorus)*

Means of Spread: Yellow iris is most commonly spread from unintentional introduction into shoreland ecosystems from ornamental water gardens, such as through flooding. Yellow iris can also reproduce vegetatively through horizontal stems growing beneath the surface (rhizomes).

Description: Yellow iris is a perennial aquatic herbaceous plant which looks like native Blue Flag Iris (*Iris versicolor*) but blooms yellow. Stems of yellow iris tend to be shorter and slightly narrower than its Blue Flag counterpart. Yellow iris was introduced as an ornamental plant in the 1800s. Yellow iris grows along shores in shallow waters, competing with native

vegetation and trapping sediment, leading to altered plant communities. Yellow iris been documented in only a few select locations in Lake County.

Regulations: The Minnesota DNR has classified yellow iris as a *Regulated Invasive Species,* meaning it is legal to possess, sell, buy, and transport the species but illegal to introduce. Other AIS commonly sold commercially for water gardens, like yellow iris, include: nonnative waterlilies, Carolina fanwort, Water hyacinth, Brazilian waterweed, and Parrot's feather.

4.0 Current Lake County Marine Access Lake Superior AIS Infestations/Diseases

As of the end of the 2018 monitoring season, Rainbow Smelt, Mystery Snails, Eurasian Ruffe, Round Goby, Viral Hemorrhagic Septicemia (VHS) disease, Curly Leaf Pondweed, Sea Lamprey, and Spiny Water Flea have been found or seen in Lake Superior near the Lake County marine accesses. A description of these species and disease and how they are spread are described below, excluding Spiny Water Flea which is described above. Species are generally listed in order of concern for prevention, outreach, monitoring, and management (as applicable). Table 2 in Appendix A presents a summary of the Lake Superior public marine access locations that are currently infested with AIS.

4.1 Viral Hemorrhagic Septicemia (VHS)

Means of Spread: VHS can be spread by moving infected fish from one body of water to another, moving infected water and equipment from one waterbody to another, stocking or releasing infected fish or water from infected fish hatcheries or the natural migration and movement of infected fish from one waterbody to another.

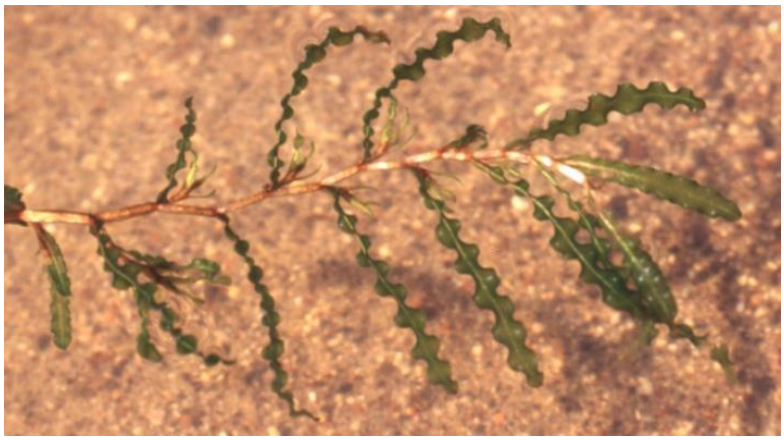
Description: At a low level of infection, fish might not display any symptoms. As the infection becomes greater, however, fish will display widespread hemorrhages (bleeding) throughout body surface (eye, skin and fins) and within the internal organs (swim bladder, intestine, kidney etc). Because of the bleeding, gills and liver might appear pale. Sick fish will often be listless, swim in circles, and are frequently observed at the surface of the water. Confirming VHS infection requires sophisticated laboratory testing. A diagnosis cannot be made based solely on observation because many different diseases of fish have very similar symptoms.

Photo courtesy of Dr. Mohamed Faisal

Regulations: If you catch a suspected diseased fish place the fish in a plastic bag and keep it in an iced cooler or refrigerator as quickly as possible (do not freeze). Call the local MNDNR fisheries office for instructions. If you observe a fish kill, call the State Duty Officer.

4.2 Curly-leaf Pondweed (*Potamogeton crispus*)

Means of Spread:

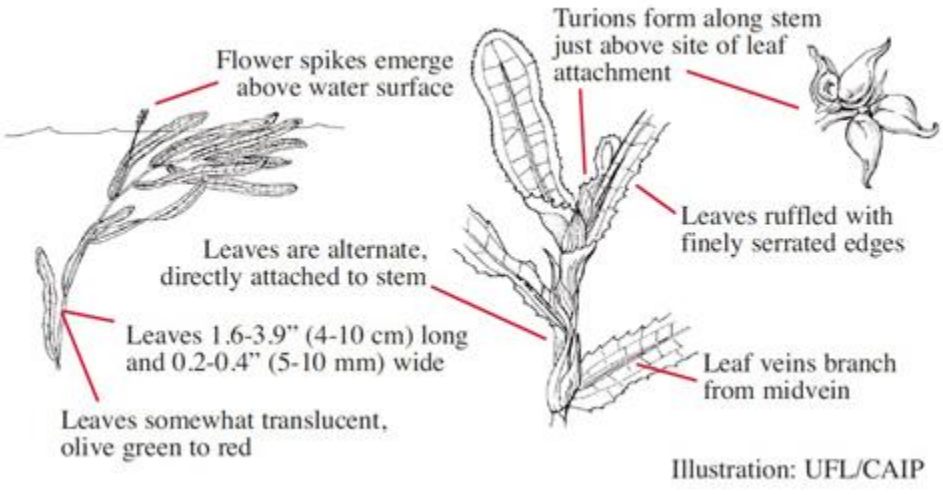


Curly-leaf pondweed is believed to spread from one body of water to another primarily by the unintentional transfer of plant fragments, primarily on trailered boats. Curly-leaf pondweed can also spread by seeds, rhizomes, turions, and plant pieces that break off and float on water currents. Your actions and your help in reporting new infestations are vital for preventing their spread.

Description: Leaves are somewhat stiff and crinkled, approximately 1/2-inch wide and 2 to 3 inches long; leaves are arranged alternately around the stem, and become more dense toward the end of branches; produces winter buds; can be confused with clasping leaf pondweed.

Native to Eurasia, Africa and Australia, Curly-leaf pondweed was first discovered in North America in the mid-1880s. By 1978, it had spread across most of the United States and Canada.

Curly-leaf pondweed is a non-native, invasive submersed aquatic plant that was first observed in Minnesota in 1910.



Regulations: Curly-leaf pondweed is classified as a *prohibited invasive species* in Minnesota. It is illegal to possess, buy, sell, transport, and introduce a prohibited invasive species.

4.3 Sea Lamprey (*Petromyzon marinus*)

Means of Spread:

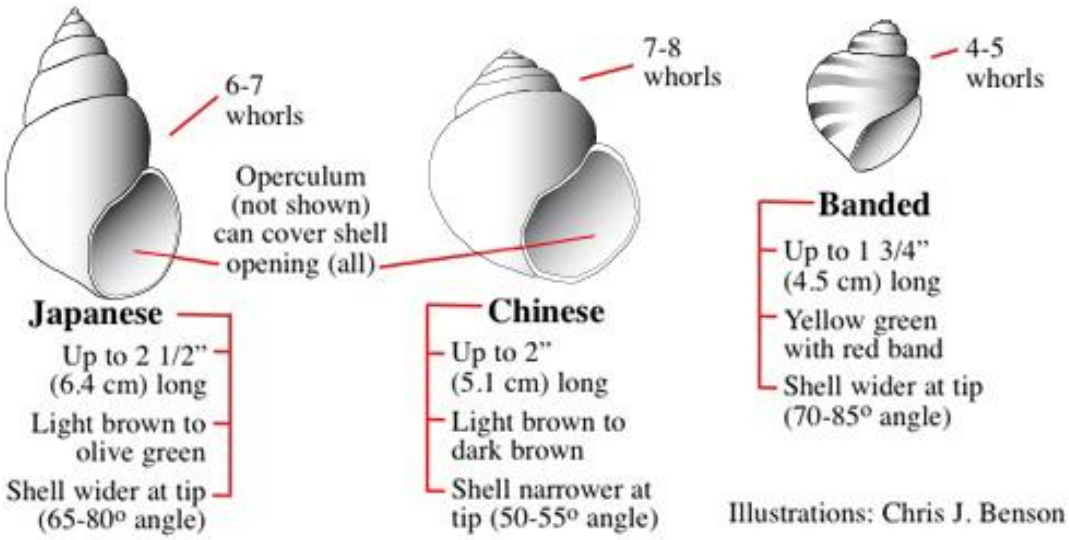
Sea lamprey are not usually transported by recreationists or anglers, unless intentionally, but all water users should follow clean, drain, dispose, and dry guidelines. If you catch a sea lamprey attached to a fish, it should be killed and properly disposed.

Description: Sea lamprey are an eel-like fish that can grow up to 20 inches long, unlike much shorter, smaller, native Chestnut and Silver lamprey. Sea lamprey do not have a jaw, but a suction-cup mouth with concentrically arranged teeth and a rasping tongue. Originally native to the Atlantic Ocean and Lake Ontario, sea lamprey spread into the Great Lakes via canals that bypassed natural barriers. Sea lamprey introduction in Lake Superior contributed to the 1950s commercial fishing crash, and the species has since been primarily managed through lampricide and barriers preventing access to spawning areas by the USFWS and the Sea Lamprey Control Program, resulting in a reduction of the population by 90%. Sea lamprey kill fish, primarily lake trout, by attaching to them parasitically and feeding on their blood. A single sea lamprey can kill 40lbs of fish in a lifetime.

Regulations: Sea lamprey are classified as a *prohibited invasive species* in Minnesota. It is illegal to possess, buy, sell, transport, and introduce a prohibited invasive species.

4.4 Mystery Snails (Chinese, Japanese and Banded)

Chinese (***Cipangopaludina chinensis***), Japanese (***C. japonica***), and banded mystery snails (***Viviparus georgianus***)



Means of Spread: Most likely introduced via dumping of aquariums and by transfer from one water body to another.

Description: Chinese mystery snail has small shallow depressions above the shell opening and rows of fine, short stiff hairs parallel to the whorl of the shell (may wear off with age and abrasion).

Banded mystery snail has red bands that are parallel to the whorl of the shell.

Regulations: Chinese and Banded mystery snails are *regulated invasive species*. All are illegal to introduce into state waters.

4.5 Eurasian Ruffe (*Gymnocephalus cernuus*)

Means of Spread: Ruffe could be accidentally transported in livewells, bilge water, and bait buckets.

Description: The ruffe is a small European member of the perch family. Ruffe are primarily bottom feeders, preferring dark environments where they can hide from predators. Ruffe rarely grow bigger than 5 inches, although the sharp spines on their gill covers, dorsal and anal fins make them difficult for larger fish to eat. The ruffe is native to central and eastern Europe. They were introduced into the Duluth harbor within ballast water discharged from ocean-going ships around 1985.

Regulations: Ruffe are a *prohibited invasive species*, which means import, possession, transport, and introduction into the wild is prohibited.

4.6 Round Goby (*Neogobius melanostomus*)

Means of Spread: Round goby could be accidentally transported in livewells, bilge water, and bait buckets.

Description: Similar to Ruffe, round gobies are small, aggressive bottom-dwelling fish usually 3-6 inches long. Adults are grey with dark blotches, resembling freshwater sculpin, commonly found at Lake County Marine accesses. The round goby feeds on macroinvertebrates, including native fish eggs and fry. They can also hunt in complete darkness and exist in densities of up to 20 individuals per square yard. The round goby was first found in Minnesota in the Duluth Harbor in 1999 and was introduced through ballast water. A 2018 survey of Agate Bay did not find round goby, but anglers occasionally catch the bottom-dwelling fish offshore.

Regulations: Round goby are a *prohibited invasive species*, which means import, possession, transport, and introduction into the wild is prohibited.

4.7 White Perch (*Morone americana*)

Means of Spread: White perch were originally introduced to the Great Lakes through canals, ballast water, and unauthorized stocking. Spread of this species can be prevented by properly disposing of live bait. It is illegal to transport lake water in Minnesota, and bait water must be drained before transport if live bait is kept. Live bait must be thrown away if disposed, not released into the water.

Photo: NOAA Great Lakes Environmental Research Lab

Description: White perch is not an actual perch (and does not have indicative perch stripes on the side) but is in the temperate bass family and looks similar to native white bass. White perch grow up to 12 inches in length and have a dark, highly domed back with silvery undersides. An opportunistic feeder, white perch feed on zooplankton, larvae, and fish eggs, outcompeting native fish for habitat and food and sometimes hybridizing white bass. White perch were found in the Duluth Harbor in 1986.

Regulations: White perch is considered a *prohibited invasive species*, meaning it is unlawful to possess, import, purchase, transport, or introduce this species.

4.8 Rainbow Smelt (*Osmerus mordax*)

Means of Spread: Rainbow smelt were stocked in the Great Lakes and were first stocked in Lake Michigan in 1923. Subsequently, rainbow smelt spread throughout all the Great Lakes. Rainbow smelt invade new waters by moving through connected waters and through human transfer.

Description: Body is slender and cylindrical. Back is silvery pale green and the sides are iridescent purple, blue, and pink. The underside is white. The body has 26-35 gill rakers, a dorsal fin, an anal fin, pectoral fins, pelvic fins, an adipose fin, and a deeply forked tail fin. It has a pointed snout and large black and silver eyes. The average size when full-grown is 7 – 9 inches and weighs 3 oz.

Regulations: You must kill your smelt at the stream, as it is unlawful to transport or possess live smelt. This is to prevent the spread of disease and smelt introduction to inland waters.

5.0 Aquatic Invasive Species of Concern for Lake County

Several AIS of concern are present in the state of Minnesota and could pose a threat to waters in Lake County, including Eurasian watermilfoil, Starry stonewort, New Zealand mudsnails, Faucet snails, Bloody red shrimp, invasive *Phragmites,* and Flowering Rush. Additional AIS are being monitored closely but are not considered a high risk for invasion at the time of this plan update, including: Hydrilla, Water Chestnut, Brazilian elodea, Parrot feather, Water soldier, Red swamp crayfish, Killer shrimp, and Invasive Carp (Bighead, Silver, Black, Grass Carp).

5.1 Eurasian Watermilfoil *(Myriophyllum spicatum)*

Means of Spread: Eurasian watermilfoil can reproduce through auto-fragmentation and seeds, so it is especially important to ensure all plant fragments are removed from water-related equipment.

Description: Eurasian watermilfoil is a rooted, submerged aquatic plant with a feathery appearance like some native species, such as Northern watermilfoil. Tips of the Eurasian watermilfoil plant may be red or pink in color when poking out above the water. Each of 4 leaves have 12 to 21 leaflets and are arranged in a whorl around the central stem. Eurasian watermilfoil was discovered in the United States in the early 1900s, and is now in several Minnesota Lakes, including one marine Lake Superior access in Cook County.

Photo: Paul Skawinski, UW Extension Lakes Program

Regulations: Eurasian watermilfoil (and its hybrids) is a *prohibited invasive species*, which means import, possession, transport, and introduction into the wild is prohibited.

5.2 Starry Stonewort (*Nitellopsis obtusa*)

Means of Spread: Starry stonewort reproductive structures (bulbils) or fragments can be transported in mud or can attach to watercraft and equipment, including boat trailers.

Description: Starry stonewort is a freshwater macro-algae native to Europe and Asia. Starry stonewort looks like other native charophytes such as muskgrass, but this invasive species displaces native plants through dense growth and can have impacts on water chemistry. Starry stonewort can reproduce vegetatively, or by cloning itself. Research is ongoing regarding the effects of this species on Minnesota ecosystems. There are 13 confirmed starry stonewort infestations in the state of MN as of 2018.

Regulations: Starry stonewort is a *prohibited invasive species*, which means import, possession, transport, and introduction into the wild is prohibited.

5.3 New Zealand Mudsnails (*Potamopyrgus antipodarum*) and Faucet Snails (*Bithynia tentaculata*)

Photo: Faucet snails, Minnesota Department of Natural Resources

Means of Spread: Snails can be transported in mud and debris, or attached to water-related equipment including anchors, ropes, and fishing or hunting gear such as felt-soled waders. By closing their operculum, these species can survive out of water for multiple days.

Description: New Zealand mudsnails and Faucet snails were introduced in the Great Lakes through ballast water. Both species are small snails (one-eighth to one-fourth inches long; Faucet snails can grow up to a half inch long and are longer than they are wide). Snails range in color from grey to brown to black, have a coiled spiral shell, and an operculum ("trap door") covering the opening. New Zealand mudsnails were confirmed in Lake Superior in 2007. Faucet snails were confirmed in Lake Winibigoshish in 2008. Faucet and New Zealand [mud]snails outcompete native macroinvertebrate populations for food and habitat and provide little nutrition for predatory fish. Faucet snails are an intermediate host for three intestinal trematode parasites which cause mortality in ducks and coots.

Photo: New Zealand Mudsnails, Mike Gangloff, Bugwood.org

Regulations: New Zealand mudsnails and Faucet snails are a *prohibited invasive species*, which means import, possession, transport, and introduction into the wild is prohibited.

5.4 Bloody Red Shrimp *(Hemimysis anomala)*

Means of Spread: Bloody red shrimp are primarily spread in water, as recognition is limited due to their small size. Ensure to clean, drain, dispose, and dry out watercraft equipment.

Description: Bloody red shrimp is a native shrimp appearing similar to the native opossum shrimp (*Mysis diluviana*), but with red pigment spots and a tail at the end of the abdomen. Bloody red shrimp are generally found in lighted areas at night, such as near piers or breakwaters, but travel throughout the water column. The species was originally introduced in ballast water to the Great Lakes, but the first confirmed in Lake Superior was in the Duluth Harbor in 2017. A 2018 survey of Agate Bay found 43 native *Mysis relicta* species, but no evidence of invasive *Hemimysis*. Impacts of bloody red shrimp are not yet well understood, but as a predatory species they could impact native zooplankton communities and aquatic food webs.

Regulations: Bloody red shrimp are an unlisted species in the state of Minnesota. Unlisted species must not be legally released into a water body or a "free-living state" without classification and DNR evaluation.

5.5 Flowering Rush (*Butomus umbellatus*)

Means of Spread: Flowering rush primarily reproduces vegetatively through rhizomes and bulbils. Bulbils (reproductive structures) can be transported in mud or on boots or other wetland-friendly equipment. Bulbils can also move along water currents. Seed production of flowering rush stands has only been documented in one location in Minnesota.

Description: Flowering rush is a wetland plant with an umbrella-like pink bloom at the top of a triangular-shaped stem. Growing along shores in shallow, slow-moving water, and in some cases in deeper water as a submerged plant, flowering rush can grow four feet high. Flowering rush was originally introduced to the area by the garden trade and ballast water. Like other wetland invasive species, flowering rush overtakes habitat and outcompetes native plants, providing unsuitable shelter, food, and nesting habitat for native plants. Flowering rush has been reported once in Lake County but no evidence to suggest a plant or infestation has been found.

Regulations: Flowering rush is a *prohibited invasive species*, which means import, possession, transport, and introduction into the wild is prohibited.

5.6 Common Reed (Invasive *Phragmites australis subsp. australis*)

Means of spread: Phragmites spreads by rhizomes (underground stems) and grayish-colored fluffy seeds. Phragmites primarily spreads through contaminated sediment, such as mud or debris stuck to boots, waders, or other fishing and hunting gear. Soil fill and connected waters or tidal ice can also contain seeds and spread this plant. Ensuring equipment is clean of all mud or debris will prevent further spread.

Description: Non-native Phragmites outcompetes native plants and animals, eliminates habitat such as intertidal channels and pools, impedes recreation and aesthetics, and can create fire risks for wetlands and upland areas. This over 18 feet-tall perennial wetland grass has distinctive, fluffy seedheads. Although there is a large amount of beneficial, native *Phragmites* in Minnesota, non-native Phragmites was only recently found in the St. Louis River (Lake Superior). Non-native Phragmites has not been confirmed in inland Minnesota waters as of 2018.

Regulations: Non-native Phragmites is listed as a *Restricted Noxious Weed* by the Minnesota Department of Agriculture, meaning importation, transportation, and sale is prohibited.

5.7 Didymo (*Didymosphenia geminata*)

Didymo is a microscopic algae also referred to as "rock snot," given the dense, carpet-like mats it forms on stream bottoms. Historically, Didymo is found in cool, clear waters with low phosphorous concentrations. Didymo is not formally listed as a species of concern for Lake County as it is not considered a non-native species to Lake Superior, but Didymo behavior exhibits like many AIS. Didymo has been found in some North Shore Streams, notably the Poplar River in 2018. Additional research is ongoing regarding Didymo spread and impacts, and Lake County's response to this potential invader will be updated as information becomes available.

6.0 Risk Assessment – Lake County

Lake County has listed the following lakes as survey priorities for zebra mussels, a key species with serious impacts on Minnesota lakes, based upon an "Eco-epidemiological model assessing aquatic invasive species management" from Dr. Nick Phelps and the Minnesota Aquatic Invasive Species Research Center (MAISRC – available at https://www.maisrc.umn.edu/modeling-ais). Lake County referenced starry stonewort risk assessment data to develop aquatic plant lake survey priorities, but risk was assessed at zero by MAISRC for all lakes in Lake County and is thus not graphed or represented in a tabular format

here. Additional statewide risk assessments are in the process to prioritize other AIS, which Lake County will use to inform future survey work. Watercraft inspection staffing and monitoring efforts by Lake County are guided in part, but not exclusively, by the provided risk assessment data.

Risk assessment data includes a background lake suitability analysis based on water chemistry. Boat risk refers to the connectivity of a waterbody based on watercraft inspection data, and river risk refers to a water's hydrological connectivity, i.e. upstream sources. Percentage refers to the probability of infestation. Note percentage values are lower than many statewide lakes and probabilities are subject to change.

High Risk Lakes – Zebra Mussels

DOW	Lake Name	Combined Risk	Boat Risk	River Risk
38002400	Crooked	100% (infested)	0	0
38078200	Garden	35%	0.2345	0.1166
38077900	Farm	31%	0.1721	0.134
38073800	North Branch Kawishiwi	29%	0.2904	0
38081700	Crooked	29%	0.2723	0.0157
38081100	Fall	22%	0.2124	0.0071
38039700	Insula	22%	0.2066	0.0108
38077800	South Farm	21%	0.046	0.1668

Medium Risk Lakes – Zebra Mussels

DOW	Lake Name	Combined Risk	Boat Risk	River Risk
38040400	Knife	19%	0.1858	0.0047
38049800	Ensign	18%	0.1357	0.045
38063700	Bald Eagle	18%	0.1319	0.047
38022000	Perent	16%	0.1587	0.0009
38022600	Kekekabic	16%	0.1525	0.0032
38033000	Alice	15%	0.1402	0.0137
38070100	Gabbro	15%	0.097	0.0567
38065600	Greenwood	15%	0.1485	0.0008
38035100	Thomas	14%	0.1388	0
38003300	Ninemile	12%	0.0929	0.0235
38081300	Fourtown	11%	0.1071	0.002
38060000	Three	10%	0.0762	0.0279
38039600	Isabella	10%	0.0972	0.0045

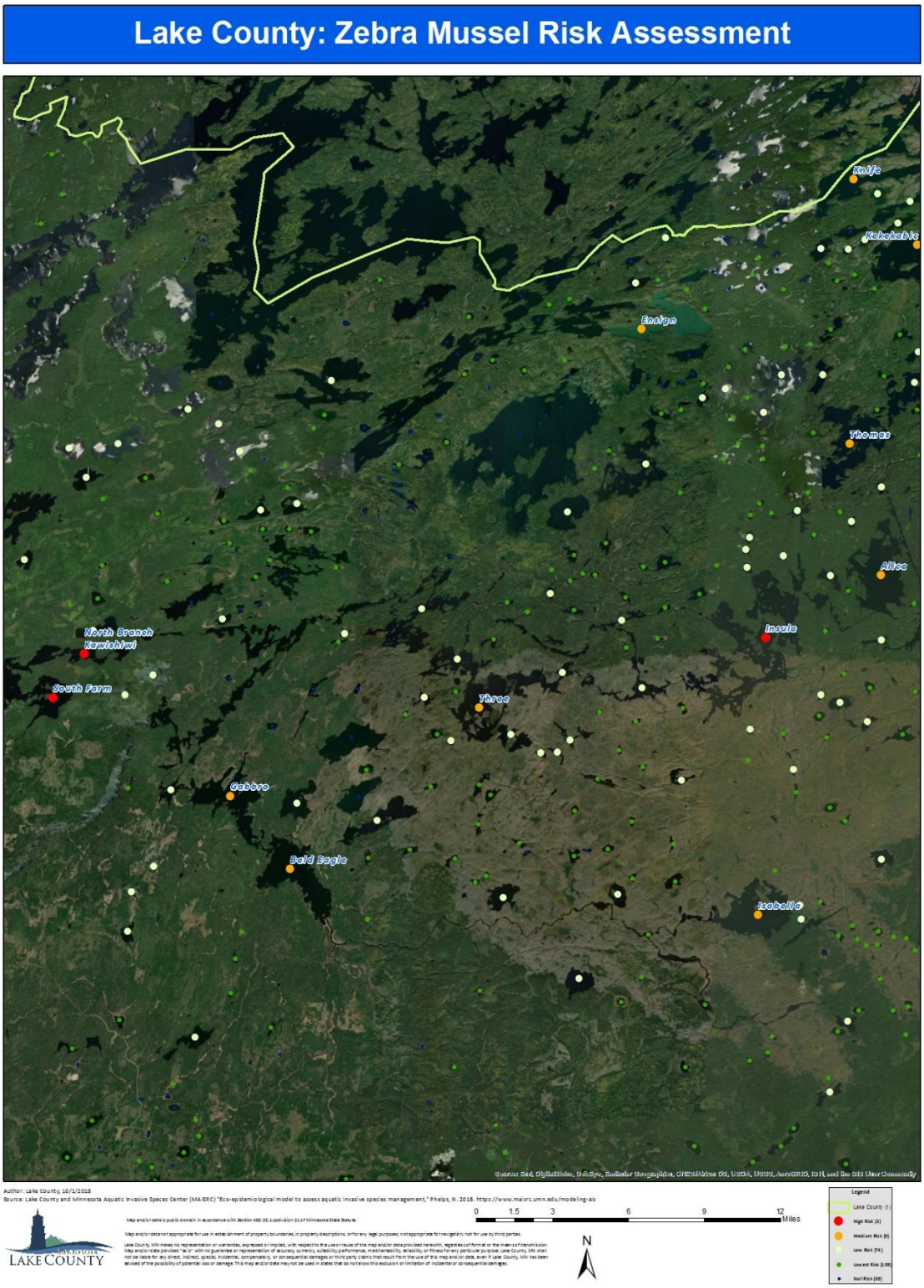


Figure 1: Lake County Zebra Mussel Risk Assessment. Additional zebra mussel low risk lakes, lowest risk lakes, and lakes yield null ("no risk") values are mapped in Figure 1. Names of lakes and associated data are available upon request. Risk assessments were based upon Crooked Lake's (DOW# 38002400) listing as infested with zebra mussels, though no zebra mussels have been found in two years of monitoring. Delisting a lake requires three years of no data findings.

7.0 Implementation

Lake County has gathered information from many Federal, State and Local entities to compile tables summarizing Lake County public water access infestations for inland lakes and rivers (Table 1, Appendix A), Lake Superior (Table 2, Appendix A), and uninfested inland lakes and rivers (Table 3, Appendix A). Tables 1, 2, and 3 are intended to be active documents that will be updated as often as necessary to reflect AIS impacts or any information useful in the implementation of the Lake County AIS Prevention Plan and are as such subject to change. Each of these tables contains the associated lake ID number (DOW), Name of Lake or River and Access, type of access (just Table 1 and 2), and AIS infestation where appropriate.

The MNDNR has made public water access data readily available through the Recreation Compass available at: https://www.dnr.state.mn.us/maps/compass/index.html . Each public access should include updated information on the government entity responsible for the access and the number of parking spaces or ramps. Additional information on AIS activities or last monitoring date changes more frequently and is available upon request.

Please contact the MNDNR or Lake County for the most up to date infestation information, as infestation lists are subject to change and do change frequently.

Future AIS prevention activities at the access locations identified in Tables 1 and 2 will be determined and implemented based upon priority ranking. These prevention activities may include field data gathering and research; education and outreach; sign placement; inspections and/or any other activities that may assist Lake County in AIS prevention.

8.0 Updating and Amending the Plan

This AIS Prevention Plan will be reviewed annually by the Environmental Services Department and updated as needed.

Appendix A

Table 1 - Lake County Inland Lake Public Accesses: AIS Infestations (2018)

Water Body	Access Type	Species	DOW-Number
Artlip Lake	n/a	Zebra mussels (DNR listed)	38002100
Basswood Lake/River	BWCAW	Rusty crayfish, spiny waterflea	38064500
Birch Lake (BWCA)	BWCAW	Rusty crayfish	38053200
Birch Lake (Tower – all accesses)	Trailer Launch	Rusty crayfish	69000300
Carp Lake	BWCAW	Rusty crayfish	38052100
Cedar Lake	Trailer Launch	Rusty crayfish	38081000
Crooked Lake (Finland)	Trailer Launch	Zebra mussels (DNR listed)	38002400
Dumbell Lake	Trailer Launch	Rusty crayfish	38039300
Ella Hall Lake	BWCAW	Rusty crayfish	38072700
Ensign Lake	BWCAW	Rusty crayfish	38049800
Fall Lake (S & N)	Trailer Launch	Rusty crayfish, spiny waterflea	38081100
Farm/South Farm Lake	Trailer Launch	Rusty crayfish	38077900
Found Lake	BWCAW	Rusty crayfish	38062000
Garden Lake	Trailer Launch	Rusty crayfish	38078200
Houghtaling Creek	n/a	Zebra mussels (DNR listed)	04010101-570
Kawishiwi River (S/N)	Trailer Launch at Campground	Rusty crayfish	38008000
Knife/South Arm Knife Lake	BWCAW	Rusty crayfish	38040400
Melon Lake	BWCAW	Rusty crayfish	38052200
Moose Lake	Trailer Launch	Rusty crayfish	38064400
Newfound Lake	BWCAW	Rusty crayfish	38061900
Newton Lake	BWCAW	Rusty crayfish, spiny waterflea	38078400
Ojibway Lake	Trailer Launch	Rusty crayfish	38064000
Parent Lake	BWCAW	Rusty crayfish	38052600
Skull Lake	BWCAW	Rusty crayfish	38062400
Snowbank Lake	Trailer Launch	Rusty crayfish	38052900
Splash Lake	BWCAW	Rusty crayfish	38053100
Stub Lake	Trailer Launch	Rusty crayfish	38078100
Sucker Lake	BWCAW	Rusty crayfish	38053000
Tofte Lake	Trailer Launch	Rusty crayfish	38072400
Triangle Lake	n/a or carry in	Rusty crayfish	38071500
White Iron Lake	Trailer Launch	Rusty crayfish	69000400

Purple loosestrife, reed canary grass, and narrow leaf cattail infestations change each season and are not always considered lake-wide infestations. Updated infestation distribution maps camp be found at https://www.eddmaps.org/distribution/ .

For an updated and complete list of statewide AIS lake infestations from the MNDNR, visit: https://www.eddmaps.org/midwest/tools/infestedwaters/map.cfm?showheader=1

Table 2 - Lake County Lake Superior Public Water Access Locations and AIS Infestations/Diseases (2018)

Access Name	Access Type	Species – documented reports	Access ID Number
Agate Bay	Trailer Launch	Curly-leaf pondweed, sea lamprey, Eurasian ruffe, SWF	16000108
Silver Bay Safe Harbor	Trailer Launch	Sea lamprey, SWF, Eurasian ruffe	16000109
Knife River	Trailer Launch (& Beach Carry In)	Curly-leaf pondweed, sea lamprey, SWF	16000112
Flood Bay	Trailer Launch	SWF	16000113
Twin Points	Trailer Launch	SWF	16000116
Burlington Bay	Carry In/Beach	SWF	16000107
Taconite Harbor	Carry In	SWF	16000110
Stewart River	Carry In	SWF	16000114
Gooseberry River	Carry In	SWF	16000115
Split Rock River	Carry In	SWF	16000117
Little Two Harbors	Carry In	SWF	16000118
North Shore Mining	Carry In/Beach	SWF	16000119
Baptism River	Carry In/Beach	SWF	16000120

* SWF = Spiny Waterflea.

* Lake Superior is considered infested with the following (all accesses): sea lamprey, spiny waterflea, Eurasian ruffe, round goby, VHS, mystery snails, faucet snails, New Zealand mudsnails, white perch, and rainbow smelt. Lake Superior is considered infested but only select reports have been filed (Apostle Islands, Duluth Harbor) with populations of zebra mussels, Eurasian watermilfoil, and bloody red shrimp.

Table 3 – Uninfested Waters

Lake Name	DOW#	Acre
Abinodji	38050700	39
Adams	38015300	590
Adventure	38051200	51
Agamok	38001100	90
Ahmakose	38036500	49
Ahsub	38051600	70
Alger	38005400	29
Alice	38033000	1684
Alsike	38067200	30
Alworth	38040100	228
Amber	38033600	157
Amberger	38064600	37
Amoeber	38022700	451
Andek	38030500	32
Arrow - 2	38030400	33
Arrow - 3	38031000	25
Ashdick	38021000	122
Ashigan	38050200	163
Assawan	38034400	33
August	38069100	221
Azion	38078700	48
Bakekana	38022400	73
Bald Eagle	38063700	1507
Balsam	38024500	240
Baskatong	38007300	81
Bean	38040900	26
Bear	38040500	39
Beaver	38022300	254
Beaver Hut	38073700	32
Becoosin	38047200	52
Bedford	38035700	32
Beetle	38055100	35
Benezie	38047300	59
Besho	38004000	29
Bill	38008500	150
Blue Wing	38000500	32
Bluebill	38026100	44
Bog	38044300	317
Boga	38031500	34
Bogberry	38069900	94
Bonanza	38002500	56
Bone	38006500	43
Bonga	38076200	138

Lake Name	DOW#	Acre
Bonnie	38039000	112
Boot	38050300	216
Boulder	38014000	314
Bow	38032400	98
Boze	38009500	78
Bright	38079000	26
Browns	38078000	248
Bruin	38070200	37
Brush	38044400	59
Bugo	38022200	48
Bullet	38081500	47
Bullfrog	38016500	78
Bullrush	38037800	36
Bunny	38029300	41
Cabin	38026000	71
Cache	38047700	40
Calamity	38030900	52
Camdre	38058300	51
Camp	38078900	84
Campers	38067900	56
Cap	38013700	46
Cargo	38059400	28
Carol	38034000	96
Cat	38055600	60
Cattyman	38051000	30
Caveman	38009300	40
Charity	38005500	26
Cherry	38016600	178
Chipmunk	38066900	39
Chippewa	38080900	95
Christianson	38075000	158
Circle	38079300	30
Clam	38017500	28
Clark	38064700	60
Clear	38072200	239
Clearwater	38063800	615
Climax	38060900	28
Cloquet	38053900	186
Coffee	38006400	139
Comfort	38029000	48
Conchu	38072000	50
Cook	38000400	84
Cook County	38001000	49
Cortes	38070000	29

Lake Name	DOW#	Acre
Cougar	38076700	71
Cramer	38001400	69
Cramer Homestead	38024600	25
Crest	38075700	93
Crooked	38081700	5580
Cross River	38000200	72
Crown	38041900	69
Culkin	38076400	58
Dam Five	38005300	92
Deep	38066800	158
Delay	38041500	121
Delta	38052700	27
Diana	38045900	52
Disappointment	38048800	950
Discovery	38060200	35
Divide	38025600	69
Dix	38039100	119
Doghouse	38093200	36
Doyle	38024900	114
Dragon	38055200	85
Driller	38065200	31
Dunnigan	38066400	84
Dutton	38017100	33
East	38002000	86
East Chub	38067400	98
Echo	38002800	46
Eddy	38018700	134
Egge	38024400	61
Eighteen	38043200	113
Elk	38036200	43
Elton	38012600	140
Eskwagama	38070700	79
Ester	38020700	458
Explorer	38039900	59
Faith	38016000	32
Fee	38013200	36
Ferne	38031100	153
Fintch	38062700	40
Fire	38048300	110
Fish	38016100	112
Fishdance	38034300	169
Fisher	38032200	79
Flash	38063000	142
Flat Horn	38056800	63

Lake Name	DOW#	Acre
Fool Hen	38006200	30
Four	38052800	749
Fourtown	38081300	1305
Frank	38042800	33
Fraser	38037200	811
Frog	38052000	58
Frond	38009400	54
Fry	38041100	32
Fulton	38005600	39
Gabbro	38070100	1174
Gander	38055400	131
Gegoka	38057300	174
Gerund	38036600	99
Gibson	38050800	36
Gift	38016200	47
Gijikiki	38020900	124
Good	38072600	183
Grass	38063500	45
Green Wing	38026400	37
Greenstone	38071800	316
Greenwood	38065600	1469
Griddle	38062900	27
Grouse	38055700	149
Grub	38050400	41
Gull	38059000	495
Gypo	38079800	53
Gypsy	38066500	26
Hanson	38020600	300
Harbor	38052500	33
Hare	38002600	48
Harmony	38037700	30
Harriet	38004800	281
Harris	38073600	121
Hatchet	38036900	158
Hawks Nest	38085500	32
Hazel	38006900	100
Heart	38069200	42
Helen	38044800	68
Hide	38055300	28
Highland	38075300	125
Hjalmer	38075800	109
Hoe	38014300	58
Hogback	38005700	44
Hoist	38025100	117

Lake Name	DOW#	Acre
Holiday	38058200	34
Holt	38017800	129
Homestead	38026900	50
Hood	38048000	26
Hope	38031900	154
Horse	38079200	724
Horsefish	38012100	51
Horseshoe	38058000	196
Hudson	38048400	374
Hula	38072800	121
Humpback	38015600	25
Ima	38040000	863
Image	38012200	57
Indiana	38072500	153
Inga	38054900	78
Insula	38039700	2550
Isabella	38039600	1318
Island River	38028900	148
Island River	38084200	49
Jack	38044100	51
Jackfish	38079400	225
Jasper	38064100	195
Jenny	38019400	115
Jitterbug	38050900	32
John Ek	38000800	59
Johnson	38024200	34
Jordan	38051100	166
Jug	38014100	43
Jump	38088700	36
Jupiter	38029900	67
Jut	38047500	47
Kallio	38014600	34
Kamimela	38071700	26
Kane	38065100	108
Katherine	38053800	77
Katydid	38027200	28
Kawasachong	38007000	177
Kawishiwi	38008000	468
Kek	38022800	62
Kekekabic	38022600	1905
Kekekabic Ponds	38018800	72
Kempton	38074000	66
Kettle	38039200	47
Kiana	38033400	207

Lake Name	DOW#	Acre
Kickshaw	38010600	34
Kitigan	38055900	84
Kivandeba	38015800	34
Kivaniva	38010800	43
Koma	38009800	266
Labrador Pond	38083800	28
Lake Of The Clouds	38016900	32
Lax	38040600	273
Legler	38064900	51
Lena	38042400	26
Leskinen	38024000	34
Lethe	38034800	42
Lillian	38054200	34
Link	38016300	45
Little Gabbro	38070300	228
Little Knife	38022900	407
Little Wilson	38005100	57
Lobo	38076600	132
Loki	38020100	31
Long	38074800	43
Lookout	38025000	60
Lost	38000300	87
Lunar	38016800	72
Lupus	38003800	93
Luster	38068200	46
Madden	38070900	37
Magnet	38051400	40
Maingan	38079600	34
Majava	38057900	26
Makwa	38014700	146
Malberg	38009000	442
Maniwaki	38030000	114
Manomin	38061600	455
Marathon	38046000	37
Marble	38065000	159
Marble	38010900	59
Micmac	38023300	121
Middle Mcdougal	38065800	108
Mirror	38058900	36
Missionary	38039800	110
Mitawan	38056100	202
Moiyaka	38040200	49
Moose	38003600	201
Moosecamp	38081600	187

Lake Name	DOW#	Acre
Mosquito	38036700	60
Mud	38074200	164
Mueller	38019300	30
Murphy	38075400	128
Museum	38047800	62
Muskeg	38078800	178
Muzzle	38051900	72
Nabek	38018200	48
Nawakwa	38020500	103
Neglige	38049200	36
Niki	38081400	56
Nine A.M.	38044500	27
Ninemile	38003300	339
Nipisiquit	38023200	50
North Mcdougal	38068600	323
North Wilder	38045200	103
No-See-Um	38080200	32
Ogishkemuncie	38018000	893
Omaday	38070600	37
One	38060500	822
Organ	38006700	44
Osier	38042000	81
Ottertrack	38021100	317
Ova	38055500	34
Pagami	38063900	75
Pakwene	38079700	25
Pan	38015100	106
Pangi	38059100	37
Papoose	38081800	54
Path	38058800	48
Pear	38020000	33
Peavey	38025200	29
Pelt	38046300	88
Perent	38022000	1844
Phantom	38065300	75
Phospor	38059200	38
Pickerel	38074100	171
Pickle	38038900	104
Pietro	38058400	325
Pike	38067000	78
Pitcha	38067600	39
Pitfall	38017600	42
Planted	38056400	61
Plum	38027300	74

Lake Name	DOW#	Acre
Polly	38010400	541
Pompous	38029800	39
Portage	38052400	67
Pose	38045500	87
Promise	38032000	44
Quadga	38059600	236
Rabbit	38021400	130
Range	38081200	100
Raven	38011300	204
Record	38009900	40
Redfin	38036400	49
Redskin	38044000	32
Rice	38046500	206
Rifle	38061000	36
River	38033800	126
Robin	38066100	25
Rock Island	38061300	65
Rock Of Ages	38058600	60
Roe	38013900	76
Rookie	38071000	26
Rota	38054300	116
Round Island	38041700	58
Saddle	38008800	44
Sagus	38022500	188
Sand	38073500	506
Sandpit	38078600	65
Sapphire	38044600	42
Saukko	38059900	26
Sauna	38079500	39
Sawmill	38074600	28
Scanlon	38026700	29
Scarp	38005800	43
Scott	38027100	52
Screamer	38034900	26
Section 29	38029200	122
Section Sixteen	38080100	70
Section Twelve	38071400	50
Sedative	38035900	95
Sema	38038600	78
Shamrock	38068700	58
Shepo	38037300	58
Shoepack	38002300	55
Short	38007500	31
Silver Island	38021900	1294

Lake Name	DOW#	Acre
Sister	38005000	125
Skindance	38019100	58
Skoota	38038100	147
Slate	38066600	354
Slowfoot	38048200	41
Slumber	38073200	44
Small	38028100	55
Smite	38037500	47
Snusbox	38029700	26
Solitude	38050000	65
Sonju	38024800	41
Source	38065400	35
South Hope	38030100	88
South Mcdougal	38065900	277
South Wigwam	38000100	63
South Wilder	38045300	75
Spice	38018900	26
Spider	38038000	33
Spinnan	38058100	29
Spoon	38038800	285
Spree	38062300	31
Sprig	38011800	48
Spruce	38054400	85
Spur	38025900	46
Square	38007400	125
Starlight	38047400	95
Steamhaul	38057000	36
Stewart	38074400	264
Stony	38066000	409
Stringer	38007600	42
Struggle	38033200	35
Strup	38036000	79
Sullivan	38075500	41
Sumpet	38028300	86
Sundown	38008200	25
Superstition	38059300	26
Surprise	38055000	38
Swamp	38001200	108
Swamp	38028500	55
Sylvania	38039500	86
T	38006600	307
Tanner	38025500	63
Termulo	38046600	31
Tetagouche	38023100	68

Lake Name	DOW#	Acre
Thirty Three	38079100	31
Thomas	38035100	1721
Thomas	38075100	157
Three	38060000	1085
Thunderbird	38003100	100
Tickle	38000900	43
Tin Can Mike	38078500	142
Toe	38018400	52
Tomahawk	38031300	50
Tomlinson	38026600	26
Topaz	38017200	174
Tornado	38044900	62
Trader	38049000	89
Trail	38009600	62
Travois	38011100	50
Treasure	38015400	32
Trident	38049500	99
Trinity	38037100	31
Turtle	38070400	359
Twenty Three	38024700	47
Twin	38074700	26
Two	38060800	529
Two Deer	38067100	52
Upland	38075600	74
Van	38011700	94
Vee	38013100	42
Vera	38049100	262
Wabosons	38080600	38
Wadop	38068100	47
Wampus	38068500	146
Wanless	38004900	84
Watonwan	38007900	64
West Chub	38067500	124
Whitefish	38006000	350
Whittler	38030700	25
Wilbar	38054800	29
Wilson	38004700	666
Wind	38064200	952
Windy	38006800	469
Wisini	38036100	129
Witness	38064300	42
Wolverine	38010500	25
Wood	38072900	587
Woodcock	38074900	53
Wooden Leg	38062200	26
Wye	38004200	57

Appendix B

Lake County AIS Prevention Plan Partners

Organization	Contact(s)
Federal Government:	
U.S. Forest Service	Jason Butcher jtbutcher@fs.fed.us
U.S. Army Corps of Engineers	Andrew Chambers Andrew.r.chambers@usace.army.mil
U.S. Fish and Wildlife Service	Mike Seider (Ashland) mike_seider@fws.gov
Natural Resources Conservation Service	Jon Sellnow jonathan.sellnow@mn.usda.gov
MN State Government: MN Department of Natural Resources	
Watercraft Inspection Supervisor - NE	Keri Hull keri.hull@state.mn.us
AIS Prevention Planner - NE	Phillip Hunsicker Philip.Hunsicker@state.mn.us
Invasive Species Specialist – NE	Rich Rezanka Richard.rezanka@state.mn.us
Law Enforcement – NE Water Resources	Mike Scott Michael.scott@state.mn.us
Pollution Control Agency	Jesse Anderson jesse.anderson@state.mn.us
Surface Water Quality Monitoring	
Board of Water & Soil Resources	Erin Loeffler erin.loeffler@state.mn.us
U of MN Sea Grant Extension Program	Doug Jensen djensen1@d.umn.edu
Independent:	
1854 Treaty Authority	Tyler Kaspar tkaspar@1854treatyauthority.org Cassie Taplin CTaplin@1854treatyauthority.org
Ely Community Resource	Julie Hignell julie@elycommunityresource.org
Lake County:	
Environmental Services Department	Christine McCarthy Christine.McCarthy@co.lake.mn.us
SWCD – District Manager	Karen Tucker Karen.Tucker@co.lake.mn.us
SWCD – AIS Coordinator	Sonja Smerud Sonja.Smerud@co.lake.mn.us
Lake County Invasive Team (LCIT)	Mackenzie Hogfeldt Mackenzie.Hogfeldt@co.lake.mn.us
4-H Extension Lake County	Tracey Anderson turne275@umn.edu
Neighboring Counties:	
Cook County:	Amanda Weberg cookcountyais@gmail.com
St. Louis County:	Michael Scharenbroich ScharenbroichM@StLouisCountyMN.gov
North St. Louis County SWCD	Emily Nelson enelson@nslswcd.org
Lake Associations:	
White Iron Chain of Lakes Assoc. (WICOLA)	www.WICOLA.org
Additional Partners	
Cities of Beaver Bay, Silver Bay, Two Harbors	As needed or inquired/TBD
Townships of Beaver Bay Crystal Bay, Fall Lake, Silver Creek, Stony River,	As needed or inquired/TBD
Neighboring Lake Associations	Carrie Cusack (Burntside) & Jeff Lovgren (Vermilion)