



Assessing the Risk of AIS in Waters with no Public Boat Access

Hennepin County 2018-2019

Fortin Consulting, Inc.
February 2020

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Assessing the Risk of AIS in Waters with no Public Boat Access

Executive Summary

The purpose of this project was to determine if and what aquatic invasive species (AIS) are found in water bodies without public boat accesses. Twenty two Hennepin County lakes were surveyed, thirteen in 2018 and nine lakes in 2019. The surveys were conducted by canoe using the Minnesota Department of Natural Resources' "Guidance for Conducting Aquatic Invasive Species Early Detection and Baseline Monitoring in Lakes, updated May 2018", with some modifications. One to five different AIS were observed in all lakes surveyed, but one. AIS found during the surveys included: curly-leaf pondweed, Eurasian watermilfoil, Chinese mystery snail, banded mystery snail, and common carp. The wetland/shoreline invasive plants, purple loosestrife and giant reed grass were also recorded. The presence of reed canary grass, a common invasive grass, was also noted. These AIS were introduced through pathways other than public boat accesses. A discussion on possible pathways for the introduction of AIS to these lakes is included in this report.

Introduction

Public boat accesses are considered the most common pathway for the introduction and spread of aquatic invasive species (AIS). Work done by Fortin Consulting for Hennepin County the past few years has shown that there are other potential sources to Hennepin County lakes, such as pet stores and garden centers. Many Hennepin County lakes have been surveyed for AIS, but most of these lakes have public boat accesses. This goal of this project was to provide AIS assessments on lakes, wetlands, and/or stormwater ponds without public boat accesses, and an assessment of potential AIS sources to these waters. The surveys took place in water bodies located throughout Hennepin County. Project results will help the County identify if AIS are reaching these waters through different pathways than public accesses and will help assess the threat of AIS to waters without accesses.

Fortin Consulting (FCI) was awarded a grant from Hennepin County in 2018 and 2019 to complete surveys, specifically looking for AIS, on lakes with no public access. The funding was part of the Minnesota Local Aquatic Invasive Species Prevention Aid program awarded to counties.

AIS Survey Methods

Lakes Surveyed

Using aerial photos and knowledge of Hennepin County, FCI prepared a draft list of potential lakes to survey. Criteria for choosing lakes included, no public access, distributed around Hennepin County, and ability/permission for staff to access the area to conduct a survey. We also limited the number of larger lakes since the surveys were conducted by canoe. FCI worked with the County AIS staff to finalize the list of lakes to survey. Contacts for landowners were obtained through the Hennepin County Property Information search map. FCI found contacts for the lakes and called or emailed them to get permission to access the lake. Thirteen lakes were chosen for the surveying in 2018 and nine in 2019.

A table of lake characteristics and survey information is found on the next page.

Survey Protocol

Fortin Consulting, Inc (FCI) followed protocol from the Minnesota Department of Natural Resources' [Guidance for Conducting Aquatic Invasive Species Early Detection and Baseline Monitoring in Lakes](#), updated May 2018, except for eliminating the "snorkel search" and using a minimum of 20 random points for the meandering search. A minimum of 10 was used for the small stormwater ponds surveyed. All surveys were conducted by two staff using a canoe. Surveys were conducted between June and September of 2018 and July and August of 2019. Since the surveys were conducted in late June to September, during the time likely to find the most plants, curly-leaf pondweed may have not been found after about mid-July but may have been present earlier in the year. Although not typically included as an AIS, if reed canary grass (*Phalaris arundinacea*) was observed, it was noted. Purple loosestrife (*Lythrum salicaria*) and giant reed grass (*Phragmites australis australis*), which are invasive shoreline or wetland plants, were also recorded. It was also noted if someone on the lake spoken to during the survey reported that an AIS had been found on the lake.

Summarized Protocol:

Fortin Consulting, Inc (FCI) will follow protocol from Department of Natural Resources' [Guidance for Conducting Aquatic Invasive Species Early Detection and Baseline Monitoring in Lakes](#), updated May 2018.

Below highlights the protocol FCI followed. Underlined items indicate adjustments FCI made to the protocol.

AIS surveys will be conducted between the months of June and September at 22 different lakes within Hennepin County with NO PUBLIC BOAT ACCESS. Each lake will be surveyed once.

FCI will use a canoe to conduct the surveys around the perimeter of the lakes. FCI will not conduct the "snorkel search".

Meandering Boat Search – by canoe

- 1) Conduct search by paddling a boat in a meandering pattern between the shoreline and the maximum rooting depth. Scan submerged rooted vegetation and confidently identify AIS.
- 2) Select a minimum of 20 random points* throughout the meander to collect plant samples with a rake (a double-sided rake is recommended) or invertebrate samples with a D-net.

- If weather conditions (e.g., wind/waves) or water quality (e.g. algae blooms or high turbidity) significantly impair visibility, note this on the field data sheet. Rake samples should still be collected (recommend doing more than 20 rake samples) in order to assess for AIS presence.

Target Site Search – by canoe, and/or in waders, if possible – FCI will not conduct “snorkel search”

A minimum of two people should spend a total of 10 minutes at each site conducting searches.

Walk or wade along 100 feet of the shoreline at each target site. Conduct searches at a minimum of three (up to five) scattered lake sites representing different within-lake habitat, substrate or shoreline characteristics.

- For larger lakes with a variety of habitat, a minimum of five sites is recommended. Sites should maximize areas most vulnerable to invasion within a lake such as inlets, highly developed shorelines, private water accesses, plant filled bays, rock bars/points, etc.

Reporting AIS

FCI will report findings as requested by DNR. If necessary, FCI will transport AIS to FCI office to verify identification before reporting findings. Note: FCI has a permit to transport and possess AIS samples.

Decontamination of boat and equipment

FCI will decontaminate boat and equipment as required by Minnesota State Laws. FCI will properly dispose of any AIS brought back to the office for identification confirmation, per our DNR permit.

*Note: A fewer number of points were surveyed in the small stormwater ponds downstream of Medicine Lake

Vegetation density

Vegetation samples collected on the survey rake were ranked to estimate species density at the site, according to the following ranking.

1= one plant on rake sample

2= more than one plant on rake sample

3= species was the dominant plant on the rake sample

Native plants

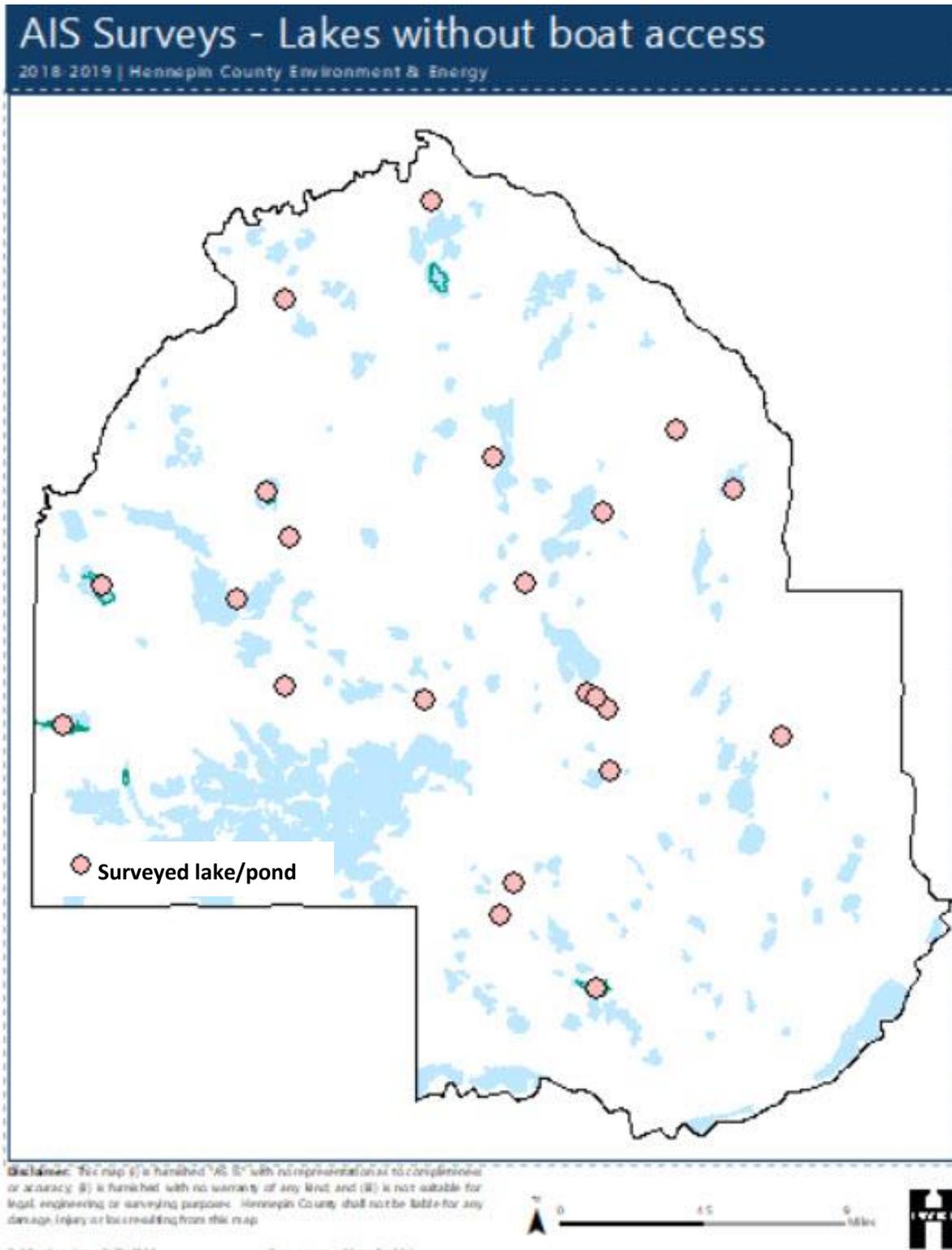
While conducting the survey, observations of native aquatic plants will also be recorded.

Lake Characteristics

Lake	DNR ID#	Watershed	City	AIS Survey date	Size (Acres)	Max Depth (feet)	Littoral acres	Water-shed Area (acres)	Notes
Ardmore	27-015300	Pioneer-Sarah Creek	Medina	7/10/2019	13	24	9	514	Adjacent to Lake Independence
Birch Island	27-0081	Nine Mile Creek	Eden Prairie	8/29/2018	43	14	43	543	Camp located next to lake. Only about 7 acres of the lake are accessible by canoe.
Classen	27-016200	Minnehaha Creek	Orono	7/30/2019	53	N/A	N/A	322	Near Orono High School
General Mills	N/A	Basset Creek Watershed	Golden Valley	7/18/2019	8	N/A	N/A	N/A	Connected to Bassett Creek; downstream from Medicine Lake
Glen	27-0093	Nine Mile Creek	Minnetonka	7/10/2018	98	25	89	1062	Businesses in watershed
Goldenrod Marsh	N/A	Elm Creek	Maple Grove	7/16/2019	25	N/A	N/A	N/A	Park surrounding lake
Hadley	27-0109	Minnehaha Creek	Plymouth	6/27/2018	33	N/A	N/A	198	Rusten Woods
Hannon	27-0052	Minnehaha Creek	St. Louis Park	7/05/2018	14	5 (est.)	N/A	N/A	Behind Westwood Lutheran Church
Henry	27-0175	Elm Creek	Hassan Township	7/16/2018	44	5	44	N/A	
Robina	27-0188	Pioneer-Sarah Creek	Independence	9/05/2018	234	<15	234	1600	
Jubert	27-0165	Elm Creek	Corcoran	8/27/2018	64	41	49	N/A	
Laura	27-012300	Elm Creek	Dayton	7/11/2019	37	N/A	N/A	140	

Loring	27-0655	Mississippi Watershed Management Organization	Minneapolis	8/22/2018	7.3	16	6.4	24	Busy park surrounding lake-used for fishing. Stocked for fishing.
Magda	27-0065	Shingle Creek	Brooklyn Park	6/26/2018	10.2	5 (est.)	10.2	62	Borders Highway 169
North Anderson	27-0062-01	Nine Mile Creek	Eden Prairie	7/30/2018	185	10	185	N/A	
Ox Yoke	27-017800	Pioneer-Sarah Creek	Minnetrista	7/26/2019	93	4	N/A	N/A	Downstream from Lake Independence
Palmer	27-0059	Shingle Creek	Brooklyn Center	7/17/2018	29	4	29	N/A	Two parks on the lake; connected to Shingle creek
Peter	27-0147	Pioneer-Sarah Creek	Loretto	7/9/2018	46	68	N/A	N/A	
Sunfish	N/A	Shingle Creek	Brooklyn Park	8/29/2018	1.25	12	1.25	N/A	Next to community center, fishing pond. Stocked for fishing.
Unnamed 1 (Curtis)	27-0593W	Shingle Creek	Plymouth	8/1/2019	16	N/A	N/A	N/A	Borders Highway 494
Unnamed 2	N/A	Bassett Creek	Plymouth	7/24/2019	1	N/A	N/A	N/A	Downstream from Medicine Lake
Unnamed 3	N/A	Basset Creek	Plymouth	7/24/2019	4	N/A	N/A	N/A	Downstream from Medicine Lake

Map of Hennepin County Lakes and ponds surveyed 2018-2019



Results

Twenty-two lakes were surveyed for this project. Although no public boat access existed on the lakes surveyed, invasive species were found in all lakes. The table below summarizes the AIS found in each lake. The last three columns (highlighted) are invasive species, but not true aquatic species. Native aquatic plants observed were also recorded and are included as an appendix. Plants, fish and snail AIS were found. An AIS was included in the table if it was found during the survey, if staff were told it has been found on the lake or if it was listed on the DNR, watershed management organization or city AIS lists.

Aquatic Invasive Species Presence

Lake	City	Year surveyed	Curly-Leaf Pondweed (<i>Potamogeton crispus</i>)	Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	Banded Mystery Snail (<i>Viviparus georgianus</i>)	Chinese Mystery Snail (<i>Cipangopaludina chinensis</i>)	Carp (<i>Cyprinus carpio</i>)	Goldfish (<i>Carassius auratus</i>)	Giant Reed Grass (<i>Phragmites australis australis</i>)	Purple Loosestrife (<i>Lythrum salicaria</i>)	Reed Canary Grass (<i>Phalaris arundinacea</i>)
Ardmore	Medina	2019					XO				X
Birch Island Lake	Eden Prairie	2018	X							X	X
Classen	Orono	2019								X	X
General Mills	Golden Valley	2019	X	X						X	X
Glen lake	Minnetonka	2018							X		
Goldenrod Marsh	Maple Grove	2019									X
Hadley Lake	Plymouth	2018	X							X	X
Hannon Lake	St. Louis Park	2018				X				X	
Henry Lake	Hassan Township	2018	X								X
Jubert Lake	Corcoran	2018	X				O				
Lake Robina	Independence	2018	X				X			X	X
Laura	Dayton	2019	X			X					X
Loring Pond	Minneapolis	2018	X	O*		O*		O*			
Magda Lake	Brooklyn Park	2018	X*	O*	X*	X*				O*	X
North Anderson	Eden Prairie	2018	O*	O*		X	O*			X	X
Ox Yoke	Minnetrista	2019	X				X				X
Palmer Lake	Brooklyn Center	2018	X			X	X			X	X
Peter Lake	Medina	2018	X							X	X
Sunfish Pond	Brooklyn Park	2018				X					
Unnamed 1 (Curtis)	Plymouth	2019	X							X	
Unnamed 2	Plymouth	2019	X	X		X				X	X
Unnamed 3	Plymouth	2019	X								
		TOTAL	16	5	1	8	6	1	1	12	15

Key	
X	Seen by FCI
O	Seen only by others
*	Previously Reported

The section for each lake below includes a description of dominant species and AIS found. Each lake section includes a description of findings, photos, a map of the lake including the survey course and points indicating if AIS was found, tables of AIS found and potential sources. Number of houses on the lake, which are potential sources of AIS, are listed in categories of 0, <10, 10 – 25, or >25. The following abbreviations were used on the photo labels: CLP-curly-leaf pondweed, EWM-Eurasian watermilfoil, PLS-purple loosestrife,

Ardmore Lake

Description

Ardmore Lake was surveyed on July 10, 2019. The lake had very little submerged vegetation. Over half of the sample points had no vegetation on the rake. Invasive carp (*Cyprinus carpio*) were also present on the lake.



Entrance point at Ardmore Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Cyprinus carpio</i>	Carp	1	B5, B8, B10	Carp population is known by property owners; attempted removal multiple times
<i>Phalaris arundinacea</i>	Reed Canary Grass	2	B1, B4, B5, TS2, B8, B10, B13, B17	



Legend

- Eurasian water milfoil
- Goldfish, carp, mystery snail, loosestrife or Curly-leaf pondweed
- No AIS identified

Potential AIS Sources

Connected waterways	Yes, connected to small un-named pond and ditches
Storm sewer	No
Houses	<10
Private docks	Yes
Special concerns	None

Invasive carp were seen on the lake and were noted by a property owner on the lake. No invasive aquatic vegetation was found but Reed Canary Grass populations were present on the shore. The invasive carp could have been introduced by property owners or entered through the stream connection on the north end of the lake.

Birch Island Lake

Description

Birch Island Lake was surveyed on August 29, 2018. The Lake had a nice diversity of submergent and floating-leaved plants and is dominated by cattail (*Typha sp.*) on the shorelines. Purple loosestrife (*Lythrum salicaria*) (PLS) and reed canary grass (*Phalaris arundinacea*) (RCG) were also present on the shoreline. The submerged vegetation was very dense and dominated by musk grasses (*Chara sp.*), Nitella (*Nitella sp.*) and coontail (*Ceratophyllum demersum*). An algal bloom was present on parts of the lake and is noted as a recurring concern by Nine Mile Creek Watershed District.



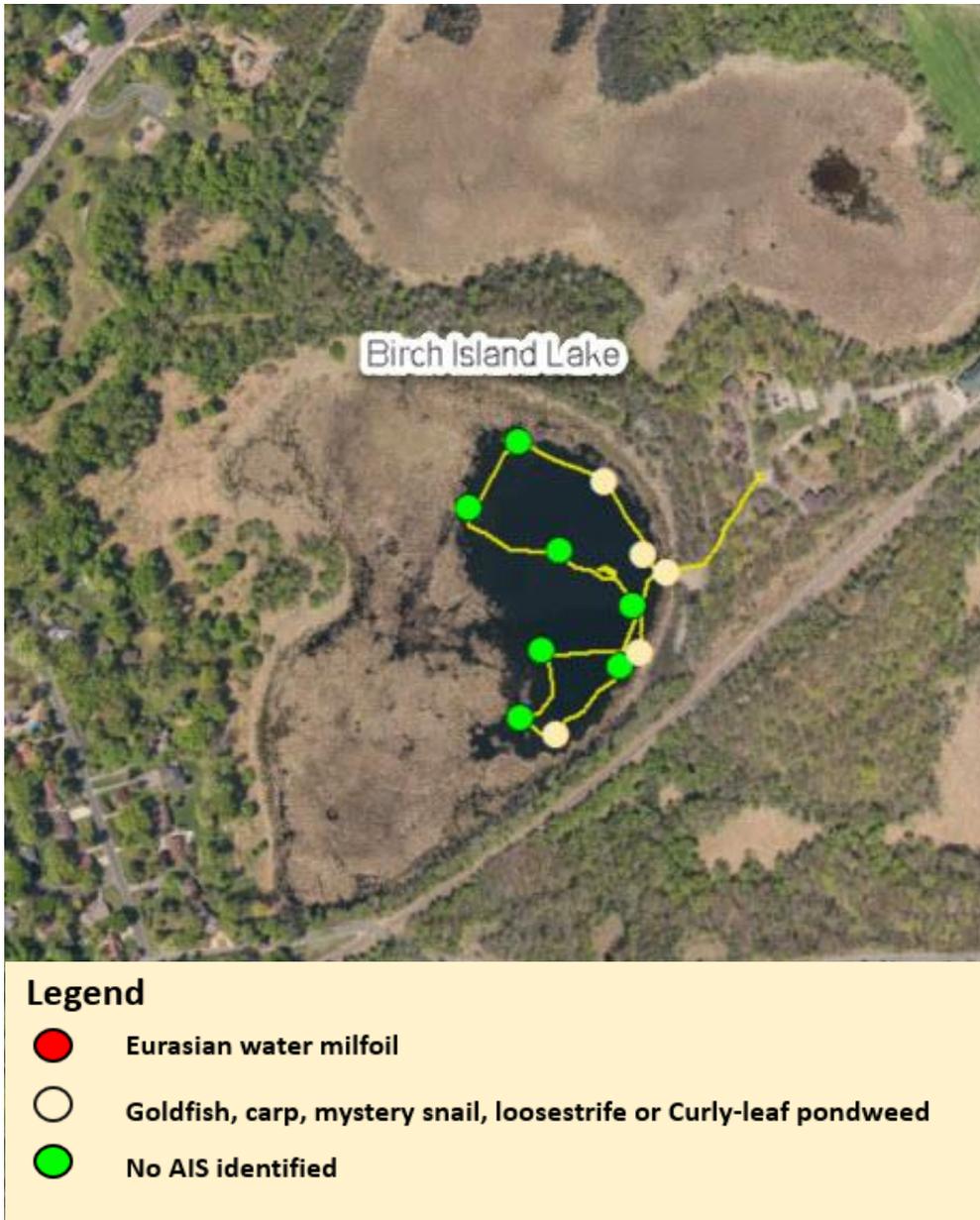
Dense submergent vegetation in Birch Island Lake



Cattails along shoreline of Birch Island Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	2	TS 1 & 2, B 1,2 & 8	
<i>Potamogeton crispus</i>	Curly-leaf pondweed	2	TS 1	
<i>Phalaris arundinacea</i>	Reed canary grass	2	TS 1 & 2	



Potential AIS Sources

Connected waterways	None
Storm sewer	No
Houses	0
Private docks	Yes
Special concerns	Camp located on next to lake with a private dock

Purple loosestrife and reed canary grass were found scattered on the shoreline of Birch Island Lake, never occurring more densely than cattail. Curly-leaf pondweed was found at the camp canoe launch location near a dilapidated dock.

Birch island lake is located near Camp Eden Wood in Eden Prairie, which has a path that leads to the lake and has canoes stored near a private launch point.



Curly-leaf pondweed on Birch Island Lake



Canoe launch used by Camp Eden Wood at Birch Island Lake



Purple loosestrife on Birch Island Lake

Lake Classen

Description

Lake Classen was surveyed on July 30, 2019. The lake had a variety of submerged vegetation and was dominated by coontail and pondweed (*Potamogeton sp.*). Cattail dominated the shoreline plants, but Purple Loosestrife and Reed Canary Grass were also present on the shore.



Lake Classen

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	2	B8, TS3, B12, B13, B15	
<i>Phalaris arundinacea</i>	Reed canary grass	2	TS1, TS3	



Potential AIS Sources

Connected waterways	Ditch to adjacent wetlands and south of Highway 12
Storm sewer	No
Houses	<10
Private docks	No
Special concerns	Orono high school; walking path near lake

No submerged AIS were found at Lake Classen, only Purple Loosestrife and Reed Canary Grass. Both were not commonly seen on the shore that was dominated by Cattail. Orono High School is next to the lake and a walking path leads to the shore.



Purple loosestrife at Lake Classen



Reed canary grass at walking path near lake

General Mills Nature Preserve

Description

General Mills Nature Preserve was surveyed on July 18, 2019. This site was chosen because it was downstream from Medicine Lake which was recently infested with starry stonewort (*Nitellopsis obtusa*). A variety of submerged plants were observed on the lake including coontail, pondweed and Bladderwort (*Utricularia sp.*). curly-leaf pondweed, Eurasian watermilfoil, purple loosestrife and reed canary grass were all present but not commonly observed.

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	2	TS2	Leaf damage from biocontrol
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	1	B6, B9	
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1	TS2, B1	
<i>Phalaris arundinacea</i>	Reed canary grass	2-3	TS1, B9, B10	



Potential AIS Sources

Connected waterways	Basset Creek, downstream of Medicine lake
Storm sewer	Yes
Houses	<10
Private docks	No
Special concerns	Near Highways 169, 494, 55; businesses near lake; walking paths

Curly-leaf pondweed and Eurasian watermilfoil were present. Both were found as a single plant at only two sample locations. Purple loosestrife and Reed Canary Grass were also observed but not as the dominate shoreline plants. Basset Creek flows downstream from Lake Independence along the southern side of the wetland. The wetland is in a nature preserve and is surrounded by a trail system.



Eurasian watermilfoil in General Mills pond



Curly-leaf pondweed in General Mills pond



Purple loosestrife in General Mills pond

Glen Lake

Description

Glen Lake was surveyed on July 10, 2018. The lake had a large diversity of submergent, floating-leaved and emergent plants. Glen Lake was dominated by cattail, White Water Lily (*Nymphaea tuberosa*), and *Nitella*. An algal bloom was present on about half the lake and is noted as a reoccurring concern by Nine Mile Creek Watershed District.

Only emergent AIS were found at Glen Lake. Invasive Phragmites (*Phragmites australis subsp. australis*) was found at target site 1 and Reed canary grass at target site 3.

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Phragmites australis subsp. australis</i>	Common reed	2	TS1	Species was confirmed by an expert at UMN
<i>Phalaris arundinacea</i>	Reed canary grass	N/A	TS3	



Legend

- Eurasian water milfoil
- Goldfish, carp, mystery snail, loosestrife or Curly-leaf pondweed
- No AIS identified

Potential AIS Sources

Connected waterways	None
Storm sewer	Yes
Houses	>25
Private docks	Yes
Special concerns	Private canoe/kayak access

Goldenrod Marsh

Description

Goldenrod Marsh was surveyed on July 16, 2019. The surface of the lake was carpeted with Wolffia (*Wolffia Sp.*) and duckweed (*Lemna minor, Spirodela sp.*). White Water Lily (*Nymphaea tuberosa*) was also observed at almost every sample point. Coontail and pondweed were the commonly observed submerged vegetation.

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Phalaris arundinacea</i>	Reed canary grass	2	TS1, TS4	



Legend

- Eurasian water milfoil
- Goldfish, carp, mystery snail, loosestrife or Curly-leaf pondweed
- No AIS identified

Potential AIS Sources

Connected waterways	None
Storm sewer	Yes
Houses	>25
Private docks	No
Special concerns	Public park, pier (not intended for fishing)

No true aquatic invasive species were observed on Goldenrod Marsh. Reed Canary Grass was seen in two spots on the lake, but cattail was the dominant shoreline plant.

Hadley Lake

Description

Hadley lake was surveyed on June 27, 2018. Hadley had fair diversity in its floating vegetation. The submergent vegetation was dominated by coontail. Decaying curly-leaf pondweed was also seen in more than half of the samples. Cattail was dense on the shoreline but was outcompeted by purple loosestrife and reed canary grass at several sample sites. An algal bloom was commonly seen in the shallower areas. *Galerucella* beetles were observed feeding on the purple loosestrife.



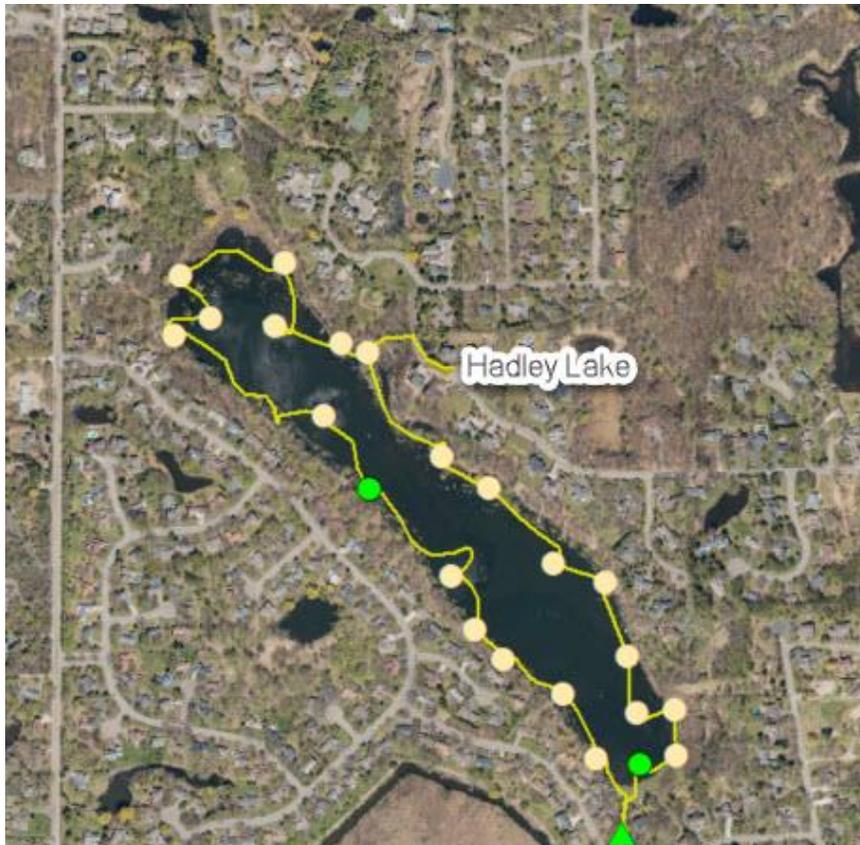
Entrance to Hadley Lake



Algal bloom on Hadley Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	2-3	B3, B4, B12, B14, B15, B16, B17, B20, TS1, TS2, TS4	Damage and some beetles on the leaves
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1-2	B1, B2, B5, B6, B7, B9, B10, B11, B12, B18, B19, B20, TS2	A homeowner said the lake association had treated for CLP
<i>Phalaris arundinacea</i>	Reed canary grass	2-3	B10, TS1, TS2	



Legend

- Eurasian water milfoil
- Goldfish, carp, mystery snail, loosestrife or Curly-leaf pondweed
- No AIS identified

Potential AIS Sources

Connected waterways	None
Storm sewer	Yes
Houses	>25
Private docks	Yes, several
Special concerns	Private park and communal private dock/canoe launch for homeowners on lake

Purple loosestrife, curly-leaf pondweed, and reed canary grass were found in Hadley Lake. The purple loosestrife was dense and was present in about half of the samples. The purple loosestrife had a population of *Galerucella* beetles on it, and plant damage from the beetle feeding was observed. Reed canary grass was found less frequently than purple loosestrife. Curly-leaf pondweed was present in half the samples. It was often decaying, and a homeowner noted that the lake association had treated the lake.



Damaged purple loosestrife in Hadley Lake

There were also signs stating the lake was treated on June 11.



Private park and lake entrance for Residents on Hadley Lake



Reed canary grass on Hadley Lake

Hadley Lake has a private park, known as Rusten Woods, for homeowners on the lake. There is a private canoe launch and several canoes were observed nearby.

Hannan Lake

Description

Hannan Lake was surveyed on July 5, 2018. The lake has a nice diversity of submergent and floating-leaved plants. Hannan Lake was dominated by white water lily on the surface and coontail and narrow-leaf pondweed (*Potamogeton sp.*) below the surface.



White water lilies on Lake Hannan

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	1-3	B1, B2, B3, B9, B12, B14, TS2	Some chewing on the plants from PLS beetles
<i>Cipangopaludina chinensis</i>	Chinese mystery snail	1	B1	



Potential AIS Sources

Connected waterways	None
Storm sewer	Yes
Houses	>25
Private docks	Yes
Special concerns	Church near lake



Purple loosestrife on Lake Hannon

Purple loosestrife and Chinese mystery snail (CMS) were present on Hannan Lake. Purple loosestrife was present in seven of the samples and was generally spotted in clusters or densely along the shoreline. A Chinese mystery snail shell was found near the canoe launch point.

Henry Lake

Description

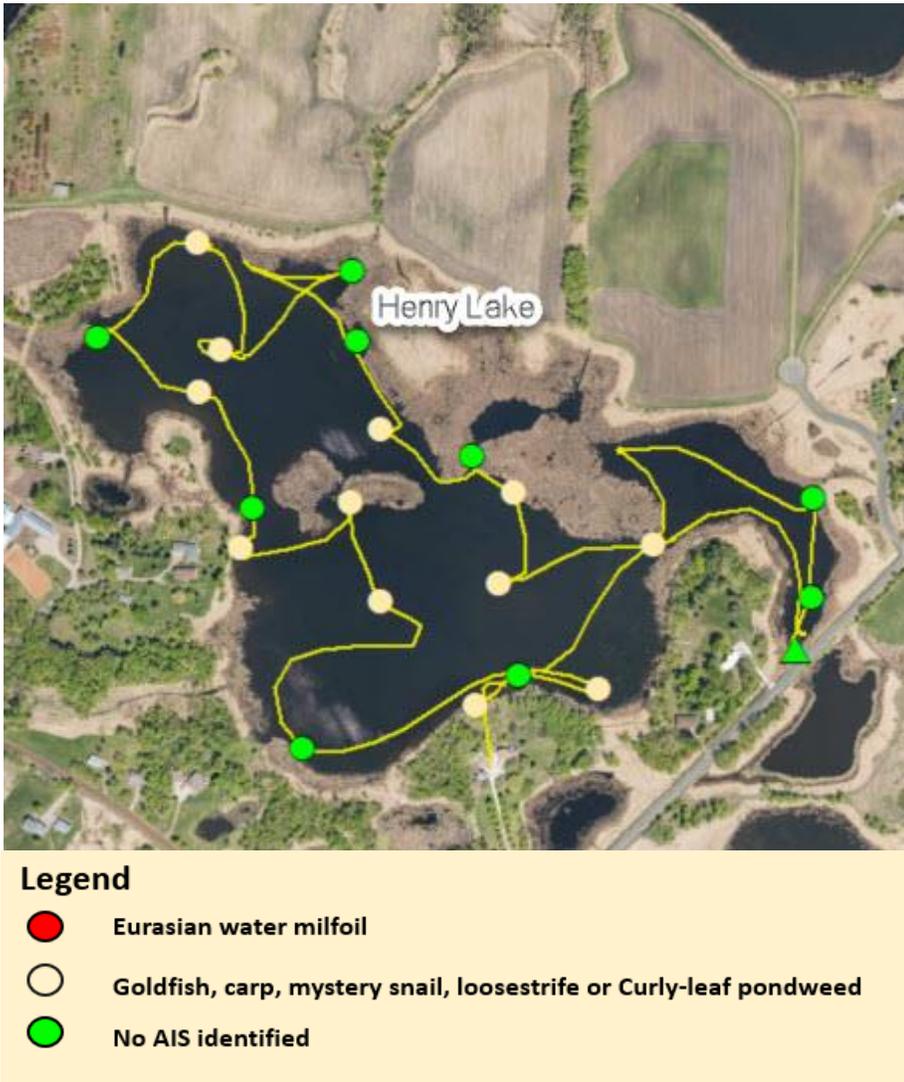
Henry Lake was surveyed on July 16, 2018. The lake had a large diversity of submerged plants and was dominated by cattail on the shoreline. The dominant submerged vegetation was coontail, Canada waterweed (*Elodea canadensis*), and narrow-leaf pondweed.



View from the shore of Henry Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1-2	B2, B6, B7, B9, B12, B13, B15, B17, B18, B20, TS1, TS3	
<i>Phalaris arundinacea</i>	Reed canary grass	3	B13, B16, TS2, TS3	



Potential AIS Sources

Connected waterways	Ditches and short streams to nearby small ponds and wetlands
Storm sewer	No
Houses	<10
Private docks	Yes
Special concerns	None



Reed canary grass on Lake Henry



Curly-leaf pondweed on Lake Henry

Henry Lake had curly-leaf pondweed and reed canary grass present. Reed canary grass was the dominant shoreline plant in four samples. Curly-leaf pondweed was present in about half of the samples.

Jubert Lake

Description

Jubert Lake was surveyed on August 27, 2018. The shoreline of the lake was dominated by cattail. Coontail and white water lily were the most common vegetation in the lake. Some parts of the lake had little to no submergent vegetation.



White water lilies on Jubert Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Potamogeton crispus</i>	Curly-leaf pondweed		B3, B5, B13-15, B17, TS2	Lots of turions Homeowner mentioned large mats of vegetation taking over lake and dying in July.
<i>Cyprinus carpio</i>	Carp			Homeowner mentioned carp- not observed by FCI



Legend

- Eurasian water milfoil
- Goldfish, carp, mystery snail, loosestrife or Curly-leaf pondweed
- No AIS identified



Curly-leaf pondweed on Jubert Lake



Curly-leaf pondweed turions on top of lilies: Jubert Lake

Curly-leaf pondweed was found on Jubert Lake. The lake was surveyed in late August after the plants usually die off. Only one vegetation sample was found but on parts of the lake numerous turions were found on top of lily pads. A homeowner also described what sounded like Curly-leaf pondweed; large mats of vegetation that take over the lake in early summer and die off in July. The number of turions seen above the water and the description from the homeowner suggest Curly-leaf pondweed is the dominant species in the lake in early summer. The homeowner stated that there was a fish kill in the spring of 2018 that included carp. No carp were seen by FCI, and the lake isn't listed as infested by carp.

Potential AIS Sources

Connected waterways	Rush Creek connecting to several wetlands/lakes all downstream, small streams/ditches draining agricultural land/wetlands from the west and north.
Storm sewer	No
Houses	10-25
Private docks	Yes
Special concerns	None

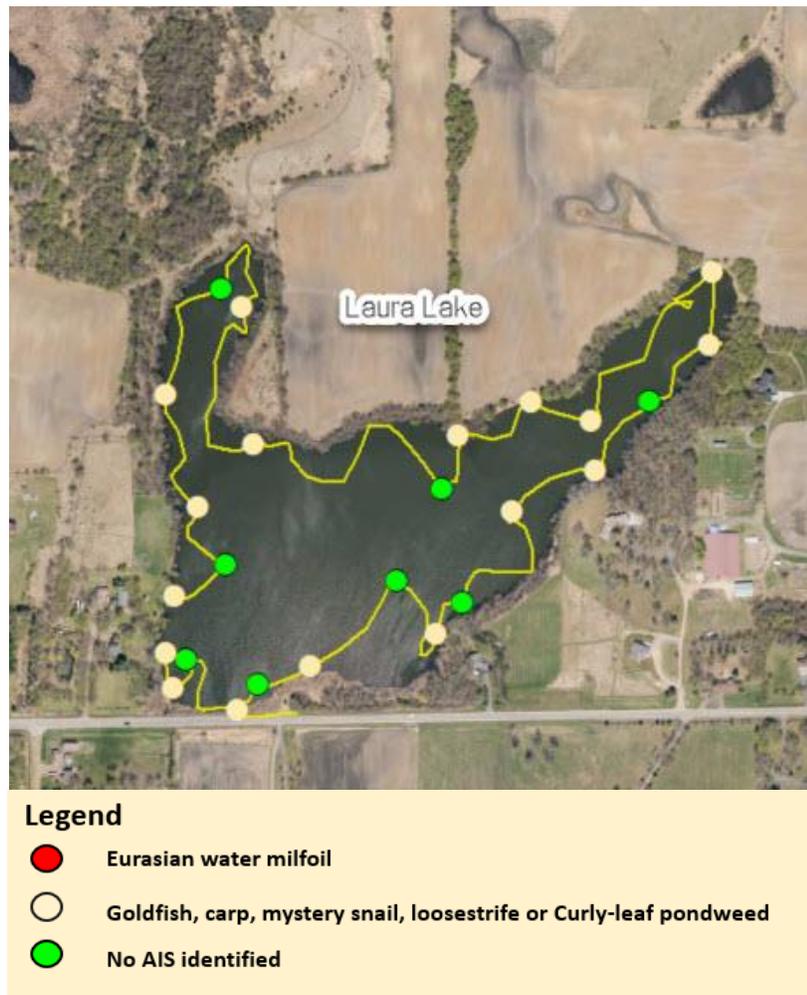
Laura Lake

Description

Laura Lake was surveyed on July 11, 2019. The lake had a variety of native plants including coontail, Canada waterweed and pondweed. The lake also had a large population of Chinese Mystery Snails.

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Cipangopaludina chinensis</i>	Chinese Mystery Snail	2-3	TS1-5, B3, B6, B8, B11, B13, B15, B16, B19	
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1-2	TS1-5, B2, B5, B6, B9, B12, B15, B16, B19	More turions found than vegetation
<i>Phalaris arundinacea</i>	Reed canary grass	2-3	TS4, B3, B11, B13,	



Potential AIS Sources

Connected waterways	Small ditch on southwest side of lake under Diamond Lake Road connects to 2 small backyard ponds
Storm sewer	No
Houses	<10
Private docks	Yes
Special concerns	None

Curly-leaf pondweed plants or turions were found in over half of the samples on Laura Lake. It is likely that CLP populates more of the lake earlier in the growing season. Chinese Mystery Snails were also seen at almost half of the sample spots on the lake. At times they were too numerous to count. Reed Canary Grass was also on the shoreline at four locations. The lake has some homes with private docks and watercraft on the lake. It is in a rural area with large lots and farm fields surrounding it.

Loring Pond

Description

Loring Pond was surveyed on August 22, 2018. The lake is situated in a heavily used public park in an urban area in Minneapolis. The lake had a nice diversity of native shoreline plants. Loring Pond was dominated by duckweed and wolffia on the surface. The submergent vegetation was primarily coontail and Canada waterweed.



Duckweed and Wolffia on Loring Pond

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil			Present as told by MPRB
<i>Potamogeton Crispus</i>	Curly-leaf pondweed	1	B8	1 turion observed
<i>Cipangopaludina chinensis</i>	Chinese mystery snail			Previously Recorded-on DNR Lake Finder
<i>Carassius auratus</i>	Goldfish			Present as told by MPRB



Potential AIS Sources

Connected waterways	None
Storm sewer	Yes
Houses	0
Private docks	None
Special concerns	Public fishing dock on lake, located in urban area and surrounded by public park

A curly-leaf pondweed turion was found by FCI. Eurasian watermilfoil, Chinese mystery snail, and goldfish have also been reported on the lake by the Minneapolis Park & Recreation Board (MPRB) and on the DNR Lake Finder but were not observed during the survey. While only one turion was found it is likely that the density is higher during peak curly-leaf pondweed season.

Loring Pond is in a public park in an urban area with no houses or private docks on the lake. It is not connected to any other streams or lakes and is storm sewered. The lake has a fishing dock and is stocked by the DNR. Goldfish may have been introduced by a well-intentioned homeowner needing to dispose of the fish but not wanting to kill them.



Curly-leaf pondweed turion from Loring Pond

Magda Lake

Description

Magda Lake was surveyed on June 26, 2018. The lake is situated next to Highway 169 on the west and is surrounded by houses on the other sides. Curly-leaf pondweed, Canada waterweed, and coontail were the most observed plants. Chinese mystery snail was also commonly seen on the lake.



Magda Lake



Canada waterweed on Magda Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	N/A		Previously recorded on DNR Lake Finder
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1-3	B1-8, B11-20, TS1-3	Previously reported
<i>Cipangopaludina chinensis</i>	Chinese mystery snail	1	B1, 3, 8, 11, 14, TS2-3	Previously reported
<i>Viviparus georgianus</i>	Banded mystery snail	1	B8	Previously reported
<i>Phalaris arundinacea</i>	Reed canary grass	2	B3	



Potential AIS Sources

Connected waterways	None
Storm sewer	Yes
Houses	10-25
Private docks	Yes
Special concerns	Walking path on north end of lake

Curly-leaf pondweed, Chinese mystery snail, and banded mystery snail were found on Magda Lake. Eurasian watermilfoil was previously recorded and was observed later in the year. Purple loosestrife has been found on the lake in previous years. Curly-leaf pondweed occurred in almost every sample. Chinese mystery snail shells were seen at multiple sample sites and one banded mystery snail shell was found. The invasive species were observed



Chinese and banded mystery snails- Magda Lake

only in the last 5 years. There are no stream or ditch connects to the lake. It is unknown how they were introduced.



Curly-leaf pondweed in Magda Lake

North Anderson Lake

Description

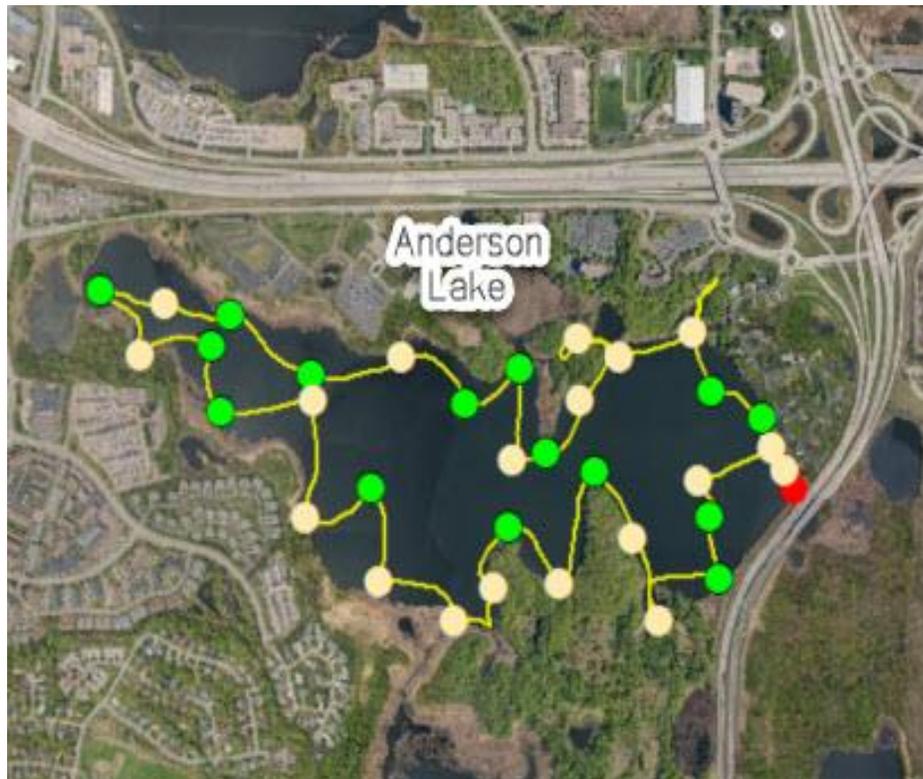
North Anderson Lake was surveyed on July 30, 2018. The lake is larger than most that were surveyed and shallow throughout. The Lake had a nice diversity of submergent, floating-leaved and emergent plants and was dominated by coontail, musk grasses, white water lily, and pondweeds. The lake had a large infestation of Chinese mystery snails.



North Anderson Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	2-3	B2, TS1-3	
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	n/a		Present as told by Three Rivers Parks District
<i>Potamogeton crispus</i>	Curly-leaf pondweed	n/a		Present as told by Three Rivers Parks District
<i>Cipangopaludina chinensis</i>	Chinese mystery snail	1-3	B2, B5-6, B8, B11, B14, B16, B19-20 B22-24, B26, B28, B31, TS1-4	
<i>Phalaris arundinacea</i>	Reed canary grass	2-3	B1, B26, TS1, TS3	
<i>Cyprinus carpio</i>	Carp	n/a		Possibly present as reported by Three Rivers Parks District



Legend

- Eurasian water milfoil
- Goldfish, carp, mystery snail, loosestrife or Curly-leaf pondweed
- No AIS identified

Potential AIS Sources

Connected waterways	Yes, unnamed stream connecting Southwest and Southeast Anderson and Bush lakes upstream
Storm sewer	Yes
Houses	10-25
Private docks	Yes
Special concerns	Park surrounding lake, public access and reported AIS upstream

Purple loosestrife, Chinese mystery snail, and reed canary grass were found by FCI while surveying the lake. Eurasian watermilfoil and Curly-leaf pondweed are also present according to Three Rivers Parks District. Reed canary grass and purple loosestrife occurred in about five of the samples as either the dominant species or in patches. Chinese mystery snail shells were observed in over half of all samples and usually in multiples.



Purple loosestrife: N. Anderson Lake



Chinese mystery snail shells in N. Anderson Lake

North Anderson Lake has 10-25 houses around the lake and business parks on the lake. There are also private docks on the lake. The lake is storm sewer and is connected to Bush Lake, Southwest Anderson and Southeast Anderson Lake by an unnamed stream. Bush Lake has a public boat launch. Southeast Anderson and Bush Lake are both listed as being infested with Eurasian watermilfoil according to the DNR. Southwest and Southeast Anderson are listed as being infested with Curly-leaf pondweed by Nine Mile Creek Watershed District

Ox Yoke Lake

Description

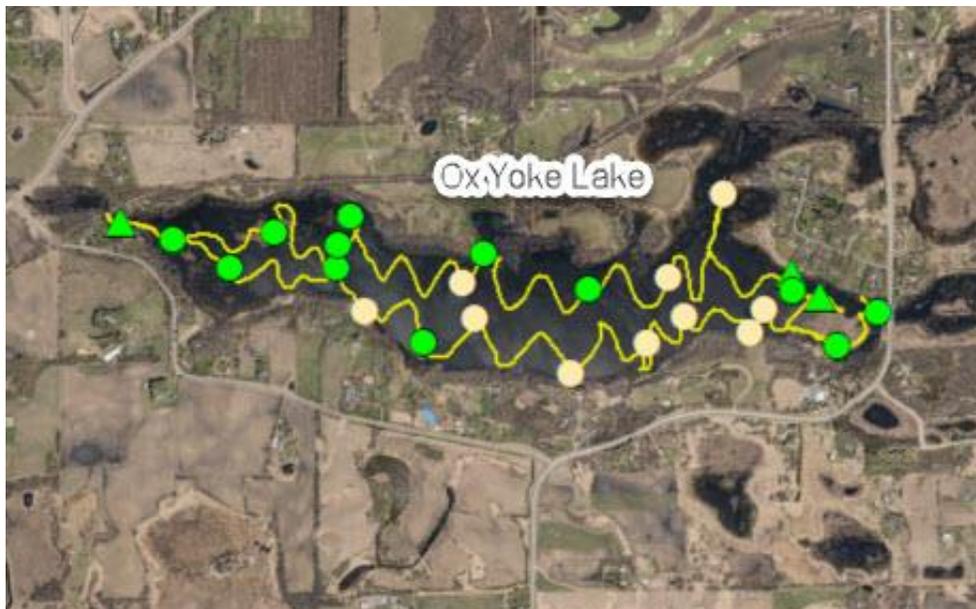
Ox Yoke Lake was surveyed on July 26, 2019. The lake had a variety of native submerged vegetation dominated by coontail, Canada waterweed, and sago pondweed. On the date surveyed the east side of the lake had a large bog in the middle populated with cattail and native *Phragmites*. The lake is bordered by a farm to the north and homes as well. Pioneer Creek runs through Ox Yoke Lake.



Ox Yoke Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Cyprinus carpio</i>	Carp	1-2	B1, B2, B10	
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1-2	B3-8, TS1, B16, B19, B20	
<i>Phalaris arundinacea</i>	Reed canary grass	2	TS2, B20	



Legend

- Eurasian water milfoil
- Goldfish, carp, mystery snail, loosestrife or Curly-leaf pondweed
- No AIS identified

Potential AIS Sources

Connected waterways	Lake Independence, Robina Lake, Pioneer creek, Whaletail Lake, several streams/ditches from smaller lakes and wetlands
Storm sewer	No
Houses	10-25
Private docks	Yes
Special concerns	None

Curly-leaf pondweed was frequently seen on Ox Yoke Lake and is likely more frequent earlier in the summer. Invasive carp was seen on the lake in two spots. Reed Canary Grass was observed but infrequently. The lake is downstream from Independence and Robina lakes and had a few residences with private docks.



Private dock on Ox Yoke Lake



Curly-leaf pondweed in Ox Yoke Lake

Palmer Lake

Description

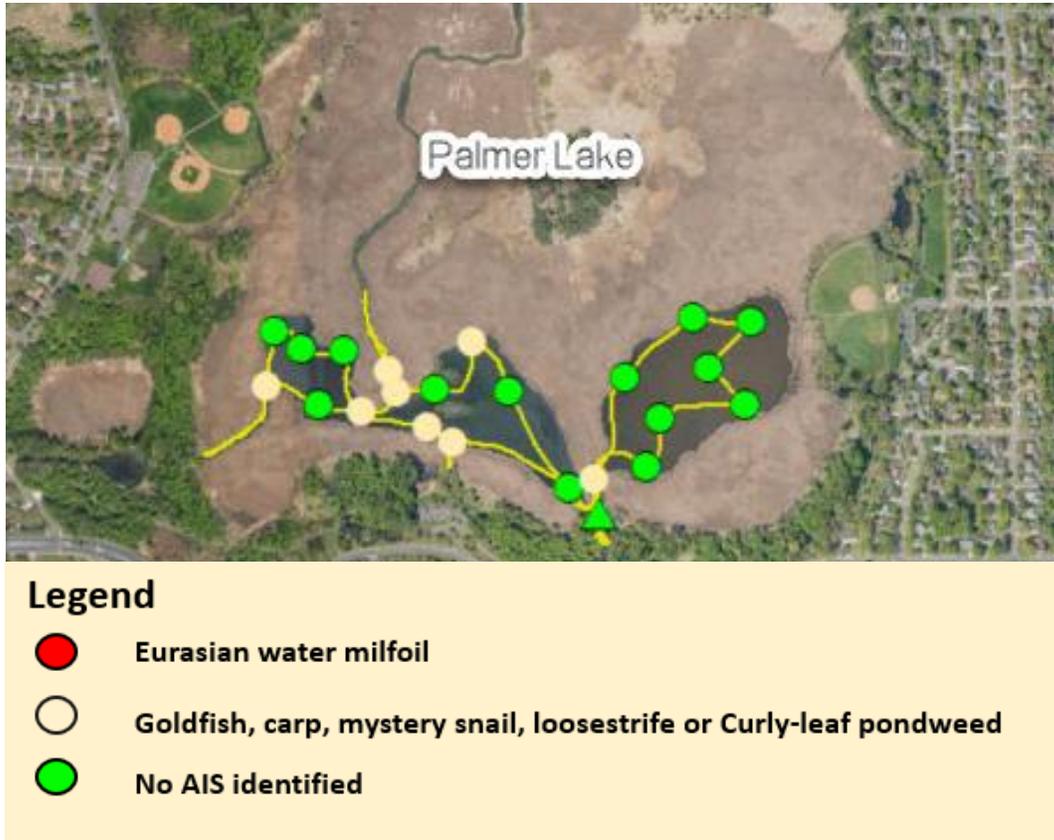
Palmer Lake was surveyed on July 17, 2018. The lake is shallow and thick with vegetation on the west side. The east side had less vegetation. There was a lot of visible trash where Shingle Creek comes into the lake. The dominant species were cattail, coontail, and sago pondweed (*Stuckenia pectinata*).



Dense vegetation on Palmer Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	1	TS1	Leaves were chewed
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1-2	B1-3, B8, B10, B13, TS1-2	
<i>Cipangopaludina chinensis</i>	Chinese mystery snail	1	TS1	
<i>Phalaris arundinacea</i>	Reed canary grass	3	B20	
<i>Cyprinus carpio</i>	Carp	2	B2-3, B11	Confirmed by Wenck



Potential AIS Sources

Connected waterways	Creeks: Shingle, Bass and Eagle; Lakes: Success, Eagle, Pike, Bass, Meadow, Magda, Schmidt
Storm sewered	Yes
Houses	<10
Private docks	No
Special concerns	Shingle creek flows through the lake. Public access and reported AIS upstream.

Purple loosestrife, curly-leaf pondweed, Chinese mystery snail, reed canary grass, and carp were found in Palmer Lake. Curly-leaf pondweed occurred in about half of the samples. Purple loosestrife, reed canary grass, and Chinese mystery snail were each observed once on the lake. Carp were seen at a few sample sites on the lake and Wenck staff were doing a fisheries survey and confirmed the presence of invasive carp on the lake.



Purple loosestrife on Palmer Lake

Palmer Lake has less than ten houses and no private docks on the lake. It is connected to Shingle Creek as well as several lakes upstream. Two of the connected lakes, Eagle and Schmidt, have a public access. Eagle, Bass, Magda, and Schmidt Lakes are listed by the DNR as infested with Eurasian watermilfoil. Shingle Creek Watershed Management Commission lists curly-leaf pondweed as present on Eagle and Magda Lakes. Schmidt and Magda Lakes also have Eurasian watermilfoil, curly-leaf pondweed, purple loosestrife and Chinese and banded mystery snail. Shingle Creek and its tributaries from these lakes are likely sources of AIS to Palmer Lake.



Reed canary grass on Palmer Lake



Chinese mystery snail on Palmer



Curly-leaf pondweed on Palmer

Purple loosestrife and Reed canary grass were likely spread by seed by water, wind, animals, or people. Chinese mystery snail and curly-leaf pondweed were possibly introduced by people using private docks or upstream waters. Invasive carp was likely introduced as from upstream waters.



Convergence of Shingle Creek and Palmer Lake

Peter Lake

Description

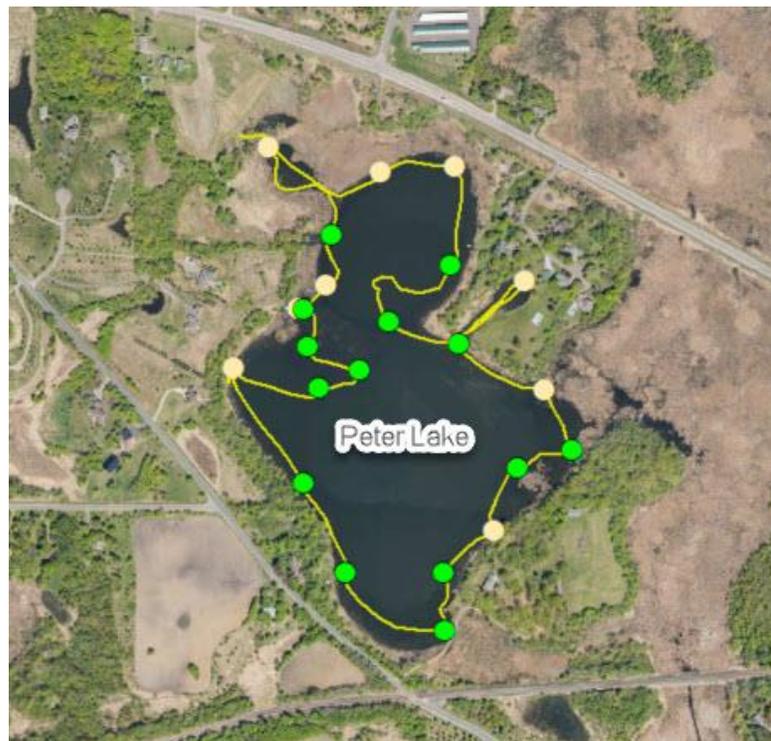
Peter Lake was surveyed on July 9, 2018. The lake had a nice diversity of submergent, floating-leaved and emergent plants. The lake was dominated by coontail, white water lily, yellow water lily (*Nuphar sp.*), and pondweed. An algal bloom was present on parts of the lake.



Peter Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	2-3	B3, B15, TS2-3	PLS shows signs of damage from beetles
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1-2	B2, B12, B15, B19-20, TS1	
<i>Phalaris arundinacea</i>	Reed canary grass	3	TS1, TS3	



Legend

- Eurasian water milfoil
- Goldfish, carp, mystery snail, loosestrife or Curly-leaf pondweed
- No AIS identified

Potential AIS Sources

Connected waterways	Pioneer creek flows through adjacent wetland to the east, small stream connecting wetlands to the west
Storm sewer	No
Houses	<10
Private docks	Yes
Special concerns	There was a private access on the lake in the past that had limited use

Purple loosestrife, curly-leaf pondweed and reed canary grass were found on Peter Lake. Purple loosestrife and reed canary grass were seen at about a quarter of the sample sites in patches or as the dominant species. Curly-leaf pondweed occurred in about a quarter of the samples and never as the dominant species.

Lake Robina

Description

Lake Robina was surveyed on September 5, 2018. The lake was dominated by cattail, coontail, and white water lily. There was not a lot of submergent vegetation in the lake, and multiple sample sites turned up no vegetation. There was an algal bloom present on the entire lake. Shading by algae may have limited submergent vegetation growth.



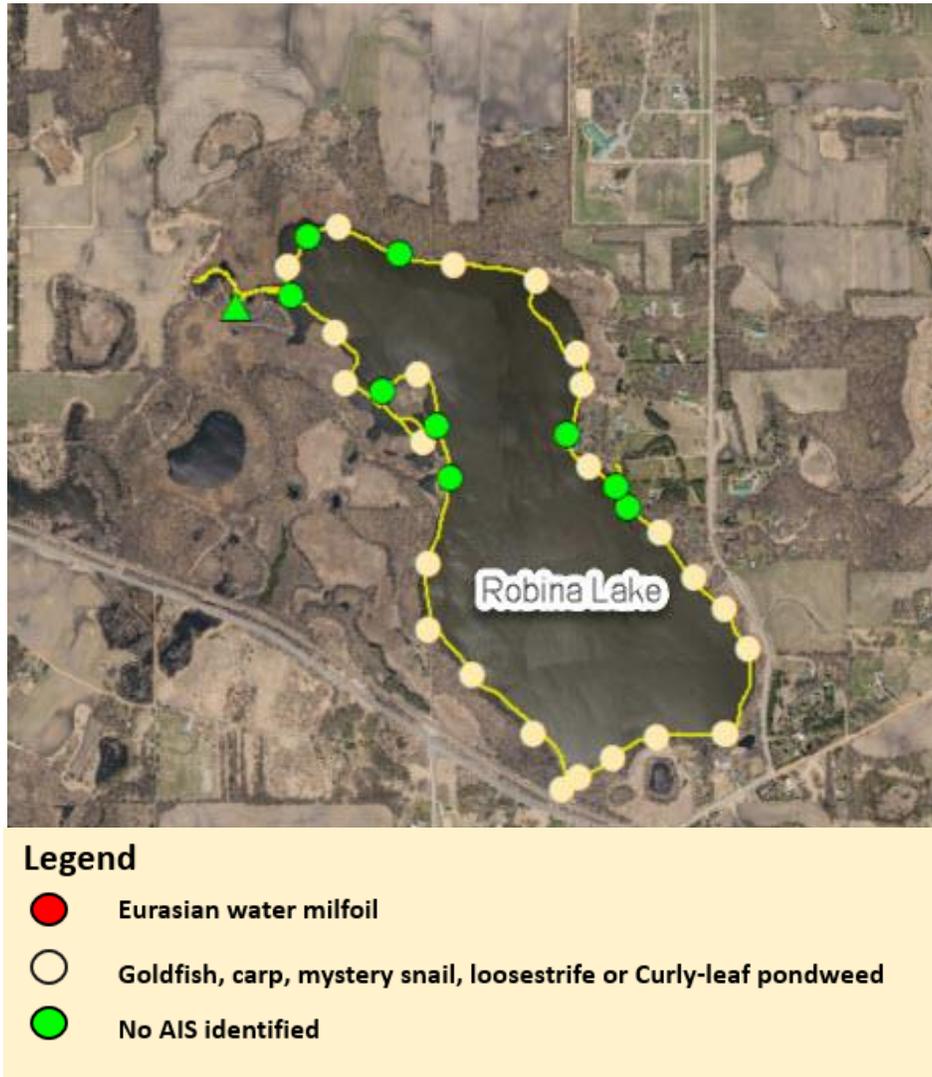
Planktonic algae on Lake Robina

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	1-3	B3-5, B7, B9, B11-12, B14, B17-28, TS1, TS3-5	
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1	B7	
<i>Phalaris arundinacea</i>	Reed canary grass	2-3	B23, B30, TS4	
<i>Cyprinus carpio</i>	Carp			Property owner on lake said there are carp, observed by FCI

Purple loosestrife, curly-leaf pondweed, and reed canary grass were found on Lake Robina. Purple loosestrife was present at most sample sites on the lake and usually seen in patches or as the dominant species on the shoreline. Reed canary grass was observed as occurring densely at three sample sites.

One curly-leaf pondweed turion was observed on the lake. Robina was surveyed in September, so it is likely curly-leaf pondweed is more dominant earlier in the season.



Potential AIS Sources

Connected waterways	Small stream to the east connected to 2 unnamed wetlands
Storm sewer	No
Houses	<10
Private docks	Yes
Special concerns	No

Fish that looked and behaved like carp were seen on the lake by FCI although they were not confirmed to be carp. A homeowner also mentioned the presence of carp. The fish were seen in multiple locations on the lake.



Purple loosestrife on Lake Robina



Curly-leaf pondweed turion on Lake Robina



Reed canary grass on Lake Robina

Sunfish Pond

Description



Sunfish Pond from the Shore



Filamentous Algae and Pondweed on Sunfish Pond

Sunfish Pond was surveyed on August 28, 2018. It is a very small constructed pond adjacent to the Brooklyn Park community center. It is designated, named and stocked as a fishing pond. The lake had a nice variety of native upland plants around the perimeter and two public docks for fishing. Only one type of narrow-leaf pondweed was observed, and an algal bloom was occurring on the pond. Narrow-leaf pondweed was found in about half of the samples and most samples were dominated by filamentous algae. Two Chinese mystery snail shells were observed on opposite shorelines of the pond. It is unknown how the Chinese mystery snails were introduced to the pond. Since it is a fishing pond, it is possible they were introduced with bait. There are no stream or ditch connections to the pond.

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Cipangopaludina chinensis</i>	Chinese mystery Snail	1	B10, TS1	



Potential AIS Sources

Connected waterways	None
Storm sewered	Yes
Houses	0
Private docks	None
Special concerns	Public fishing dock



Public Fishing Docks on Sunfish Pond



Chinese mystery snail on Sunfish Pond

Unnamed 1 (Curtis)

Description

Curtis Lake was surveyed on August 1, 2019. The cattail population was dense around the lake and about 15 feet thick at the entrance point. Coontail was found at every sample point on the lake. Muskgrass (*Chara* sp.), pondweed and bladderwort were also present. Purple Loosestrife was seen in most points where shoreline plants were documented.



Curtis Lake

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Lythrum salicaria</i>	Purple loosestrife	2	TS1-2, B1, B6, B9, B12, B14-16, B19, B20	Damaged by biocontrol
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1	B1, B5	Turion and vegetation



Potential AIS Sources

Connected waterways	Connected to Pomerleau and Bass Lakes and several wetlands and ponds by a stream/ditch on the north end
Storm sewered	Yes
Houses	>25
Private docks	Yes
Special concerns	Adjacent to interstate 494

Purple loosestrife and Curly-leaf pondweed were found on the lake. CLP was only found in two samples on the lake. It is possible it would have been more commonly seen earlier in the season. Both Bass Lake and Pomerleau Lake have reported infestations of curly-leaf pondweed and are a likely source this invasive species.



Curly-leaf pondweed on Curtis Lake



Purple loosestrife and cattail on shore of Curtis Lake

Unnamed 2

Description

Unnamed 2, the first of the unnamed wetlands connected to Medicine Lake, was surveyed on July 24, 2019. This wetland is located east of Revere lane on the north west corner of highways 55 and 169. It is just downstream of Medicine Lake. It was surveyed in part to determine if starry stonewort is being released from Medicine Lake. The wetland had a variety of native plants including coontail, duckweed, multiple species of pondweed and white water lily.



Unnamed 2 wetland

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Cipangopaludina chinensis</i>	Chinese Mystery Snail	2	B5	
<i>Lythrum salicaria</i>	Purple loosestrife	2	TS1, B2, B7	
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	1-2	TS2, B1, B-9	
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1	TS2, B7, B8	Turion and vegetation
<i>Phalaris arundinacea</i>	Reed canary grass	2	TS1-2, B1, B2, B4	



Potential AIS Sources

Connected waterways	Medicine Lake, Bassett Creek
Storm sewer	Yes
Houses	0
Private docks	No
Special concerns	None

Eurasian watermilfoil, Curly-leaf pondweed and Chinese mystery snail were found in the wetland. Eurasian watermilfoil was common and found in about half the samples. Curly leaf pondweed was not commonly seen but the wetland was surveyed late in the season. Chinese mystery snails were found at one sample point. Reed Canary Grass and Purple Loosestrife were also observed on the shore. Basset creek runs along the west side of this wetland and it is downstream from Medicine Lake, the likely source of the AIS.



Inlet on unnamed 2



Chinese mystery snail on unnamed 2

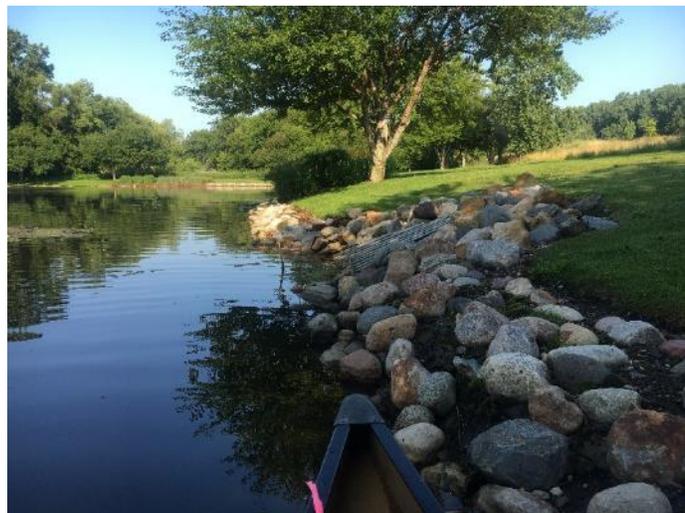


Eurasian watermilfoil on unnamed 2

Unnamed 3

Description

Unnamed 3, the second of the unnamed wetlands connected to Medicine Lake, was surveyed on July 24, 2019. This wetland is in a business park just downstream from the first unnamed wetland on the north west corner of highways 55 and 169. The wetland had low diversity of plants. It was dominated by coontail, sago pondweed (*Stuckenia pectinata*), curly-leaf pondweed and algae.



Unnamed 3 wetland

AIS Found

Latin name	Common name	Density	Locations found	Notes
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1-2	TS1-3, B1-8	



Potential AIS Sources

Connected waterways	Medicine Lake, Bassett Creek
Storm sewer	Yes
Houses	0
Private docks	No
Special concerns	Walking path around lake

Curly-leaf pondweed was the only invasive species found on this wetland. It was found in nearly all samples. It is likely that the Curly-leaf pondweed entered the wetland from Medicine Lake through Bassett Creek.



Curly-leaf pondweed and algae on "unnamed 2"

Discussion and Conclusions

Invasive species were found in all the lakes and ponds surveyed during this project, except one. Classen, Glen Lake and Goldenrod Marsh only had shoreline invasive plants (giant reed grass and purple loosestrife). Henry Lake had no officially listed invasive species, but reed canary grass was present. Curly-leaf pondweed was the most commonly found AIS, found in 16 lakes (73%); followed by Chinese mystery snail, found in eight lakes (36%). Fisheries surveys were not included in this project but were recorded if observed or reported. Carp and goldfish may be present in some of the lakes that were not observed during the survey. The species observed are found in many lakes around Hennepin County and in many areas of Minnesota. Goldfish have been found in a few lakes in Hennepin County, but fortunately are not widely distributed.

AIS Frequency

Aquatic Invasive Species	# of Lakes infested	%
Curly-leaf pondweed (<i>Potamogeton crispus</i>)	16	73%
Chinese mystery Snail (<i>Cipangopludina chinensis</i>)	8	36%
Carp (<i>Cyprinus carpio</i>)	6	27%
Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	5	23%
Banded mystery snail (<i>Viviparus georgianus</i>)	1	5%
Goldfish (<i>Carassius auratus</i>)	1	5%
Giant reed grass (<i>Phragmites australis australis</i>)	1	5%
Purple loosestrife (<i>Lythrum salicaria</i>)	12	55%

Purple loosestrife was the most observed invasive wetland/shoreline species on the lakes surveyed, found in 55% of the lakes/ponds. Purple loosestrife is fairly-widely distributed in wetlands and along lakes, streams and ditches in Hennepin County. It is more of a wetland plant, but is also found along lakeshores, streambanks and ditches. Gallerucella beetles are a biological control for purple loosestrife that have been introduced to many wetlands and may move to other areas. They were observed on some of the plants.

Reed canary grass is an invasive plant that was commonly planted on agricultural lands. It grows in both wet and drier conditions. Although reed canary grass is very invasive, it is not normally considered an invasive species. It is widely distributed around Hennepin County. It was noted in these surveys (71%) to show how widely distributed it is on our lakeshores. It is a problem when restoration of native species is desired. It is very difficult to eradicate from a site.

Giant reed grass was found at one site and is not widely distributed in Hennepin County. It is more of an emergent wetland plant than an aquatic plant. The University of Minnesota Aquatic Invasive Species Research Center has worked on documenting giant reed grass in Minnesota. It is believed that with a large effort from local government, it could be managed and kept from becoming widespread.

Potential Sources

Aquatic invasive species found in the lakes included curly-leaf pondweed, Eurasian watermilfoil, Chinese and banded mystery snails, and invasive carp and goldfish. These species are more likely to be spread by people using the lakes or through connected waterways. Although none of the lakes had public boat accesses, some had private canoe or walk in accesses. Many homeowners had docks and a couple of the lakes also had public fishing docks. Some lakes were connected to others upstream that are infested with invasive species. In the case of Palmer Lake, Ox Yoke Lake, General Mills Nature Preserve and unnamed lakes 2 and 3, upstream lakes have known infestations of AIS that may have been transported through the connecting creeks.

The shoreline plants that are spread by seed or turions (purple loosestrife, curly-leaf pondweed, reed canary grass, and invasive *Phragmites*) could have all been spread by wind or water. Animals are not usually considered a source of aquatic invasive species, but there are some reports of animals moving AIS. Seeds of the terrestrial or emergent wetland plants could be carried by birds and mammals as well as humans and equipment such as construction vehicles.

Invasive plants could have been introduced by uncleaned boats at private docks, uncleaned fishing or hunting gear, and through seeds and mud carried on clothing, boots and waders. One source that has not been investigated is the cleaning of boats and equipment where the wash water and debris is carried into the stormsewers to lakes and streams. Many of the lakes/ponds surveyed had stormsewer connections. Invasive goldfish may have been intentionally introduced by homeowners as a place to dispose of an unwanted pet.

The results from these surveys show AIS is being spread in lakes without public boat accesses. These results highlight that efforts for prevention need to extend to other pathways beyond boaters using public accesses. More research into other sources and pathways of AIS introduction and spread, beyond public accesses, would be a beneficial next step for AIS prevention. These potential pathways include pet stores, garden centers or nurseries and release by customers, school pets and species used in science classes, fish stocking and crayfish sold for food. Disposal of AIS through stormsewers is also a potential source that has not been investigated.

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Appendix

Native Species Presence by Lake

2018-2019	Lake	Ardmore Lake	Birch Island Lake	Lake Classen	Glen	Goldenrod Marsh	Hadley	Hannon	Henry	Jubert	Laura Lake	Loring
Latin Name	Common Name											
<i>Alga, Filamentous</i>	Filamentous algae	x	x	x	x	x			x		x	
<i>Alga, Planktonic</i>	Planktonic algae											
<i>Brasenia schreberi</i>	Water shield				x							
<i>Ceratophyllum demersum</i>	Coontail	x	x	x	x	x	x	x	x	x	x	x
<i>Carex sp.</i>	Sedge	x										
<i>Chara sp.</i>	Muskgrasses		x	x		x						
<i>Elodea canadensis</i>	Canada Waterweed			x	x	x		x	x	x	x	x
<i>Hydrocotyle sp.</i>	Pennywort											
<i>Impatiens sp.</i>	Jewelweed		x							x		
<i>Iris versicolor</i>	Blue Iris						x					
<i>Lemna minor</i>	Duckweed	x		x	x	x	x	x	x	x	x	x
<i>Lemna trisulca</i>	Duckweed			x	x	x			x			x
<i>Myriophyllum sp.</i>	Native milfoil											
<i>Najas flexilis</i>	Bushy Pondweed			x	x	x			x			
<i>Nelumbo lutea</i>	Lotus			x	x							
<i>Nitella sp.</i>	Stonewort		x		x	x		x				
<i>Nuphar sp.</i>	Yellow Water Lily		x		x		x	x		x		
<i>Nymphaea tuberosa</i>	White Water Lily		x	x	x	x	x	x	x	x		
<i>Phragmites</i>	Phragmites (native)	x	x	x								
<i>Polygonum sp.</i>	Smartweed						x		x			
<i>Potamogeton sp.</i>	Pondweeds, narrow		x	x	x	x		x	x	x	x	x
<i>Potamogeton sp.</i>	Pondweeds, other		x		x	x						
<i>Ranunculus sp.</i>	Water buttercup											
<i>Riccia</i>	Liverwort							x				
<i>Sagittaria sp.</i>	Arrowhead	x		x		x			x			x
<i>Salix</i>	Willow	x					x					x
<i>Scirpus</i>	Bulrush		x			x			x	x		x
<i>Scutellaria sp.</i>	Skullcap											
<i>Spirodela sp.</i>	Duckweed			x	x	x	x	x	x	x	x	x
<i>Stuckenia pectinata</i>	Sago pondweed		x	x	x	x		x		x	x	
<i>Typha sp.</i>	Cattail	x	x	x	x	x	x	x	x	x	x	x
<i>Utricularia sp.</i>	Bladderwort		x		x	x		x	x			x
<i>Wolffia sp.</i>	Wolffia	x			x		x	x	x	x		x
<i>Zosterella dubia</i>	Water stargrass											
	Total Species Observed	9	14	15	18	17	10	13	15	12	8	12

Native Species Presence by Lake (cont.)

2018-2019	Lake	Magda	North Anderson	Palmer	Peter	Robina	Sunfish Pond	Unnamed 1 (Curtis)	Unnamed 2	Unnamed 3
Latin Name	Common Name									
<i>Alga, Filamentous</i>	Filamentous algae			x	x		x	x	x	x
<i>Alga, Planktonic</i>	Planktonic algae					x				
<i>Brasenia schreberi</i>	Water shield									
<i>Ceratophyllum demersum</i>	Coontail	x	x	x	x	x		x	x	x
<i>Carex sp.</i>	Sedge									
<i>Chara sp.</i>	Muskgrasses	x	x					x		
<i>Elodea canadensis</i>	Canada Waterweed	x	x	x	x	x			x	x
<i>Hydrocotyle sp.</i>	Pennywort		x							
<i>Impatiens sp</i>	Jewelweed									
<i>Iris versicolor</i>	Blue Iris	x								
<i>Lemna minor</i>	Duckweed	x	x	x	x	x		x	x	x
<i>Lemna trisulca</i>	Duckweed		x			x		x	x	
<i>Myriophyllum sp.</i>	Native milfoil				x					
<i>Najas flexilis</i>	Bushy Pondweed								x	
<i>Nelumbo lutea</i>	Lotus		x							
<i>Nitella sp</i>	Stonewort								x	
<i>Nuphar sp.</i>	Yellow Water Lily	x	x		x			x		
<i>Nymphaea tuberosa</i>	White Water Lily		x		x	x			x	
<i>Phragmites</i>	Phragmites (native)					x			x	
<i>Polygonum sp</i>	Smartweed						x			
<i>Potamogeton sp.</i>	Pondweeds, narrow	x	x		x	x	x	x	x	
<i>Potamogeton sp.</i>	Pondweeds, other		x		x				x	x
<i>Ranunculus sp.</i>	Water buttercup									
<i>Riccia</i>	Liverwort				x					
<i>Sagittaria sp.</i>	Arrowhead	x	x		x				x	
<i>Salix</i>	Willow									
<i>Scirpus</i>	Bulrush		x		x					
<i>Scuttalaria sp.</i>	Skullcap									
<i>Spirodela sp.</i>	Duckweed	x	x	x	x	x		x	x	
<i>Stuckenia pectinata</i>	Sago pondweed	x	x	x	x	x		x	x	x
<i>Typha sp.</i>	Cattail	x	x	x	x	x		x	x	
<i>Utricularia sp.</i>	Bladderwort		x		x	x		x		
<i>Wolffia sp.</i>	Wolffia		x	x	x	x		x	x	
<i>Zosterella dubia</i>	Water stargrass			x					x	
	Total Species Observed	11	18	9	17	13	3	12	17	6