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eric@aisconsultingmn.com
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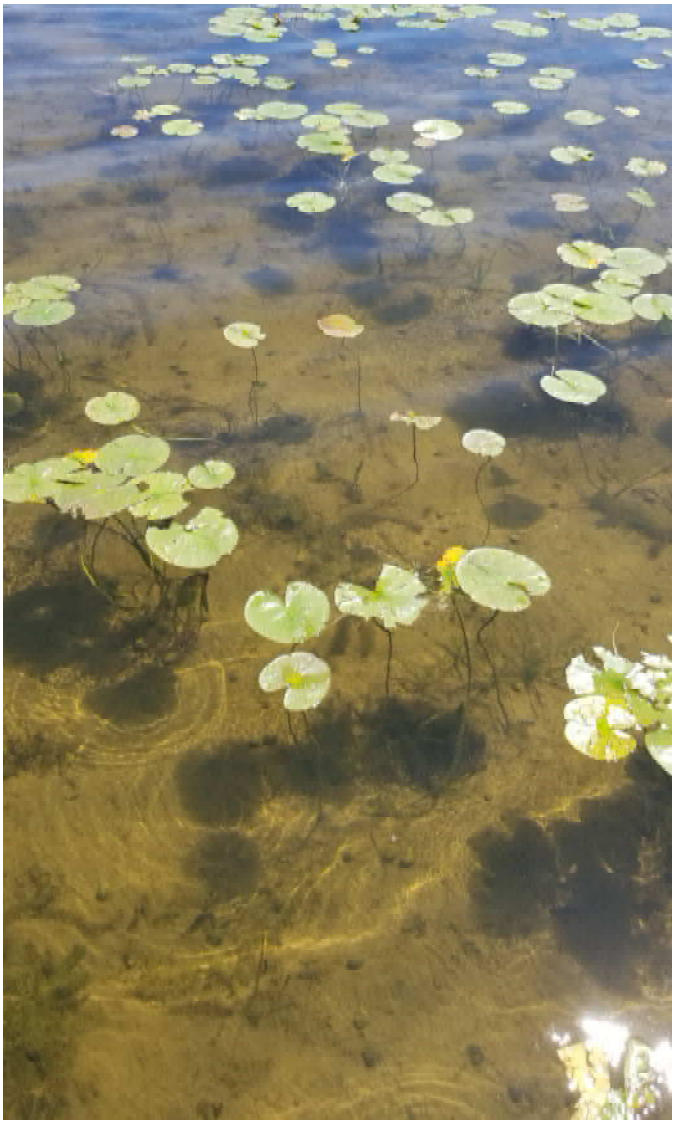
Aquatic Plant Survey Report
Clearwater Lake (Wright/Stearns Co.)

Point-Intercept Survey

July 1, 2, 6, 7 & 10, 2020

DOW# 86025200



Report Date: September 25, 2020—Eric Fieldseth, AIS Consulting Services

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Introduction

An aquatic plant point-intercept survey was conducted on Clearwater Lake (DOW 86025200) over several days in early July 2020 by AIS Consulting Services. The purpose of the survey was to characterize the aquatic plant community in the lake, including invasive plants Curlyleaf Pondweed and Eurasian Watermilfoil, and look for new invasives not currently known to be present in the lake such as Starry Stonewort. A point-intercept survey provides a statistical assessment to determine which aquatic plants are present in the lake and compare their relative abundance to each other. Since the point-intercept survey covers the entire littoral zone (area of the lake where aquatic plants grow—defined as less than or equal to 15 feet water depth), it's also a great tool to search for the presence of new invasive species in the lake, such as Starry Stonewort. However, it lacks detail as an early detection tool and does not thoroughly cover high priority areas where searching for new invasives should occur, such as boat launches. Point-intercept surveys are often conducted once every few years, as a way to monitor lakewide changes in aquatic plants. This survey compliments annual surveys, called delineations, that are often conducted for specific invasive plants and performed at strategic times of the year to inform management for that specific species. In Clearwater Lake, a Curlyleaf Pondweed delineation was conducted on April 27, 2020 and a Eurasian Watermilfoil survey was conducted on July 29, 2020.

Summary of Results

During the July 2020 point-intercept survey, AIS Consulting Services observed 27 unique aquatic plant species in the lake, of which 20 were submerged aquatic plant species. While there is a very good diversity of aquatic plants in Clearwater Lake, only 7 species were found at greater than 5% of sample points. The plant community is largely dominated by the native plant Chara, found at 72.3% of sample points. Other common species include: Coontail (16.8%), Northern Watermilfoil (14%), Fries' Pondweed (13.5%), Bladderwort (10.8%), Wild Celery (5.7%) and Sago Pondweed (5.3%).

Two invasive plants are known to be present in Clearwater Lake, Eurasian Watermilfoil and Curlyleaf Pondweed. Both species were found at very low abundances during the survey with Eurasian Watermilfoil being found at 0.4% of sample points and Curlyleaf Pondweed found at 3.4% of sample points. While neither species are providing lakewide issues, localized impact to navigation may occur. The point-intercept survey is not designed to provide this level of detail. To better delineate localized issues of Curlyleaf Pondweed and Eurasian Watermilfoil, other types of surveys called delineations are conducted. These surveys are designed to assess the location and estimated density of the target invasive plant to inform management. For Curlyleaf Pondweed, a delineation was conducted in Clearwater Lake on April 27, 2020 which identified 27.3 acres of Curlyleaf for treatment (Figure 9). Curlyleaf Pondweed has a unique lifecycle, it begins its growth in late fall, with increased growth in the spring as water temperatures begin to warm. It reaches peak biomass by late spring, and dies off by mid-summer. The goal in managing Curlyleaf Pondweed is to treat the plant in the early spring, prior to the plant forming turions and prior to increased growth of native plants. For Eurasian Watermilfoil, a delineation was conducted on July 29, 2020 which identified 2.24 acres of Eurasian Watermilfoil for treatment (Figure 11). Treatment of Eurasian Watermilfoil typically occurs mid to late summer.

Overall, aquatic plants in Clearwater Lake are abundant, occupying 94% of sample points in the littoral zone. The plant community is mostly composed of a good diversity of native species (25 native species), and 2 invasive species that are found at a lower abundance but may provide some localized issues with navigation. While a good diversity of plants exists, only 7 different species were found at 5% or more of sample points, with Chara being the most common at 72.3%. Good water clarity in Clearwater Lake is likely helping maintain a stable aquatic plant community that is likely providing good habitat for fish and aquatic organisms.

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Methods

Point-Intercept Survey

Protocol for the survey followed the standard protocol for point-intercept surveys by the Minnesota DNR. A grid of points was created in ArcGIS over an aerial image of Clearwater Lake using the extension *Repeating Shapes* by Jenness Enterprises, with 100 meter spacing between points. Bathymetric contours were then uploaded to ArcGIS from the Minnesota Geospatial Commons, and points that were clearly greater than 20 feet deep were deleted. A total of 959 sample points were created. These sample points were uploaded to a GPS unit and used to navigate to each sample point in the field.

At each point, the depth was taken with our sonar unit and recorded. The sample rake was tossed on a designated side of the boat approximately 1 to 2 meters, and dragged on the lake bottom back to the boat before retrieving. A density rating was given to each species on the rake, as well as an overall rating for the entire sample. Density ratings are based on the percent of rake head occupied by the plant sample. Plants that were not collected on the rake but were observed within the sample area were given a density of "0", and were not included in any statistics, but were marked at that location.

Rake Density Ratings - *estimated coverage of rake head by plant sample*

1 = **Covering up to 1/3 of the rake head** *(plants typically scattered)*

2 = **Covering between 1/3 to 2/3 of rake head** *(plants common)*

3 = **Covered entire rake head** *(dense stands of plants)*

Maps and statistics were created from the data and can be found in the "Results" section of this report.

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Figure 1. Clearwater Lake Point-Intercept Survey Grid, 100 meter spacing (959 sample points)

Figure 2. Number of sample points by depth range

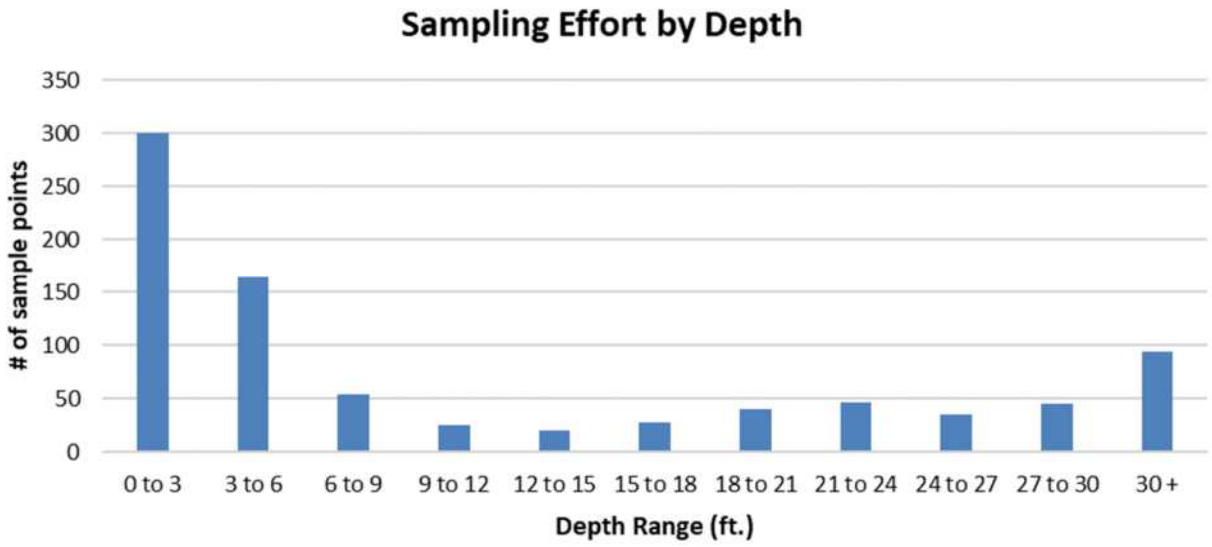

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Figure 3. Summary of aquatic plant community metrics from Clearwater Lake July 2020 point-intercept survey

Surface Area (acres)	3,158
Max. Depth of Plant Growth (ft.)	17
Number of sample points	959
Points inaccessible	105
Points actually sampled	854
% of Points Vegetated	62.8%
Littoral Area (≤ 15 ft.)	1,595
Littoral Points Sampled (≤ 15 ft.)	564
% Littoral Points Vegetated	94.1%
Species Richness (all species)	27
Species Richness (submerged plants)	20
Mean Number of Native Species/Littoral Point	1.73
Mean Number of Invasive Species/Littoral Point	0.04
Mean number of Species/Littoral Point	1.77

Figure 4. Percent of sample points with vegetation by depth range

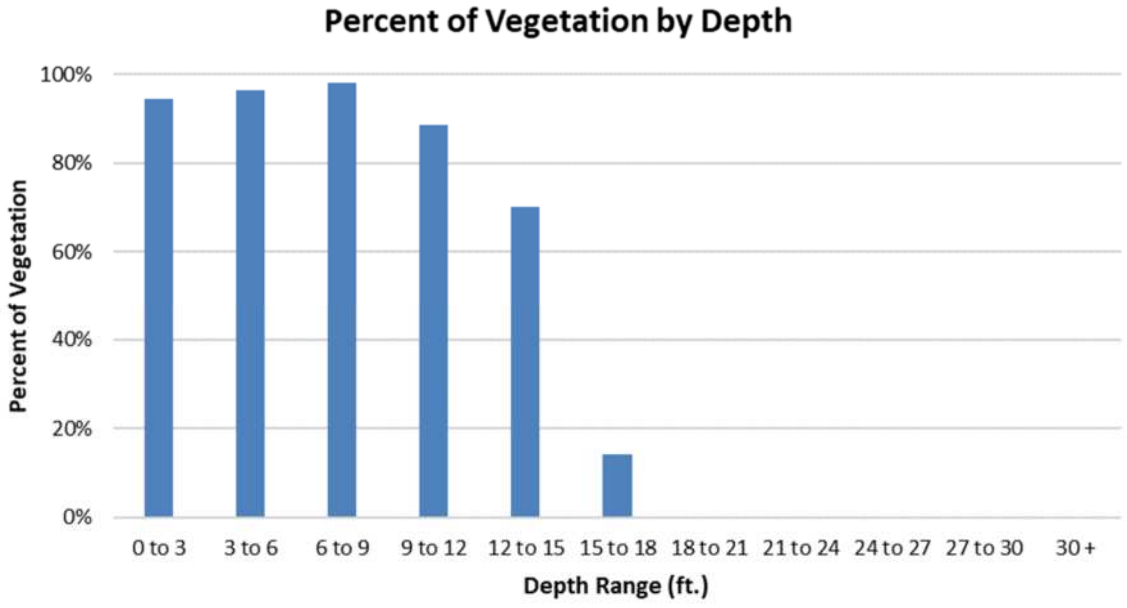

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Figure 5. Overall vegetation density

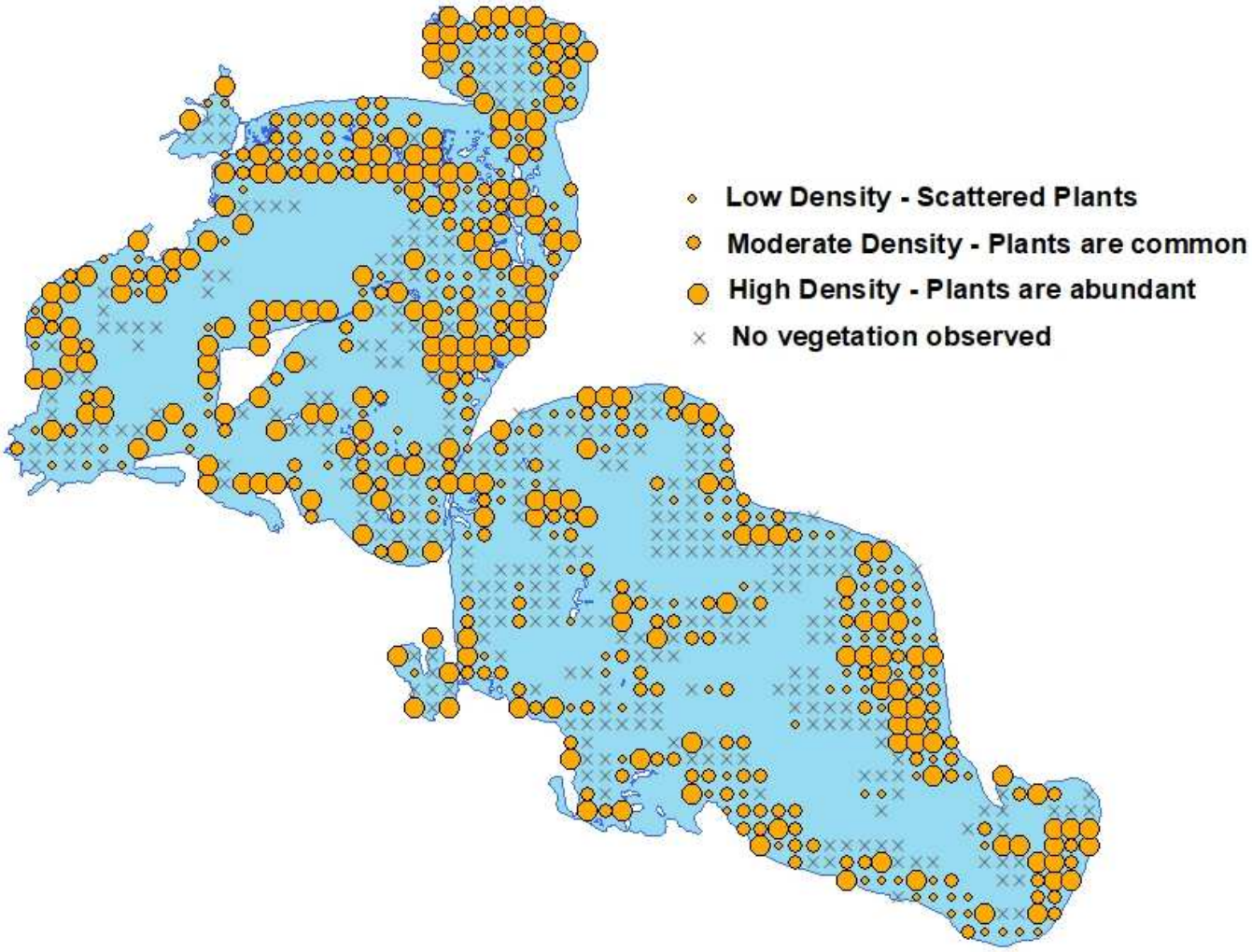

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Figure 6. Percent frequency of occurrence for plant species observed during Clearwater Lake July 2020 point-intercept survey. Calculated using all littoral points (≤15ft).

Common Name	Scientific Name	% Occurrence
Submersed Plants		
Chara	*Chara sp.*	72.3%
Coontail	*Ceratophyllum demersum*	16.8%
Northern Watermilfoil	*Myriophyllum sibiricum*	14.0%
Fries' Pondweed	*Potamogeton friesii*	13.5%
Bladderwort	*Utricularia sp.*	10.8%
Wild Celery	*Vallisneria americana*	5.7%
Sago Pondweed	*Stuckenia pectinata*	5.3%
Flat-Stem Pondweed	*Potamogeton zosteriformis*	4.6%
White Water Buttercup	*Ranunculus aquatilis*	4.3%
Illinois Pondweed	*Potamogeton illinoensis*	3.9%
Narrowleaf Pondweed	*Potamogeton sp.*	3.9%
Curlyleaf Pondweed	*Potamogeton crispus*	3.4%
Clasping Leaf Pondweed	*Potamogeton richardsonii*	3.2%
White Stem Pondweed	*Potamogeton praelongus*	2.7%
Variable Pondweed	*Potamogeton gramineus*	2.5%
Water Stargrass	*Heteranthera dubia*	0.9%
Bushy Pondweed	*Najas flexilis*	0.5%
Eurasian Watermilfoil	*Myriophyllum spicatum*	0.4%
Elodea	*Elodea Canadensis*	0.2%
Largeleaf Pondweed	*Potamogeton amplifolius*	0.2%
Emergent		
Wild Rice	*Zizania palustris*	2.0%
White Water Lily	*Nymphaea odorata*	4.3%
Bullhead Pond Lily	*Nuphar variegata*	1.1%
Bulrush	*Schoenoplectus sp.*	Present
Cattail	*Typha sp.*	Present
Mare's Tail	*Hippuris vulgaris*	0.2%
Sagittaria sp.	Sagittaria sp.	0.2%

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Figure 7. Number of species observed at each sample point

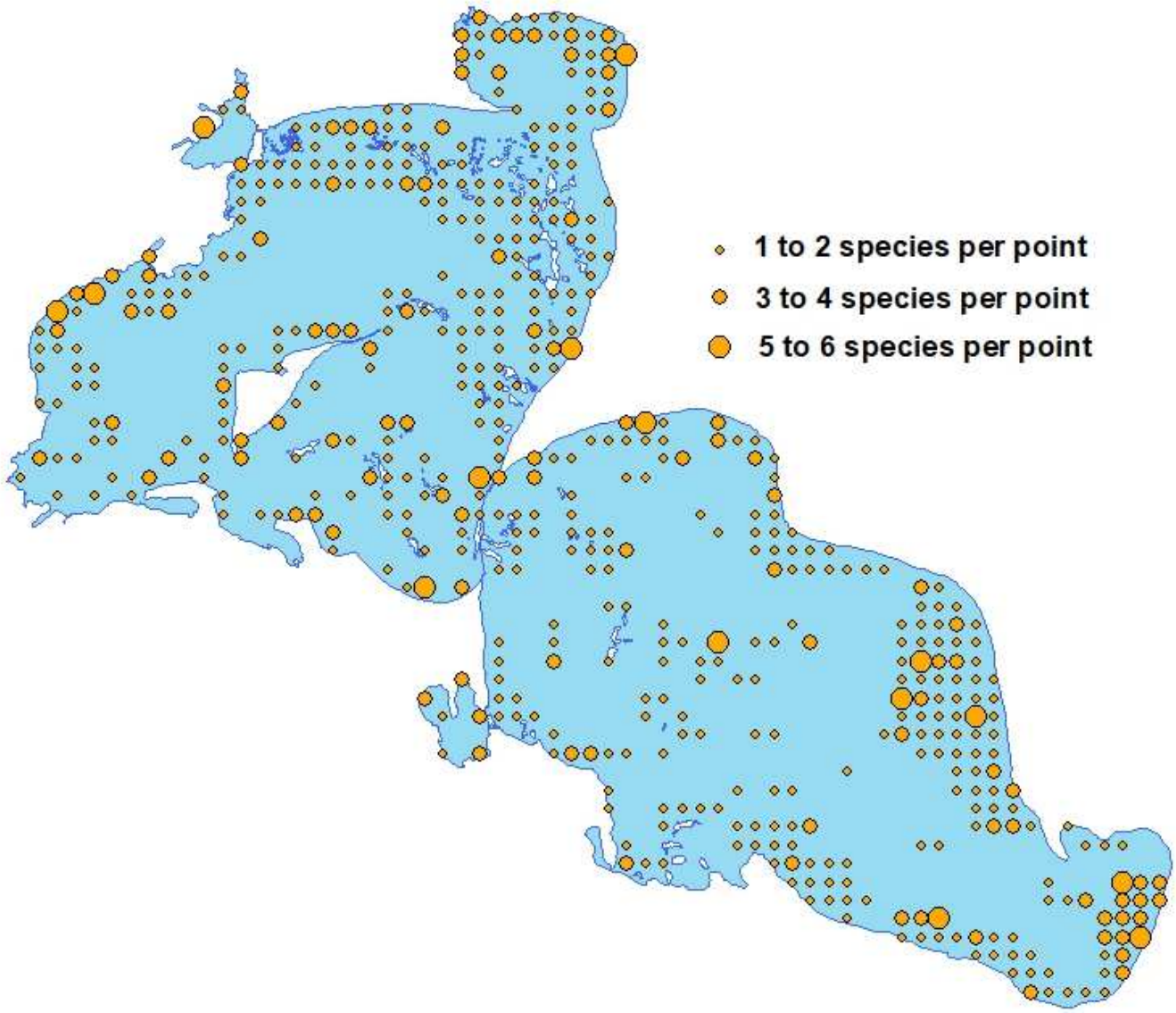

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Figure 8. Curlyleaf Pondweed Distribution from July 2020 point-intercept survey

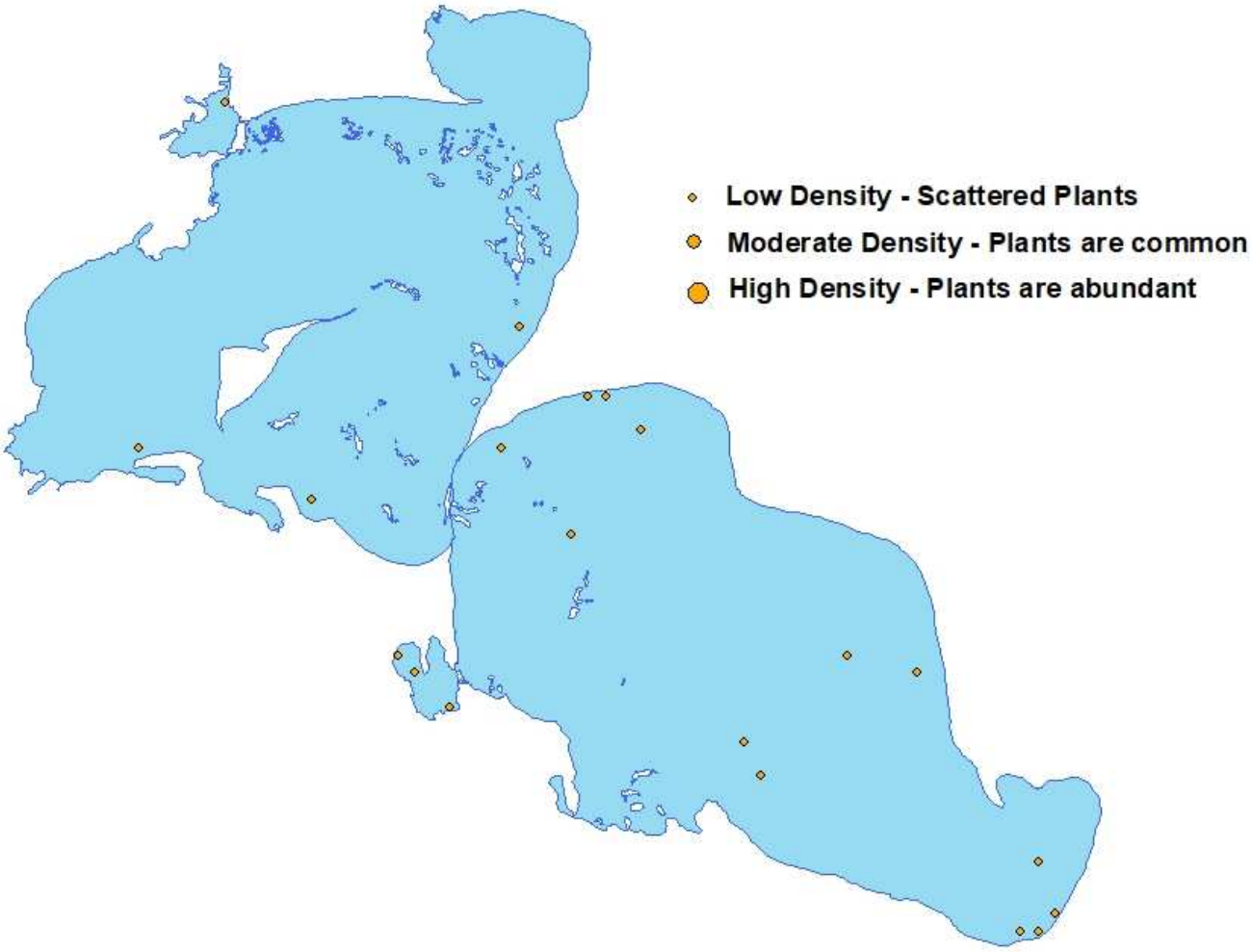

Figure 9. Curlyleaf Pondweed Distribution from 4/27/20 Curlyleaf Pondweed delineation (27.3 acres)

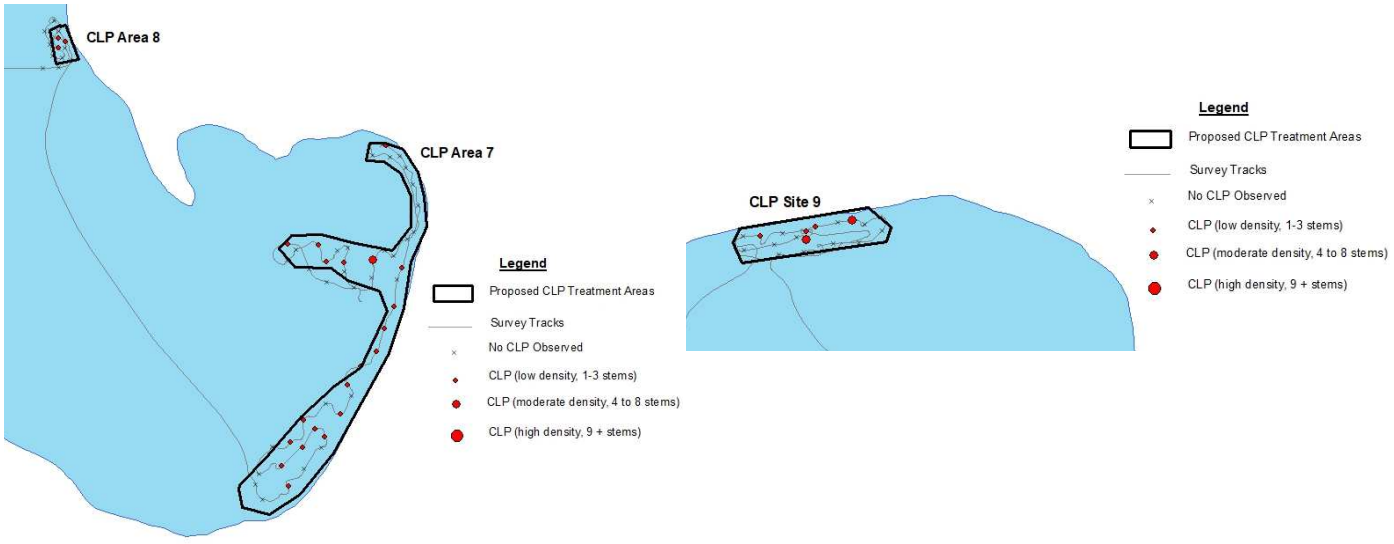

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Figure 10. Eurasian Watermilfoil Distribution from July 2020 point-intercept survey

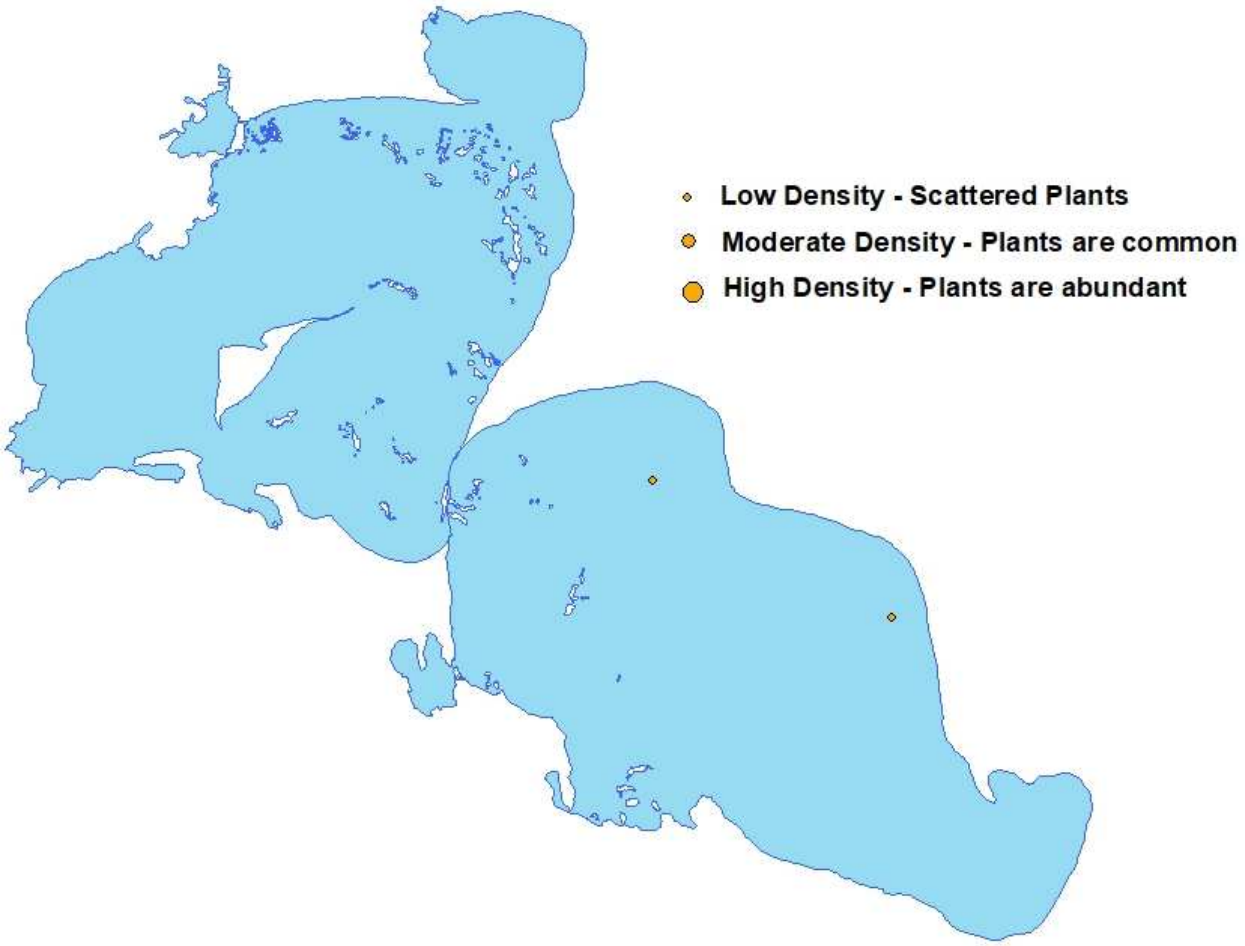

Figure 11. Eurasian Watermilfoil (EWM) Treatment Sites from 7/29/20 EWM Delineation (2.24 acres)

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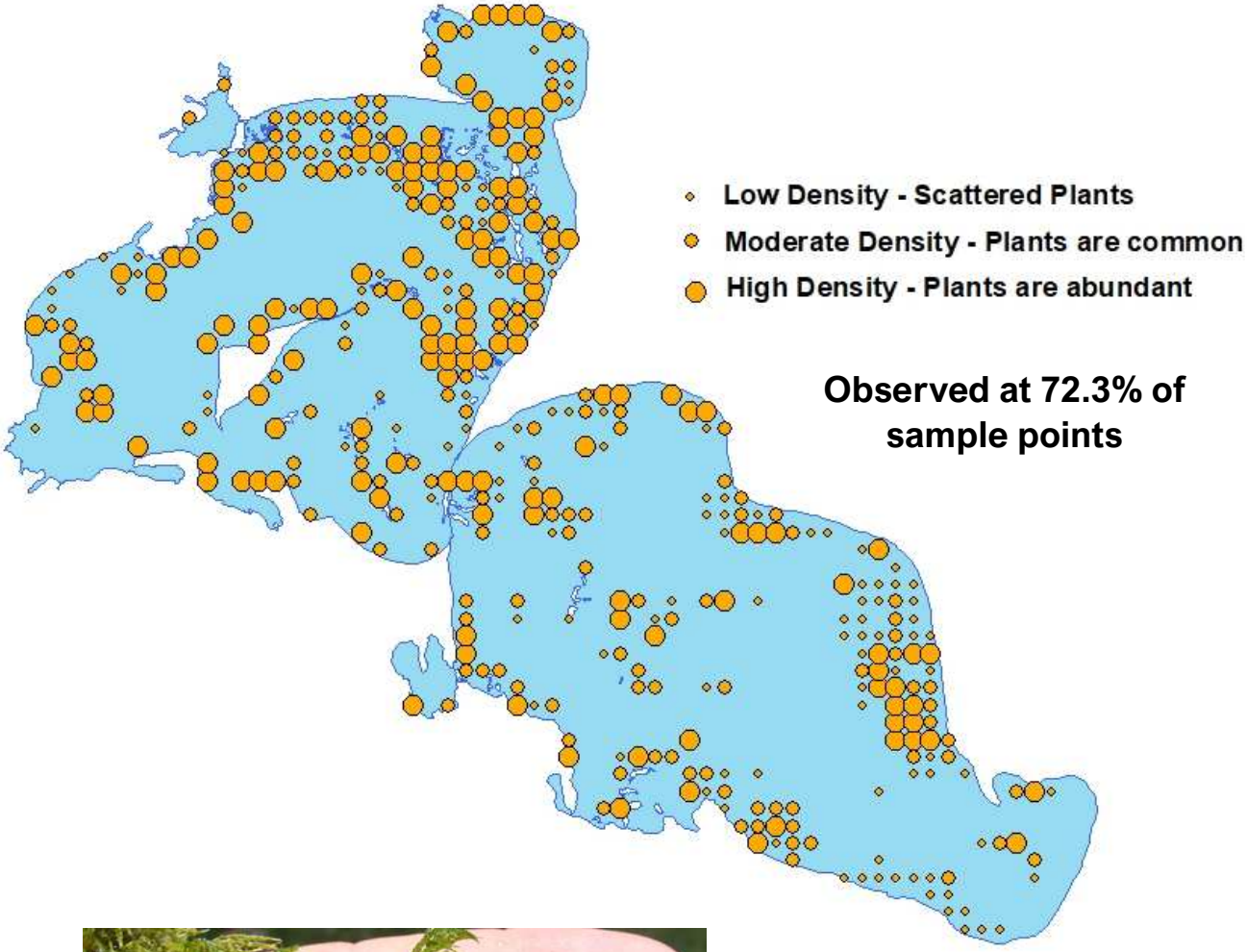
Distribution Maps of Aquatic Plants Observed in Clearwater Lake during July 2020 Point-intercept Survey

Chara (*Chara sp.*)



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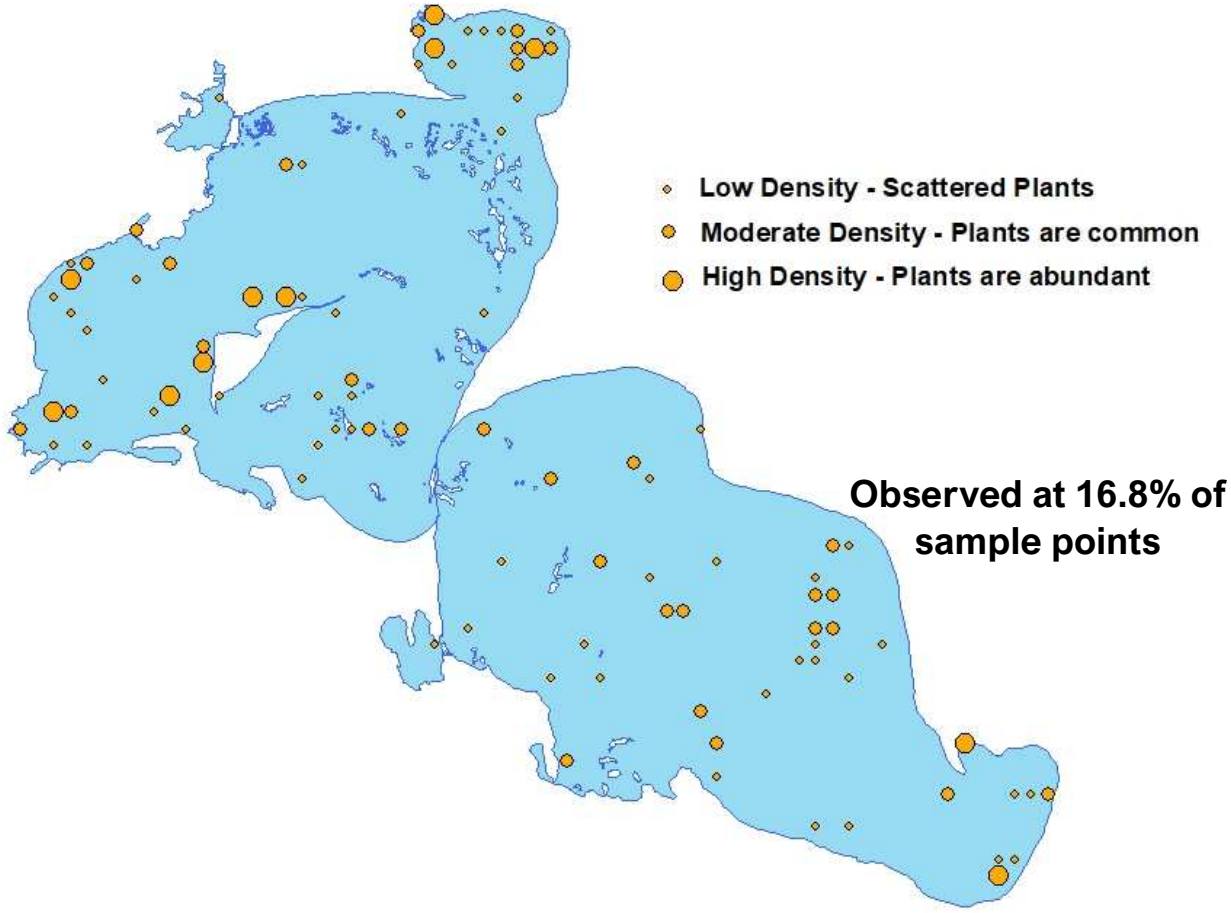
Coontail (*Ceratophyllum demersum*)



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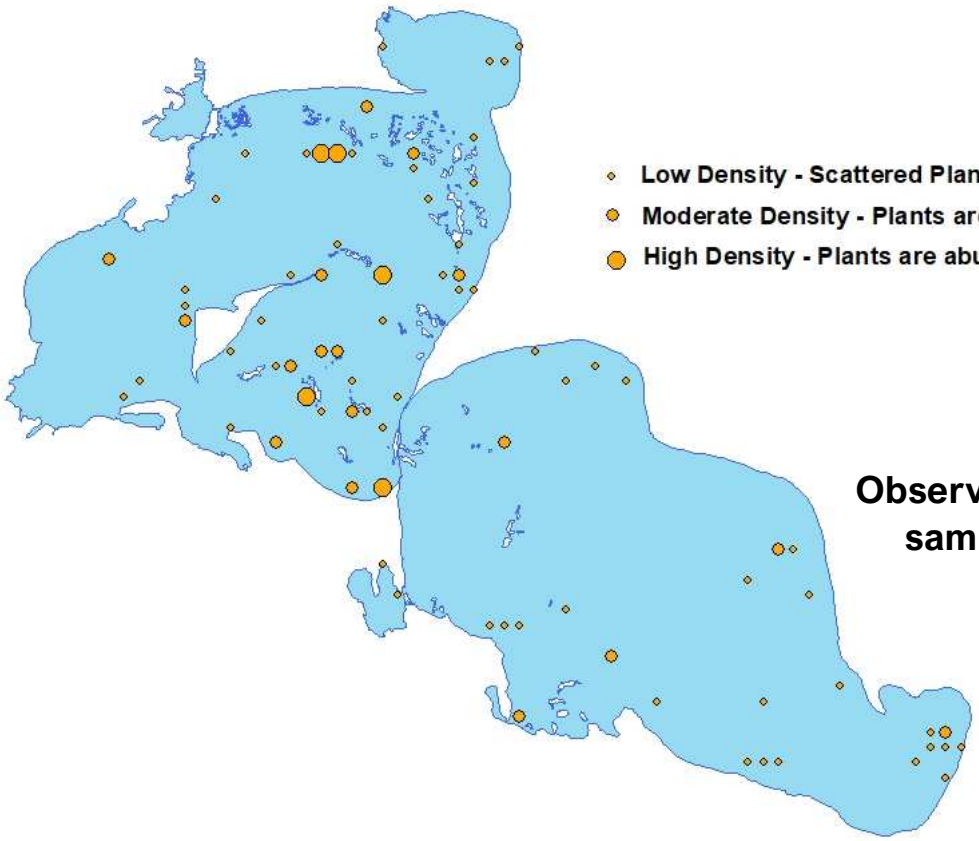
Northern Watermilfoil (*Myriophyllum sibiricum*)



Observed at 14% of sample points

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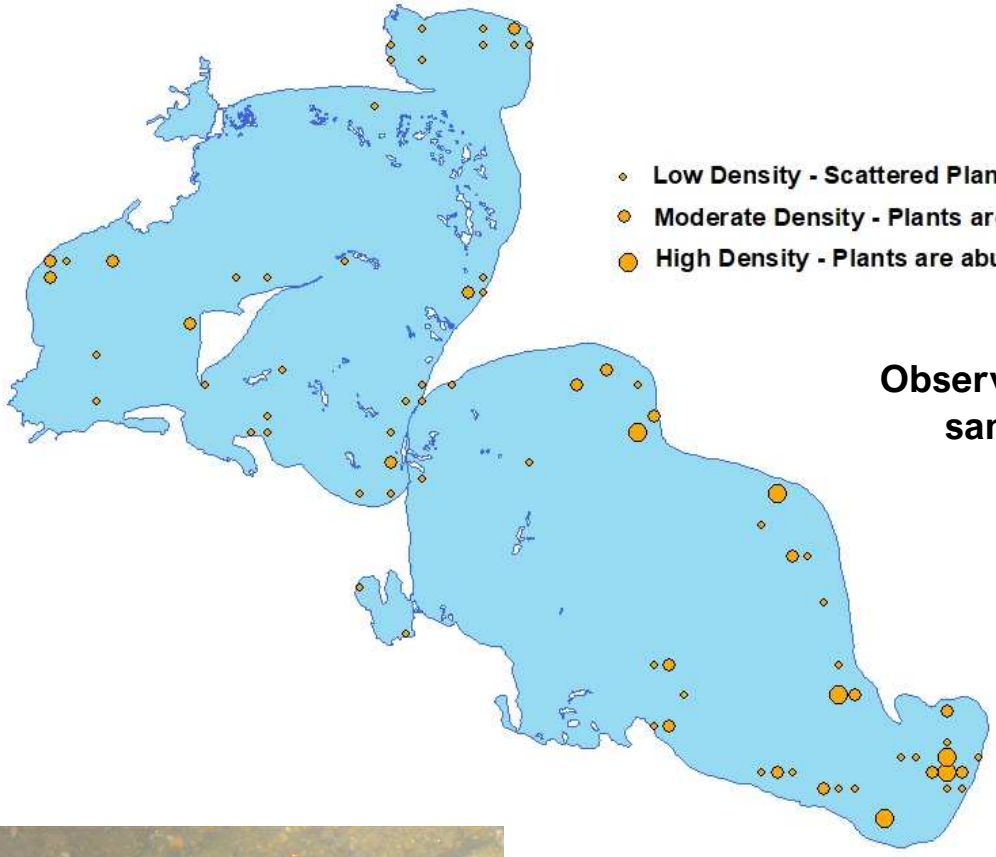
Fries' Pondweed (*Potamogeton friesii*)



Observed at 13.5% of sample points

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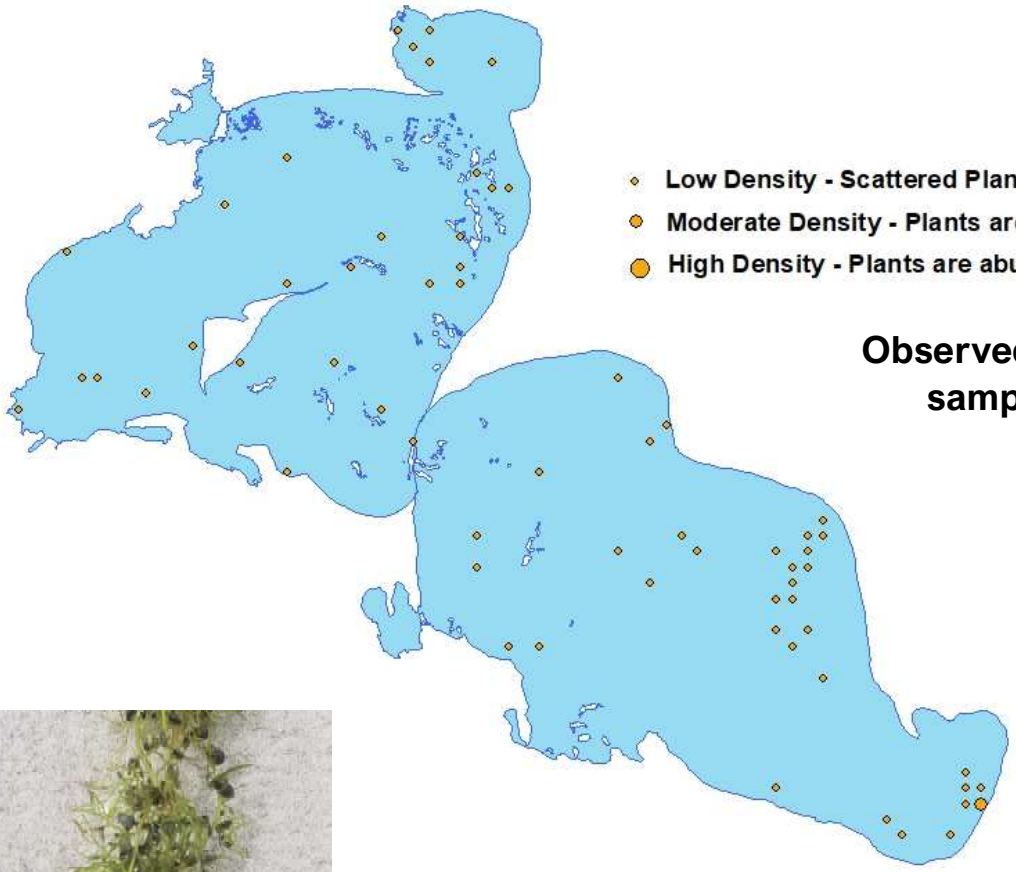
Bladderwort (*Utricularia sp.*)



Observed at 10.8% of sample points

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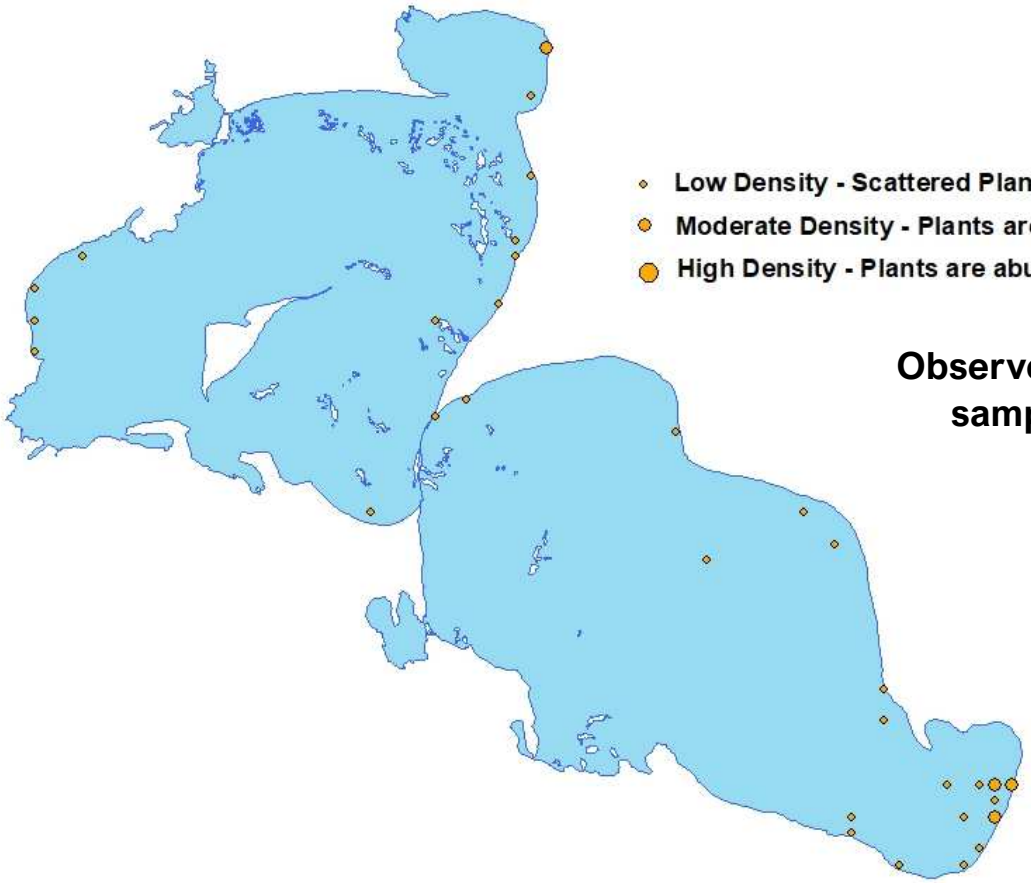
Wild Celery (*Vallisneria americana*)



Observed at 5.7% of sample points

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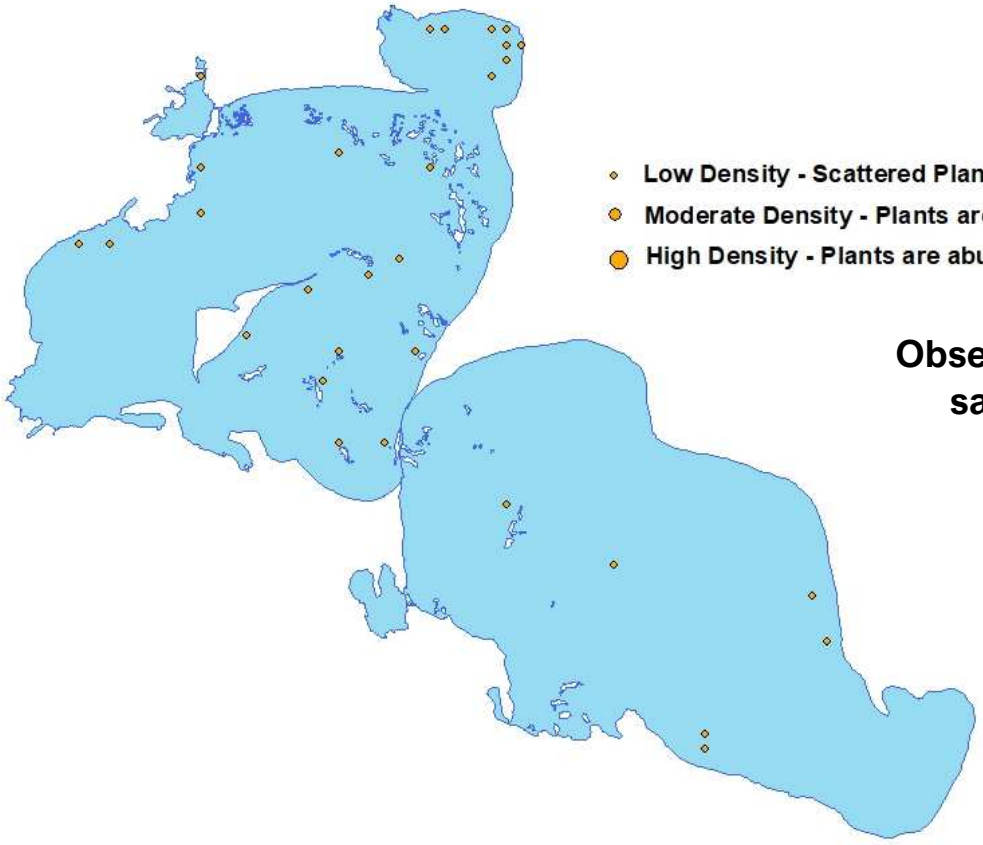
Sago Pondweed (*Stuckenia pectinata*)



Observed at 5.3% of sample points

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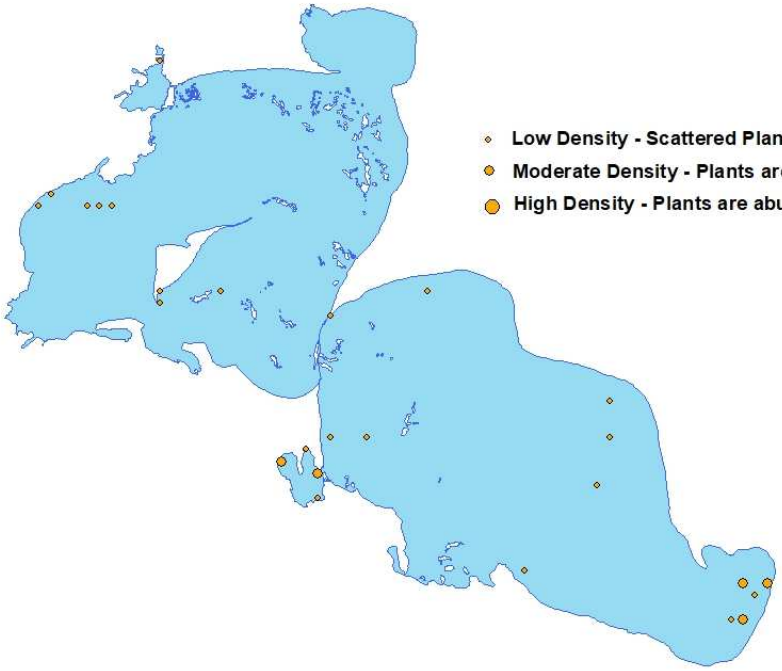
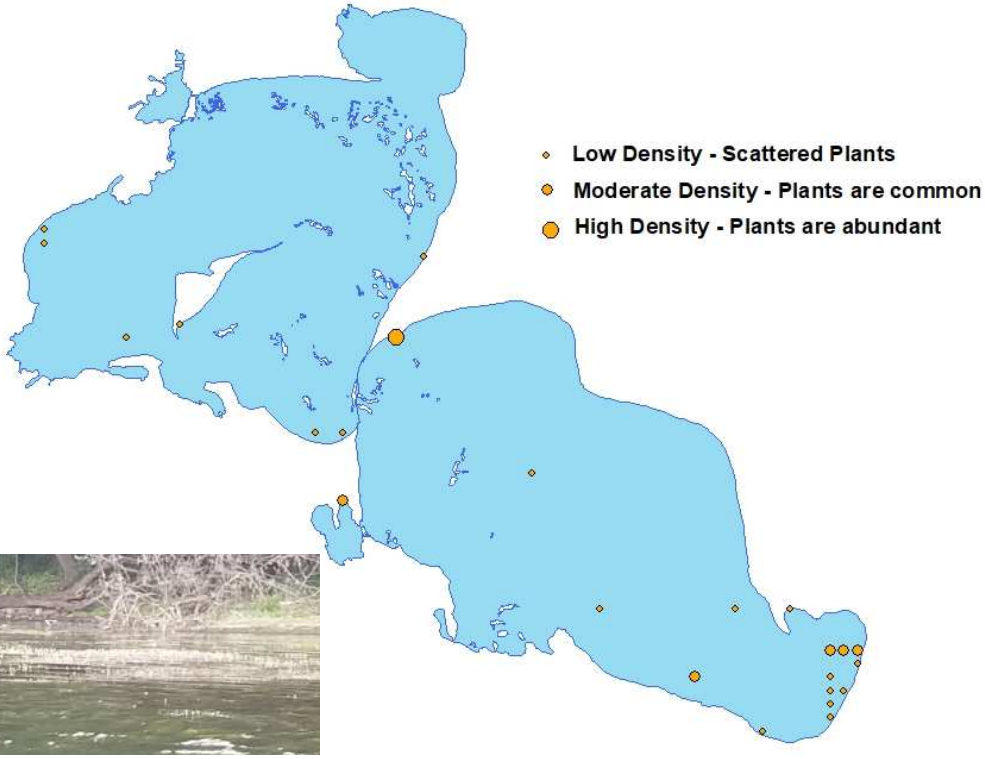
Flat Stem Pondweed (*Potamogeton zosteriformis*)



Observed at 4.6% of sample points

White Water Buttercup (*Ranunculus aquatilis*)

Observed at 4.3% of sample points



White water buttercup produces white flowers that can be present on the surface of the water

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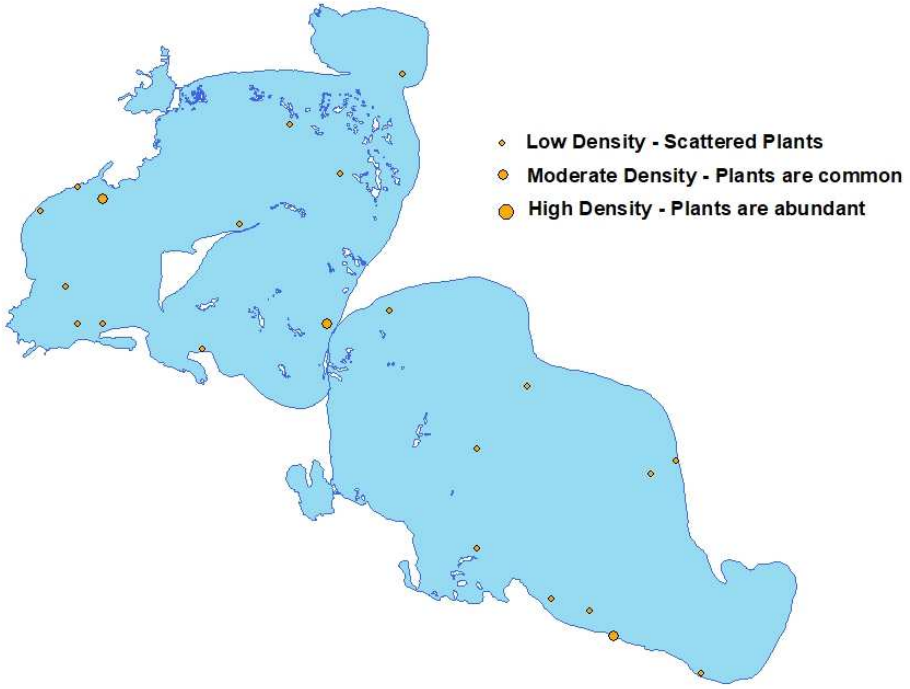
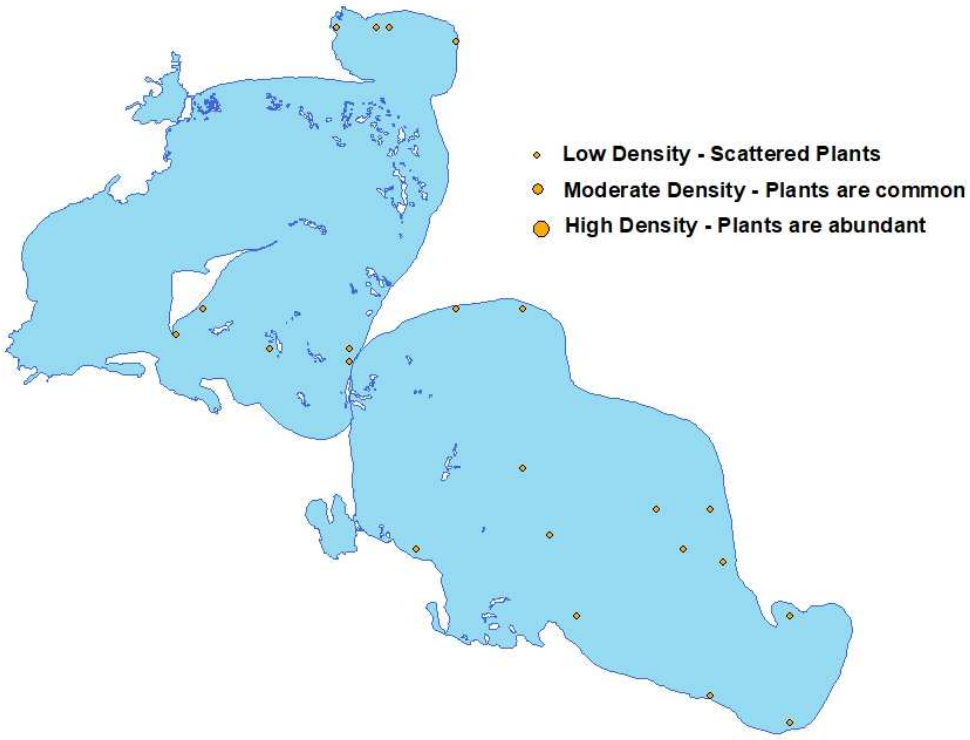
Illinois Pondweed (*Potamogeton illinoensis*)



Observed at 3.9% of sample points

Narrowleaf Pondweed (*Potamogeton sp.*)

Observed at 3.9% of sample points



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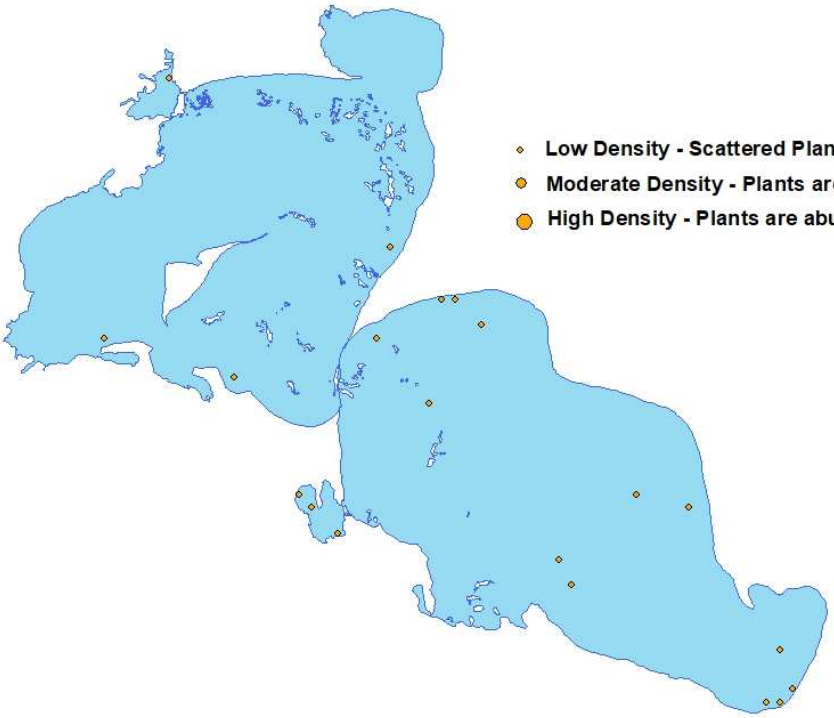
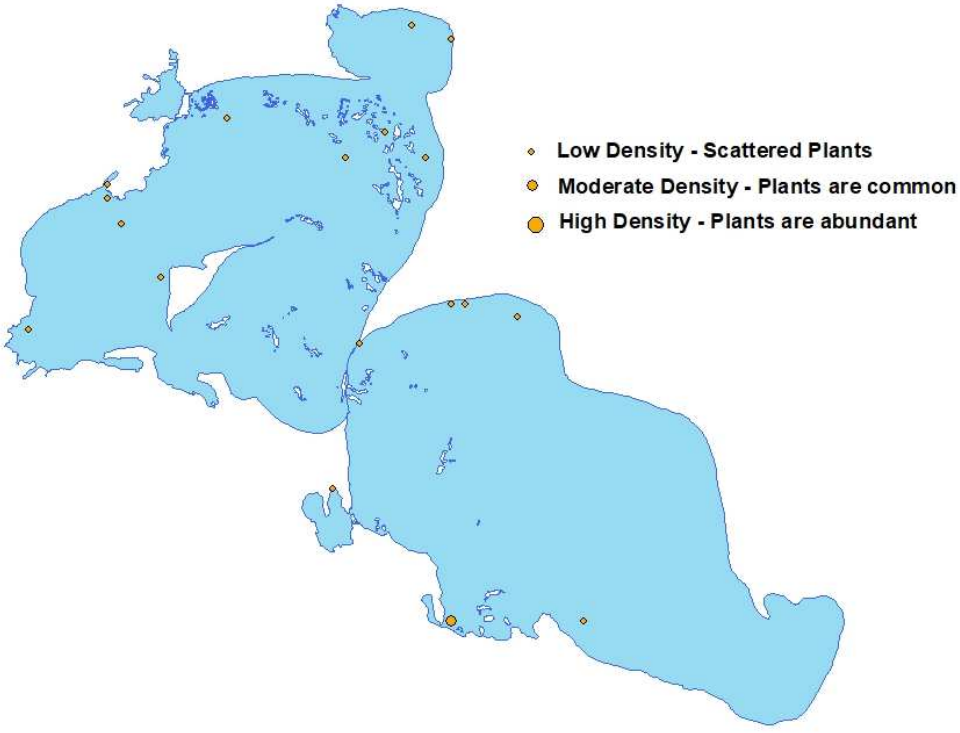
Curlyleaf Pondweed (*Potamogeton crispus*)



Observed at 3.4% of sample points

Clasping Leaf Pondweed (*Potamogeton richardsonii*)

Observed at 3.2% of sample points



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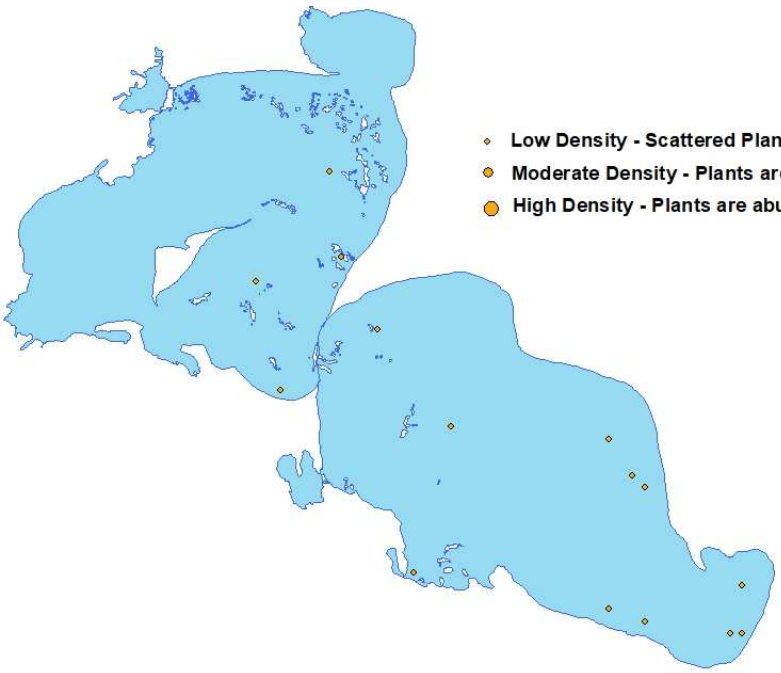
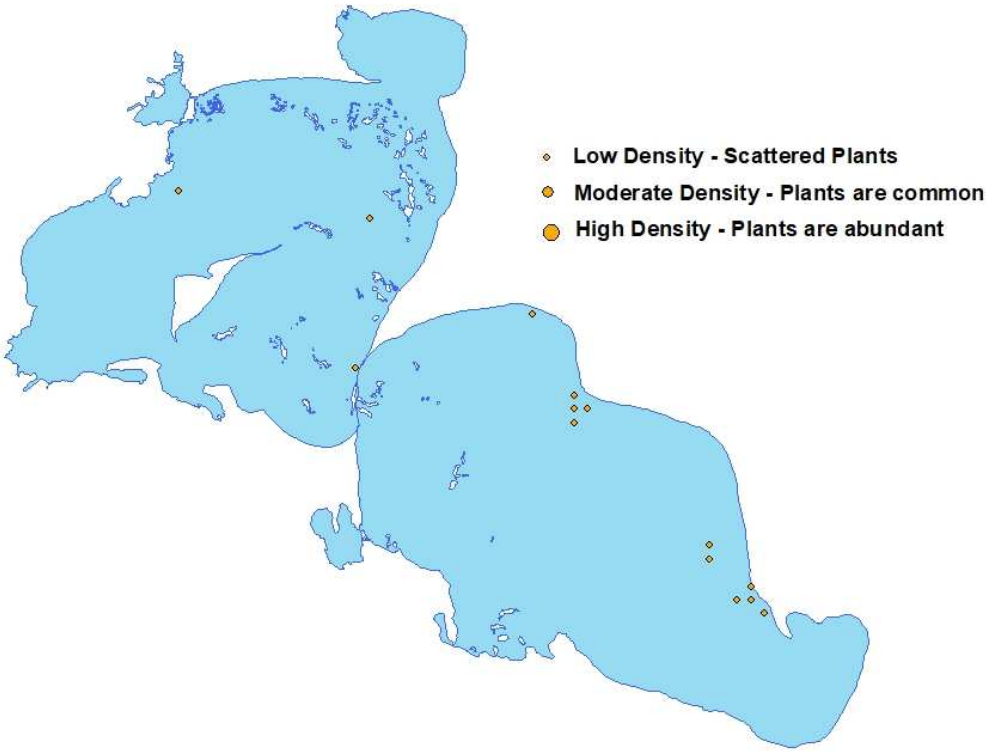
White Stem Pondweed (*Potamogeton praelongus*)



Observed at 2.7% of sample points

Variable Pondweed (*Potamogeton gramineus*)

Observed at 2.5% of sample points



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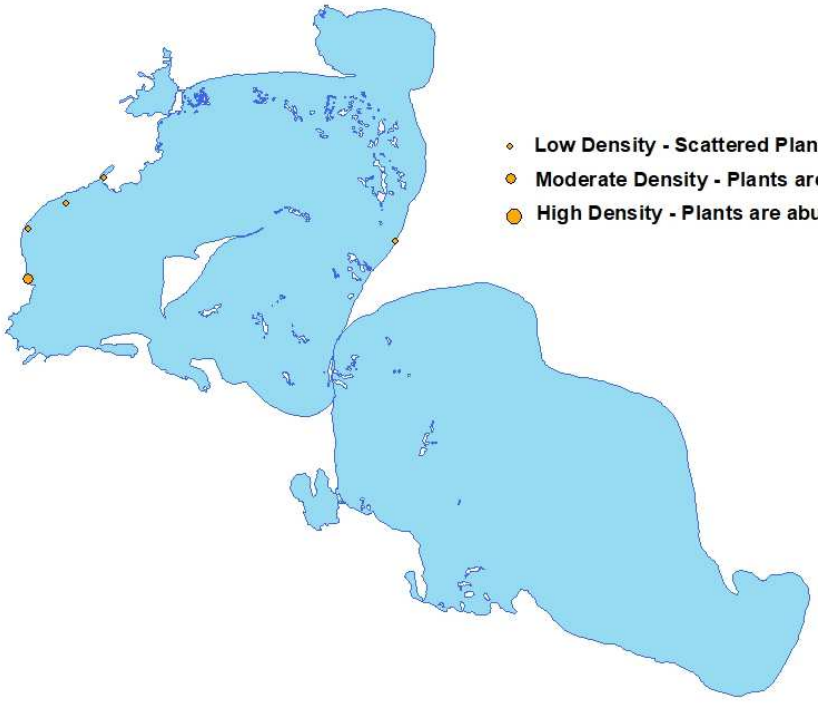
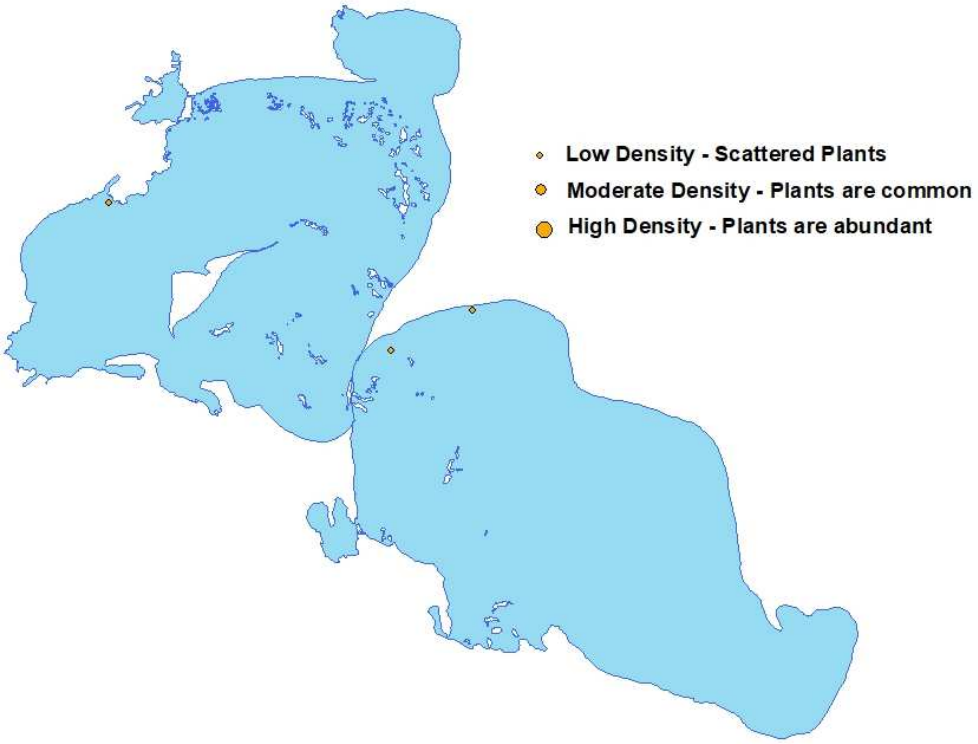
Water Stargrass (*Heteranthera dubia*)



Observed at 0.9% of sample points

Bushy Pondweed (*Najas flexilis*)



Observed at 0.5% of sample points

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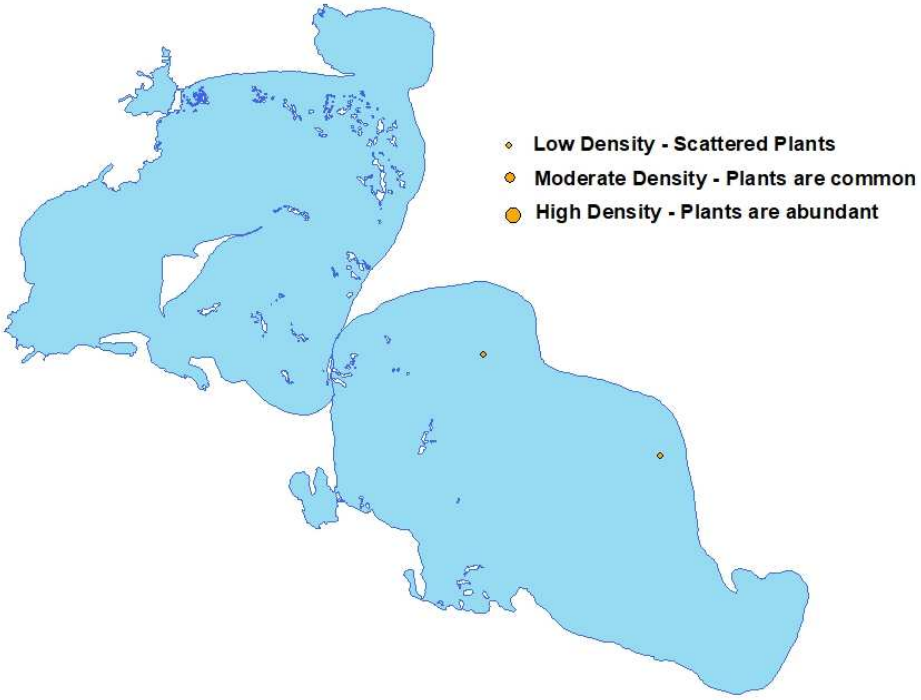
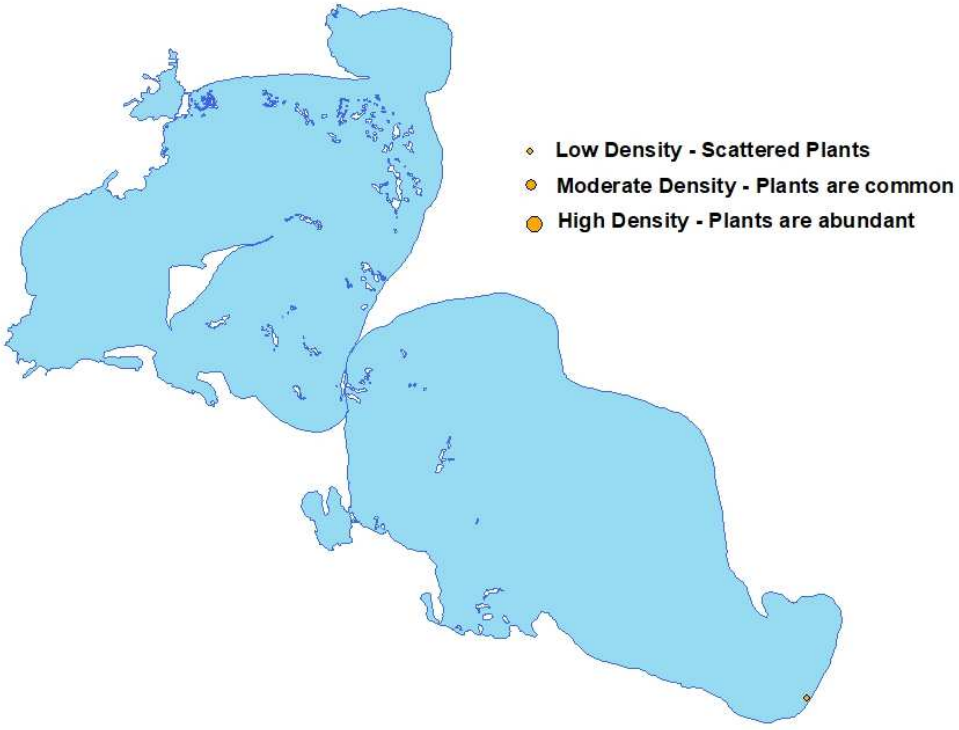
Eurasian Watermilfoil (*Myriophyllum spicatum*)



Observed at 0.4% of sample points

Elodea (*Elodea canadensis*)



Observed at 0.2% of sample points

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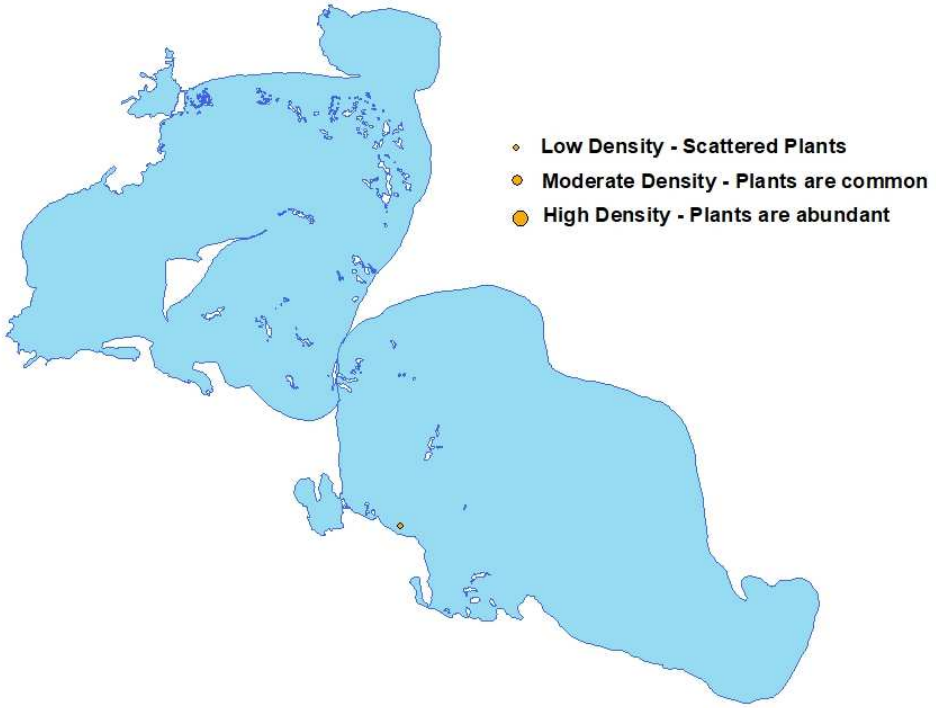
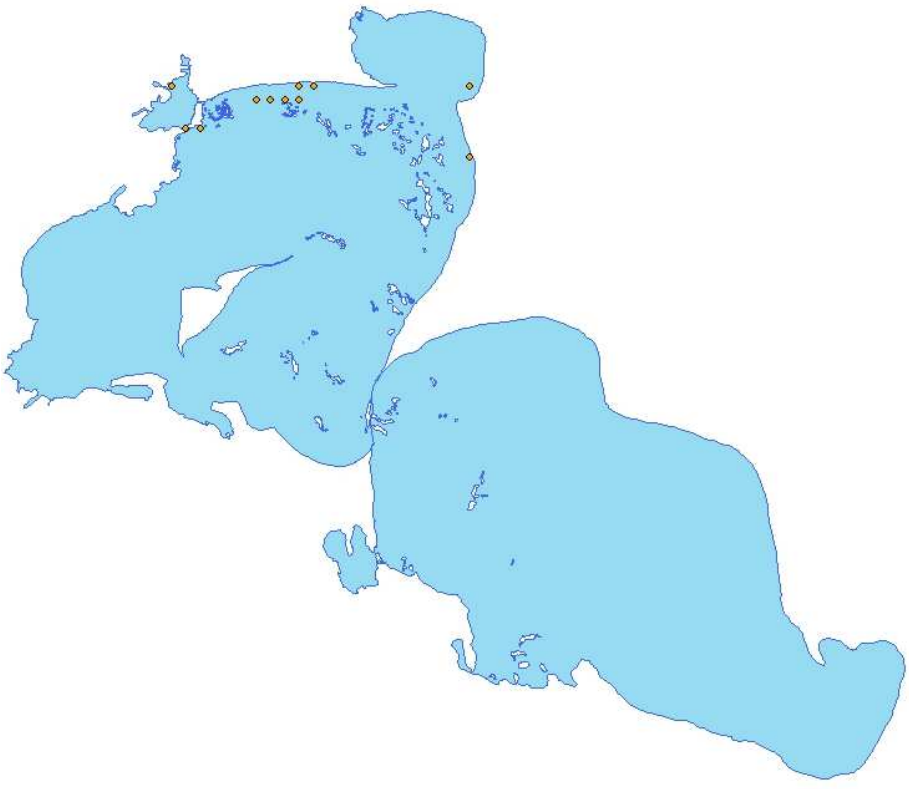
Largeleaf Pondweed (*Potamogeton amplifolius*)



Observed at 0.2% of sample points

Wild Rice (*Zizania palustris*)



Observed at 2% of sample points

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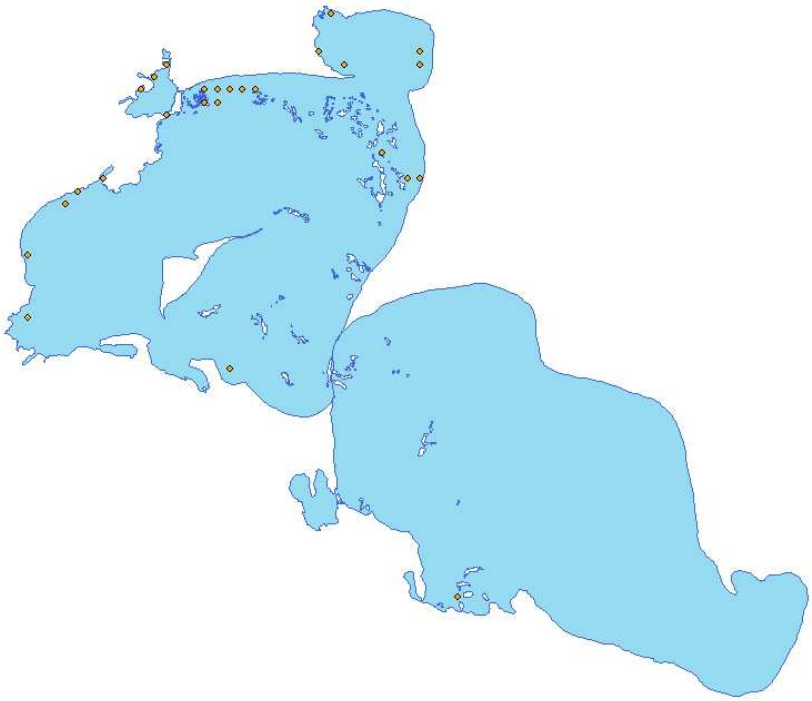
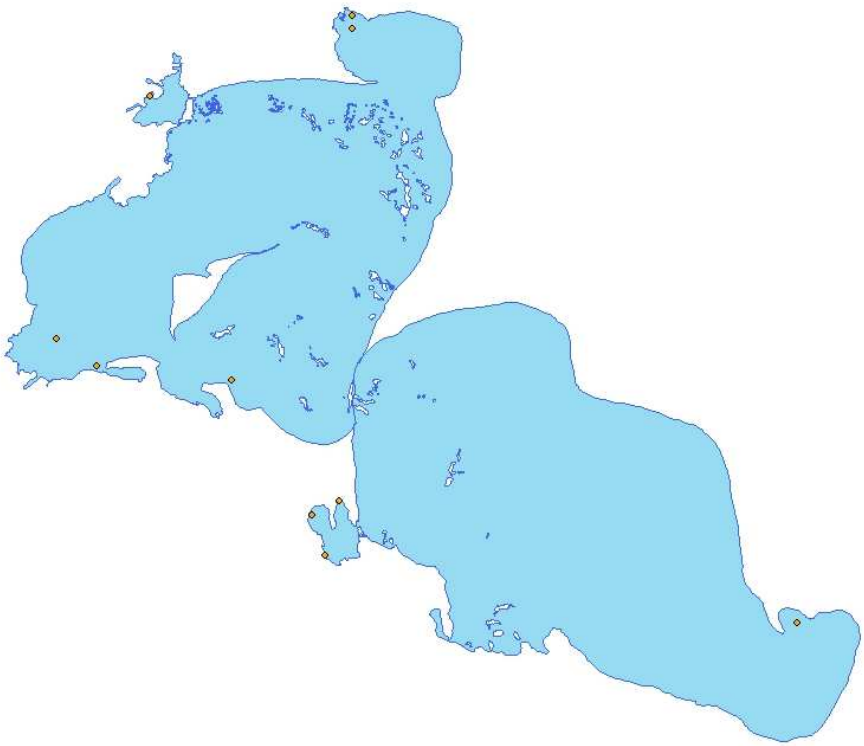
White Water Lily (*Nympaea odorata*)



Observed at 4.3% of sample points

Bullhead Pond Lily (*Nuphar variegata*)

Observed at 1.1% of sample points



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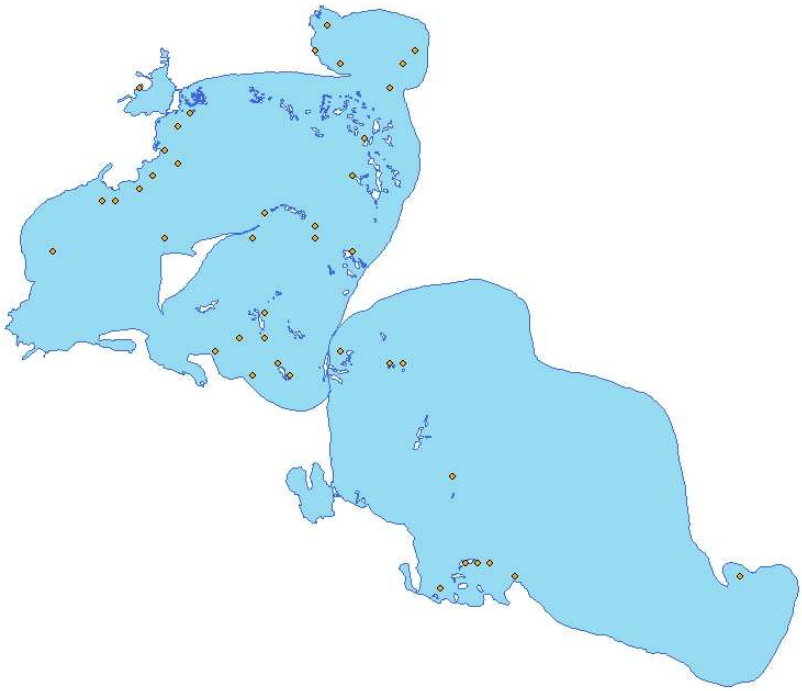
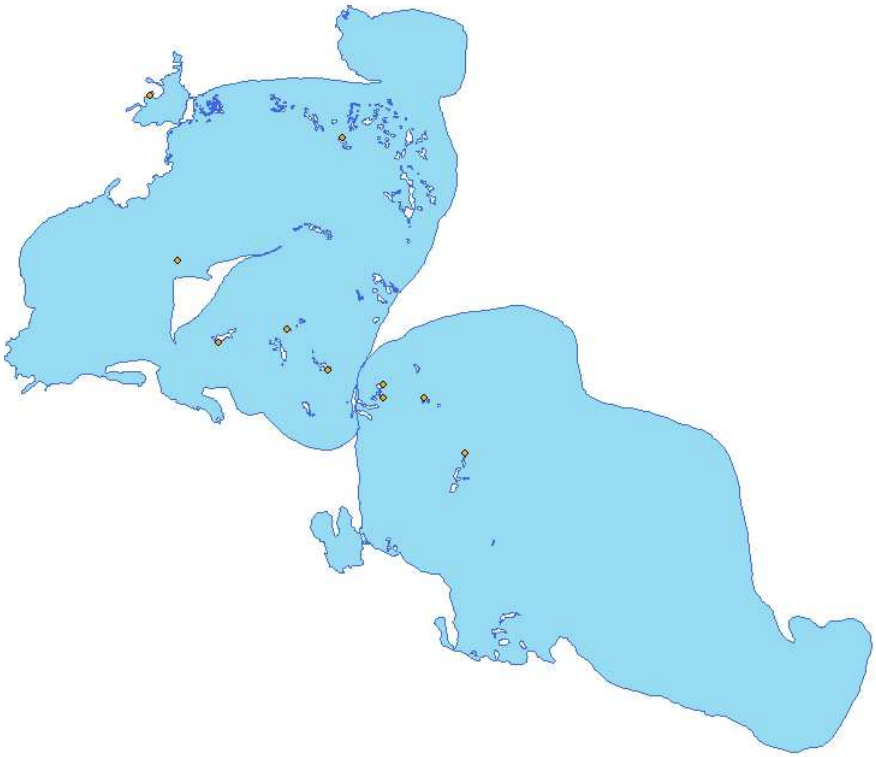
Bulrush (*Schoenoplectus sp.*)



Cattail (*Typha sp.*)



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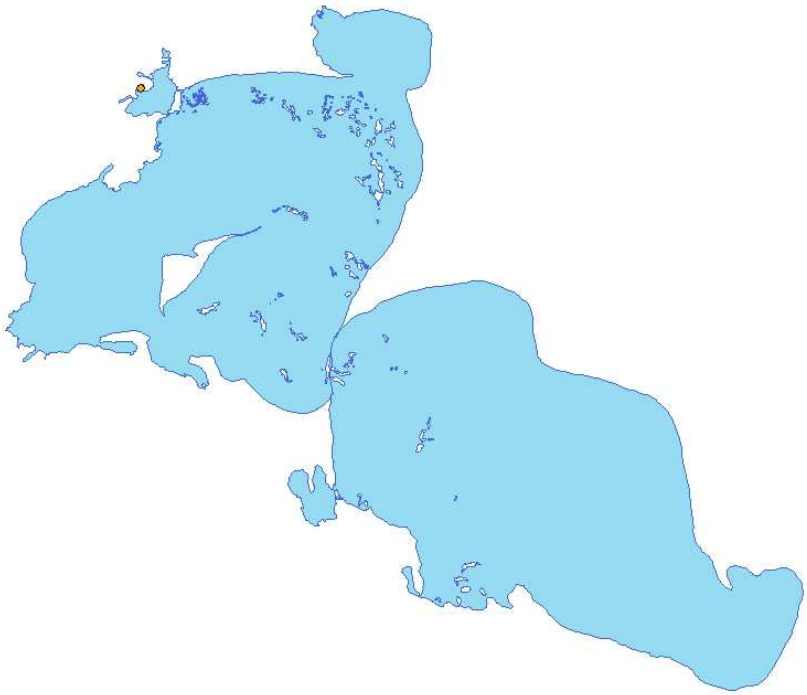
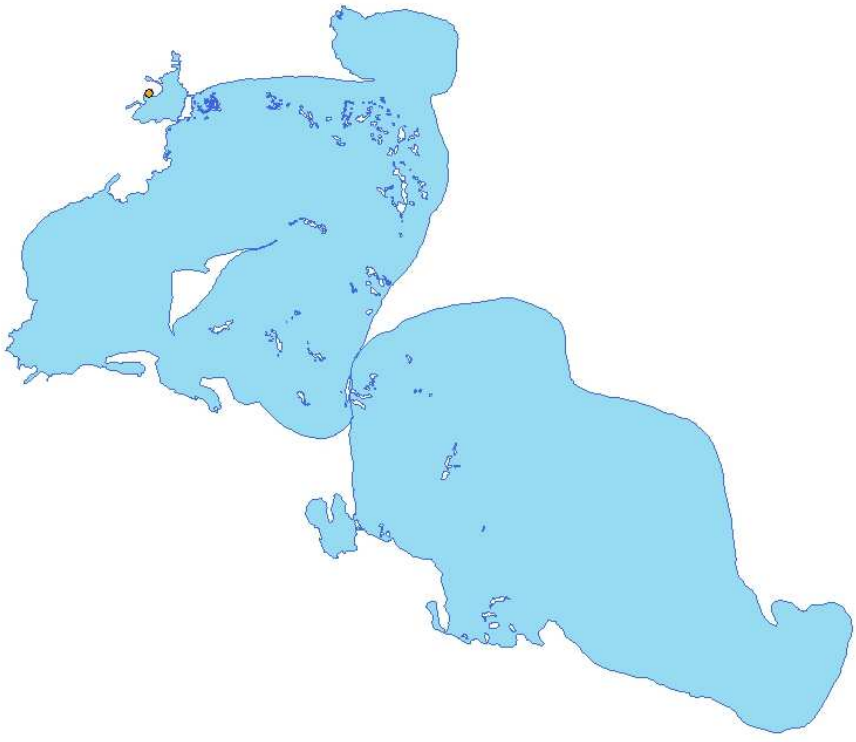
eric@aisconsultingmn.com
www.aisconsultingmn.com

Mare's Tail (*Hippuris vulgaris*)



Sagittaria (*Sagittaria sp.*)



Aquatic Invasive Species Consulting Services

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eric@aisconsultingmn.com
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Historical Aquatic Plant Survey Data from Clearwater Lake.
(2017 survey was also completed by AIS Consulting Services)

	2017	2020
Surface Area (acres)	3,158	3,158
Max. Depth of Plant Growth (ft.)	15	17
Number of sample points	959	959
Points inaccessible	120	105
Points actually sampled	839	854
% of Points Vegetated	53.7%	62.8%
Littoral Area (≤ 15 ft.)	1,595	1,595
Littoral Points Sampled (≤ 15 ft.)	554	564
% Littoral Points Vegetated	81.4%	94.1%
Species Richness (all species)	25	27
Species Richness (submerged plants)	19	20
Mean Number of Native Species/Littoral Point	1.2	1.73
Mean Number of Invasive Species/Littoral Point	0.1	0.04
Mean number of Species/Littoral Point	1.3	1.77

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Historical Aquatic Plant Survey Data from Clearwater Lake.
(2017 survey was also completed by AIS Consulting Services)

		2017	2020
Common Name	**Scientific Name**	**% Occurrence**	**% Occurrence**
Submersed Plants			
Chara	*Chara sp.*	69.1%	72.3%
Curlyleaf Pondweed	*Potamogeton crispus*	9.8%	3.4%
Coontail	*Ceratophyllum demersum*	8.5%	16.8%
Fries' Pondweed	*Potamogeton friesii*	7.8%	13.5%
Flat-Stem Pondweed	*Potamogeton zosteriformis*	6.0%	4.6%
Sago Pondweed	*Stuckenia pectinata*	5.2%	5.3%
Bladderwort	*Utricularia sp.*	5.1%	10.8%
Wild Celery	*Vallisneria americana*	4.3%	5.7%
Illinois Pondweed	*Potamogeton illinoensis*	3.1%	3.9%
Variable Pondweed	*Potamogeton gramineus*	2.2%	2.5%
White Water Buttercup	*Ranunculus aquatilis*	2.4%	4.3%
Clasping Leaf Pondweed	*Potamogeton richardsonii*	2.0%	3.2%
Narrowleaf Pondweed	*Potamogeton sp.*	1.4%	3.9%
Eurasian Watermilfoil	*Myriophyllum spicatum*	1.1%	0.4%
Northern Watermilfoil	*Myriophyllum sibiricum*	1.1%	14.0%
Elodea	*Elodea Canadensis*	0.7%	0.2%
Water Stargrass	*Heteranthera dubia*	0.4%	0.9%
White Stem Pondweed	*Potamogeton praelongus*	0.2%	2.7%
Bushy Pondweed	*Najas flexilis*	0.2%	0.5%
Largeleaf Pondweed	*Potamogeton amplifolius*	-	0.2%
Emergent			
Wild Rice	*Zizania palustris*	0.5%	2.0%
White Water Lily	*Nymphaea odorata*	0.5%	4.3%
Bullhead Pond Lily	*Nuphar variegata*	0.5%	1.1%
Bulrush	*Schoenoplectus sp.*	Present	Present
Cattail	*Typha sp.*	Present	Present
Mare's Tail	*Hippuris vulgaris*	Present	0.2%
Sagittaria sp.	*Sagittaria sp.*	-	0.2%