

Clearwater Lake
Point-Intercept Survey
June 25 & July 1, 6 and 8, 2017
Wright County
Annandale, MN
DOW# 86025200



Mare's Tail, *Hippuris vulgaris* found in Clearwater Lake during survey.



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August 4, 2017

Introduction

A point-intercept survey was conducted on Clearwater Lake in Wright County over several days in late June (25th) and early July (1st, 6th & 8th), by AIS Consulting Services. The purpose of the survey was to characterize the aquatic plant community in the lake, including invasive plants like Curlyleaf Pondweed and Eurasian Watermilfoil, as well as look for new invasives not currently found in the lake, such as Starry Stonewort.

Summary

Aquatic plants were abundant in Clearwater Lake during the survey, occurring at 81% of sites in the littoral zone (≤ 15 ft.). 25 different plant species were observed, with 19 of those being submerged species. Chara dominated the plant community, occurring at 69% of littoral sites. Other common plants that were found between 5-10% of littoral sites include: Curlyleaf Pondweed (9.8%), Coontail (8.5%), Fries' Pondweed (7.8%), Flat-stem Pondweed (6%), Sago Pondweed (5.2%) and Bladderwort (5.1%). The remaining 18 species were all found at less than 5% of sites, including Eurasian Watermilfoil (1.1%). Additional locations of Eurasian Watermilfoil were marked in between the survey points, but patches tended to be small, and typically were at a low to moderate density. Eurasian watermilfoil was typically found in 4 to 6 feet of water, and often occupying the ledges of drop offs. No new invasive plants were found during the survey. One interesting finding was the discovery of a native aquatic plant called Mare's Tail, *Hippuris vulgaris*. Pictures and maps of that plant can be found later in this report, but its uncommon to this area of Minnesota. Zebra mussels, which were found in the lake in 2015, were observed in shallow sandy areas, typically covering native mussels. Zebra mussels were not commonly found attaching to aquatic plants, but its only been a couple years since the infestation was observed.

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. If points were inaccessible, it was noted and the point was skipped

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)

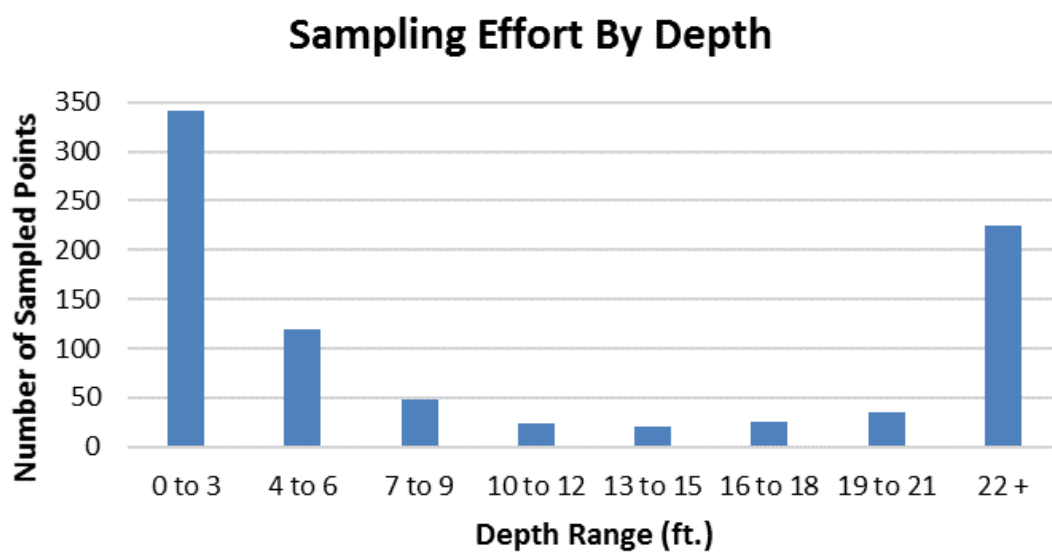
2 = Covering between 1/3 to 2/3 of rake head (plants common)

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.



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



Results

Summary of aquatic
plant community
metrics.
Clearwater Lake
(Wright County)

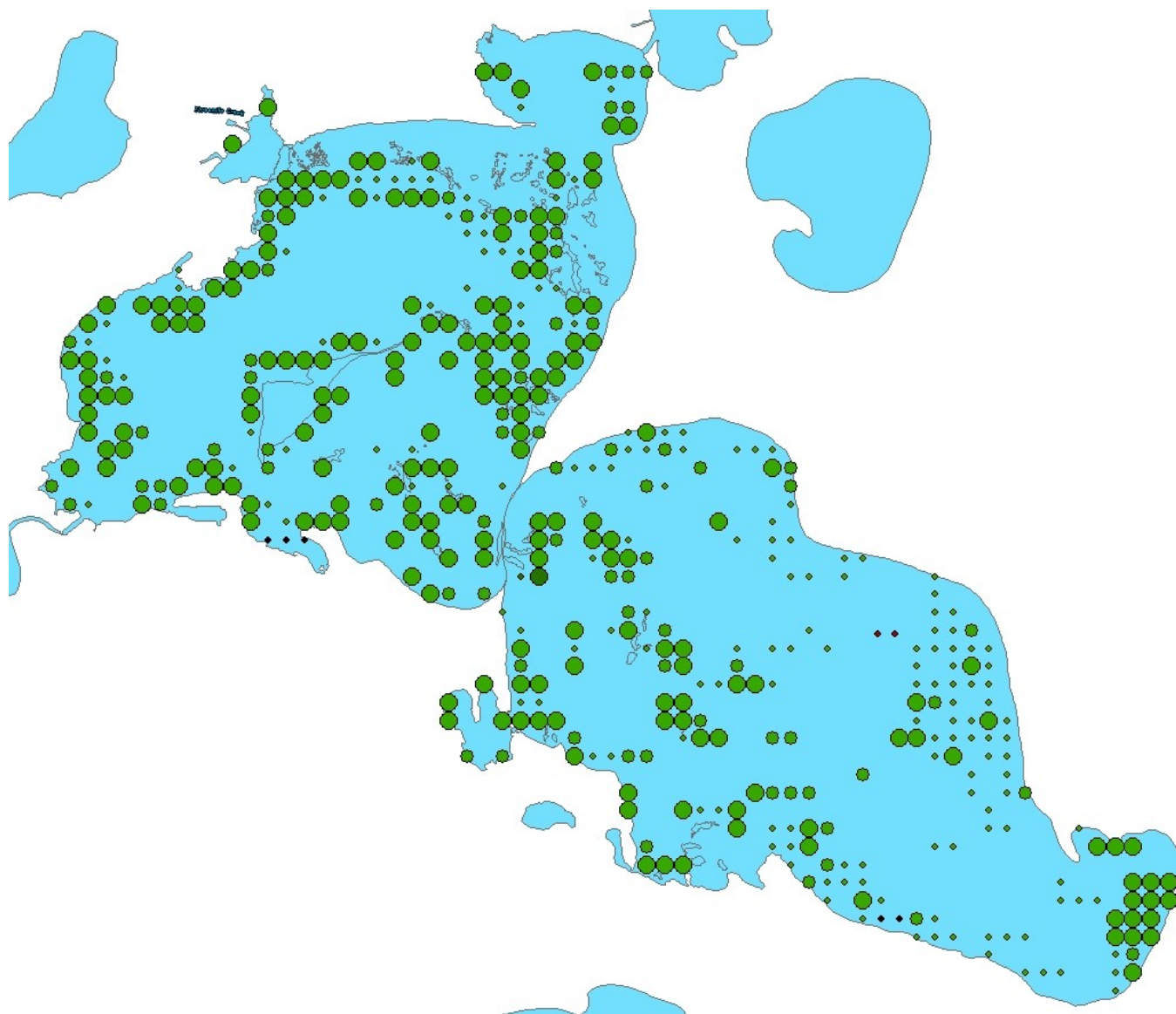
Surface Area (acres)	3,158
Maximum Depth (ft.)	73
Max. Depth of Plant Growth (ft.)	15
Number of sample points	959
Points inaccessible	120
Points actually sampled	839
% of Points Vegetated	53.7%
Littoral Area (acres, ≤ 15 ft.)	1,595
Littoral Points Sampled (≤ 15 ft.)	554
% Littoral Points Vegetated	81.4%
Species Richness (all species)	25
Species Richness (submerged plants)	19
Mean Number of Native Species/Littoral Point	1.2
Mean Number of Invasive Species/Littoral Point	0.1
Mean number of Species/Littoral Point	1.3

Percent frequency of
occurrence for plant species
surveyed on Clearwater
Lake (Wright County),
Calculated using all littoral
points sampled (≤15ft).

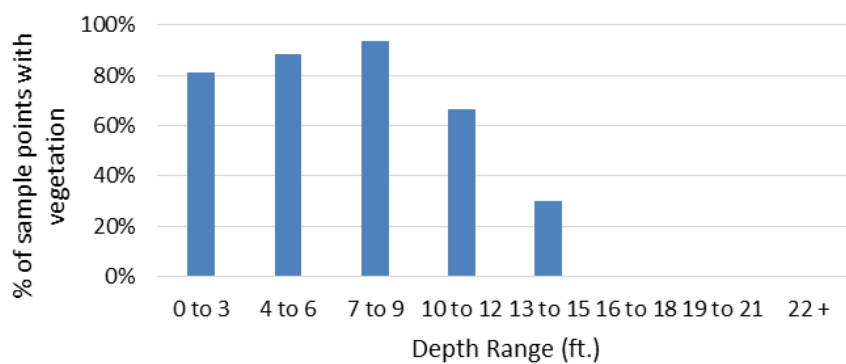
Common Name	Scientific Name	% Occurrence
Submersed Plants		
Chara	<i>Chara sp.</i>	69.1%
Curlyleaf Pondweed	<i>Potamogeton crispus</i>	9.8%
Coontail	<i>Ceratophyllum demersum</i>	8.5%
Fries' Pondweed	<i>Potamogeton friesii</i>	7.8%
Flat-Stem Pondweed	<i>Potamogeton zosteriformis</i>	6.0%
Sago Pondweed	<i>Stuckenia pectinata</i>	5.2%
Bladderwort	<i>Utricularia sp.</i>	5.1%
Wild Celery	<i>Vallisneria americana</i>	4.3%
Illinois Pondweed	<i>Potamogeton illinoensis</i>	3.1%
Variable Pondweed	<i>Potamogeton gramineus</i>	2.2%
White Water Buttercup	<i>Ranunculus aquatilis</i>	2.4%
Clasping Leaf Pondweed	<i>Potamogeton richardsonii</i>	2.0%
Narrowleaf Pondweed	<i>Potamogeton sp.</i>	1.4%
Eurasian Watermilfoil	<i>Myriophyllum spicatum</i>	1.1%
Northern Watermilfoil	<i>Myriophyllum sibiricum</i>	1.1%
Elodea	<i>Elodea Canadensis</i>	0.7%
Water Stargrass	<i>Heteranthera dubia</i>	0.4%
White Stem Pondweed	<i>Potamogeton praelongus</i>	0.2%
Bushy Pondweed	<i>Najas flexilis</i>	0.2%

Emergent		
Northern Wild Rice	<i>Zizania palustris</i>	0.5%
White Water Lily	<i>Nymphaea odorata</i>	0.5%
Bullhead Pond Lily	<i>Nuphar variegata</i>	0.5%
Bulrush	<i>Schoenoplectus sp.</i>	Present
Cattail	<i>Typha sp.</i>	Present
Mare's Tail	<i>Hippuris vulgaris</i>	Present

Overall Vegetation Abundance



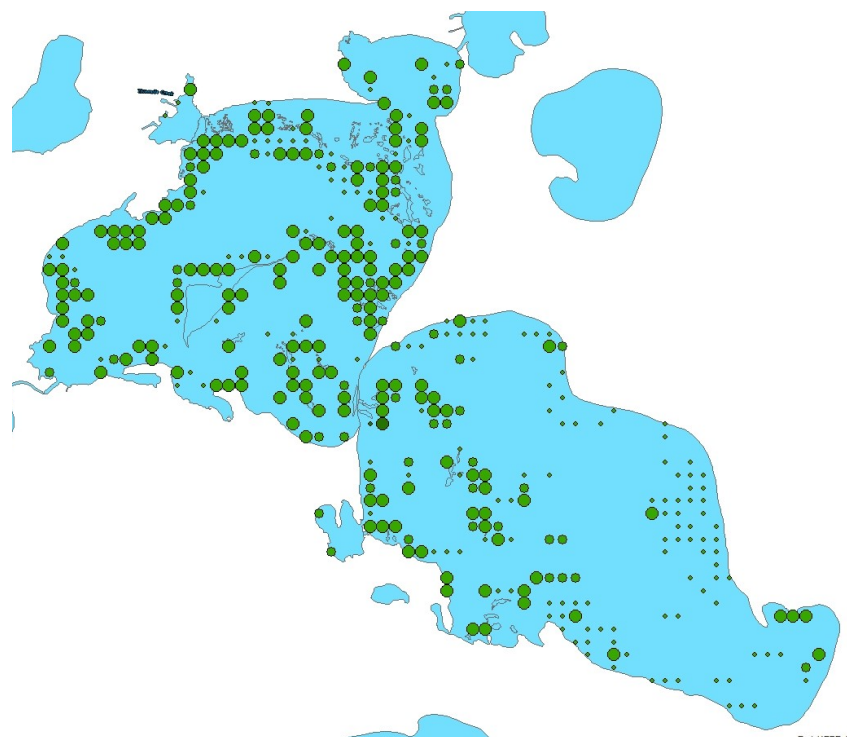
Percent of Vegetation By Depth



Legend

- Low growth
- Moderate growth
- Heavy growth

Chara



Legend

•

Low growth

•

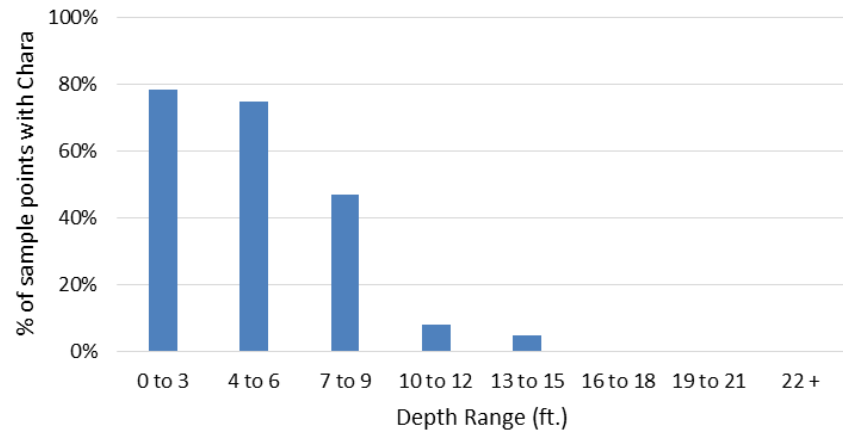
Moderate growth

•

Heavy growth



Percent Occurrence of Chara by Depth



Aquatic Invasive Plants

Curlyleaf Pondweed

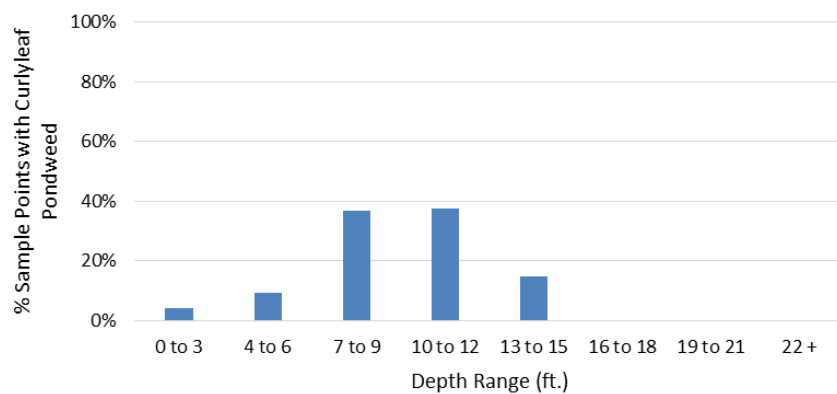


Legend

- Low growth
- Moderate growth
- Heavy growth

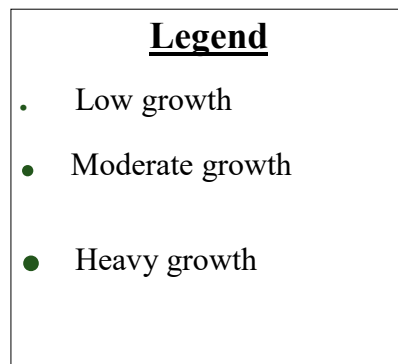


Percent Occurrence of Curlyleaf Pondweed by Depth

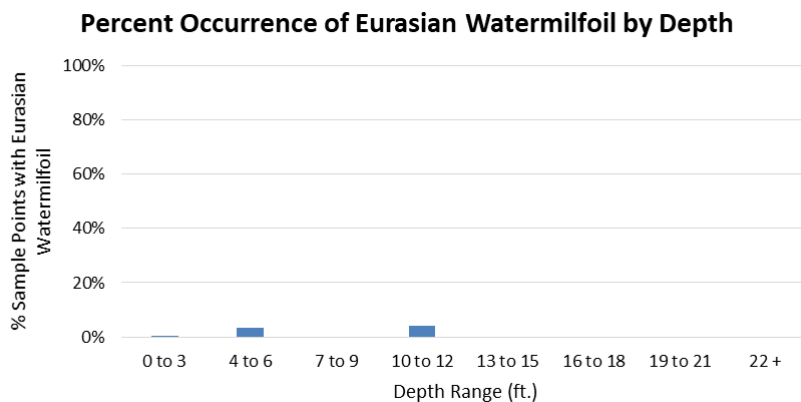
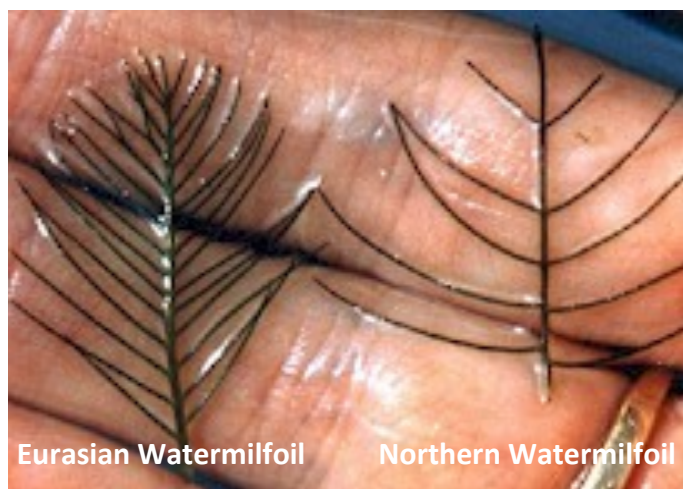


Aquatic Invasive Plants

Eurasian Watermilfoil

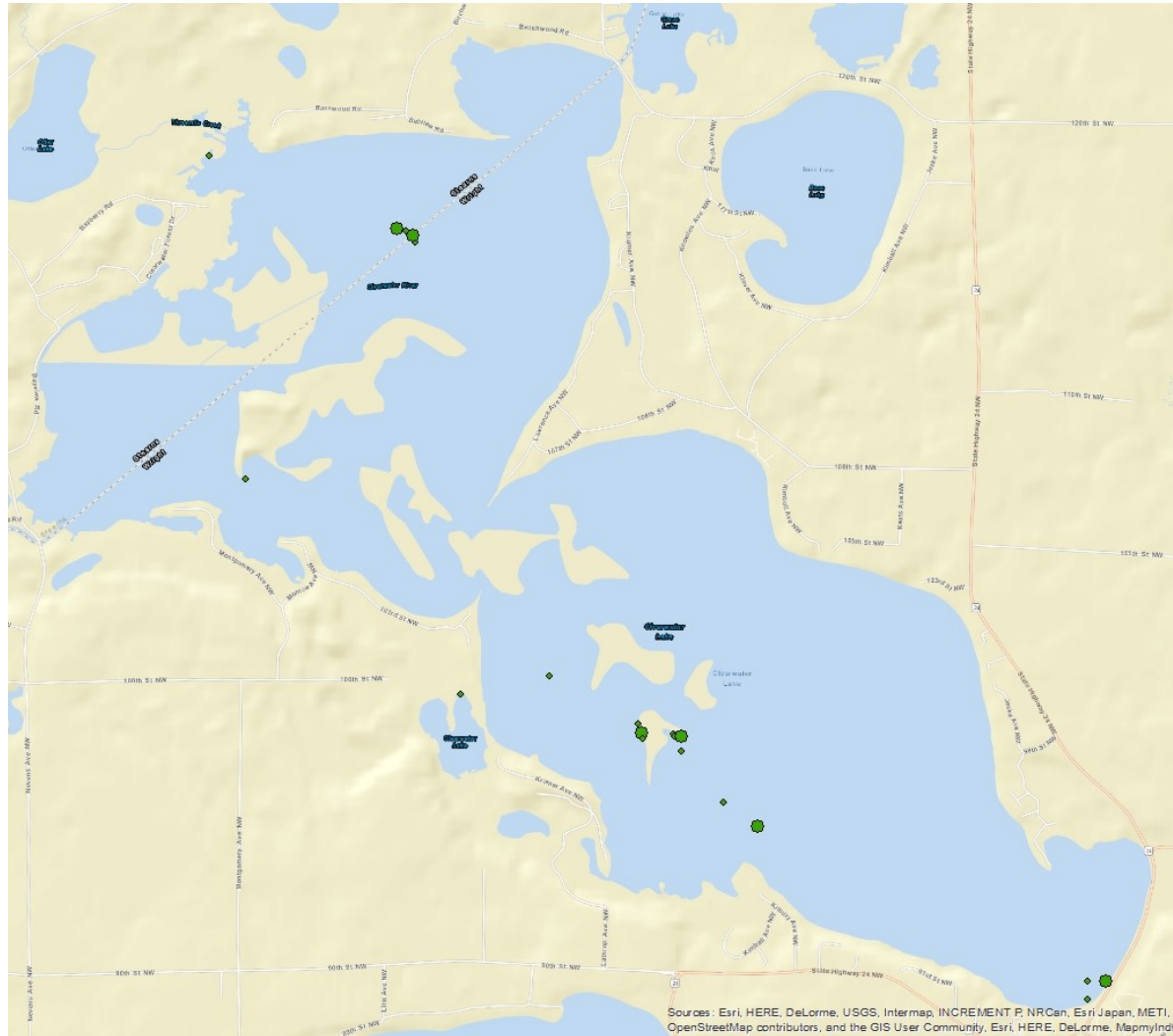


Eurasian Watermilfoil found from only point-intercept survey points. An additional map of all areas where Eurasian Watermilfoil was found, including areas in between and outside survey points, can be found on the next page of this report.



Eurasian Watermilfoil

During the survey, additional areas in between and just outside the survey points were assessed for the presence of Eurasian Watermilfoil. Several small patches or scattered plants were found. While these observations cannot be used in the statistical analysis of the survey, they are still valuable for those working on vegetation management in the lake. This was not an exhaustive delineation of all Eurasian Watermilfoil in the lake, however, a lot of ground was covered during the survey and there were likely not any significant or overly abundant patches of Eurasian Watermilfoil not noted in the map below. It is likely, however, that there are more small scattered areas of Eurasian Watermilfoil around the lake that were not identified during the survey.

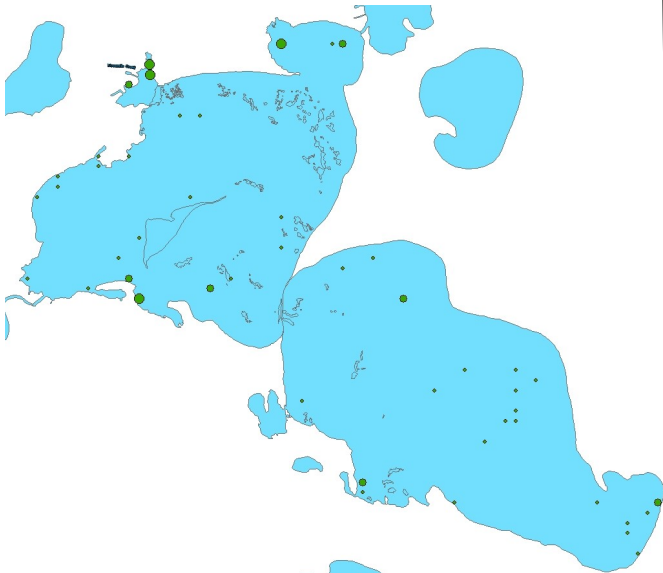


Legend

- Low growth
- Moderate growth
- Heavy growth

Maps of Additional Aquatic Plant Species Found During Survey

Coontail



Elodea



Legend

- Low growth
- Moderate growth
- Heavy growth



Coontail
Ceratophyllum demersum
Photo by V. Ramey
Copyright 2002 Univ. Florida



elodea
Elodea canadensis
Photo by William Haller
© 2008 University of Florida

Illinois Pondweed



Variable Pondweed



Legend

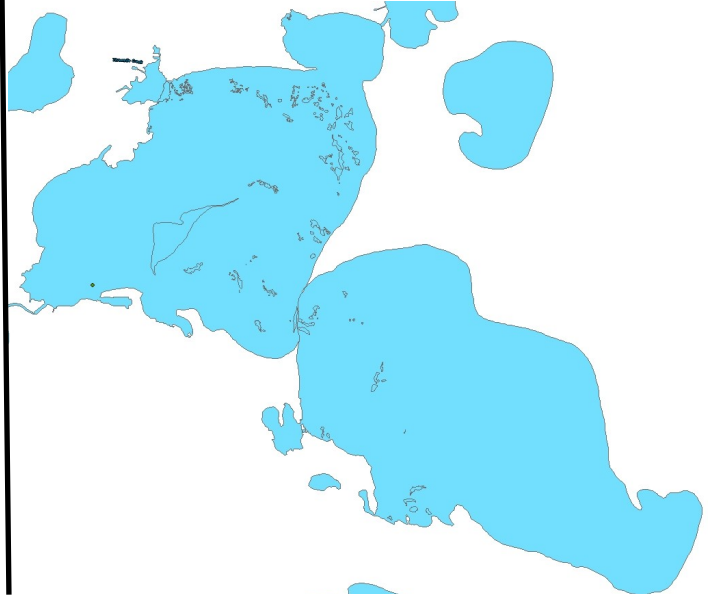
- Low growth
- Moderate growth
- Heavy growth



Clasping Leaf Pondweed



White Stem Pondweed



Legend

- Low growth
- Moderate growth
- Heavy growth



Flat Stem Pondweed



Sago Pondweed



(C) Paul Skawinski, 2009

Legend

- Low growth
- Moderate growth
- Heavy growth



©2004 Gary Fewless



Stipule of sago pondweed
Potamogeton pectinatus
Photo by A. Murray
Copyright 2001 Univ. Florida

Wild Celery

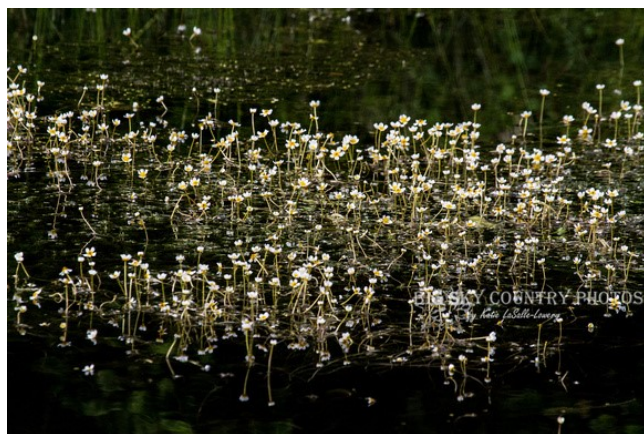


White Water Buttercup



Legend

- Low growth
- Moderate growth
- Heavy growth



Bladderwort



Northern Watermilfoil



Legend

- Low growth
- Moderate growth
- Heavy growth

Fries' Pondweed



Narrow Leaf Pondweed



Legend

- Low growth
- Moderate growth
- Heavy growth



Water Stargrass



Bushy Pondweed



Legend

- Low growth
- Moderate growth
- Heavy growth



Wild Rice



Bulrush



Legend

- Low growth
- Moderate growth
- Heavy growth
- ▲ Present



White Water Lily

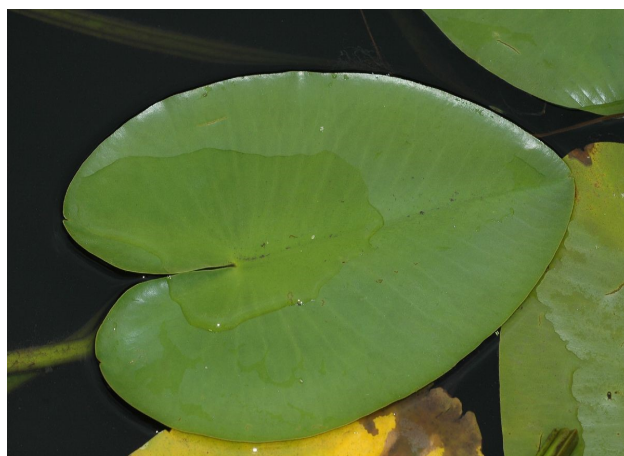
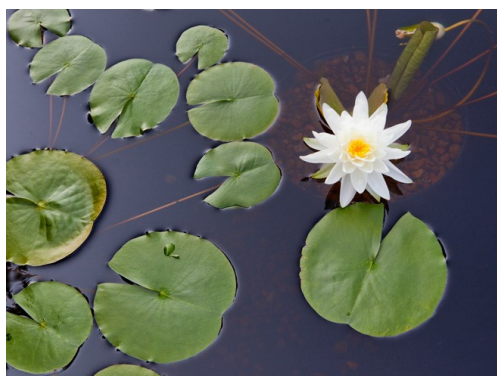


Bullhead Pond Lily

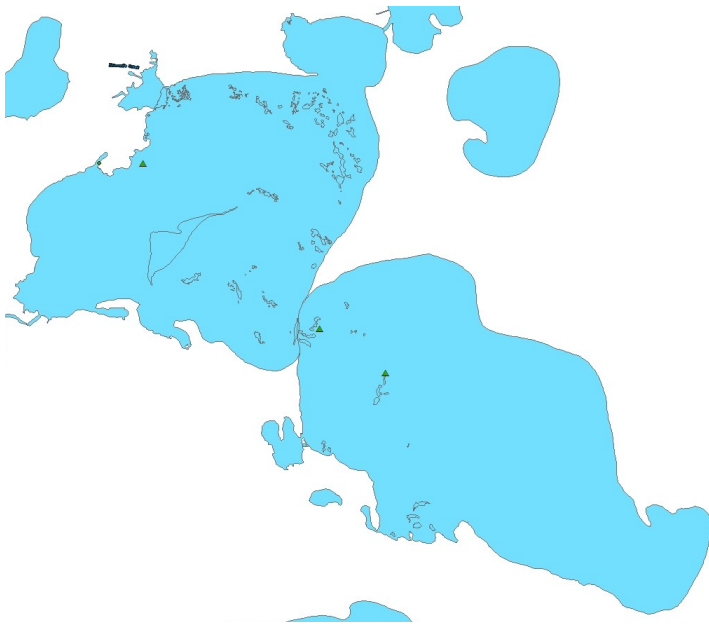


Legend

- Low growth
- Moderate growth
- Heavy growth
- ▲ Present



Cattail



Mare's Tail



Legend

- Low growth
- Moderate growth
- Heavy growth
- ▲ Present

