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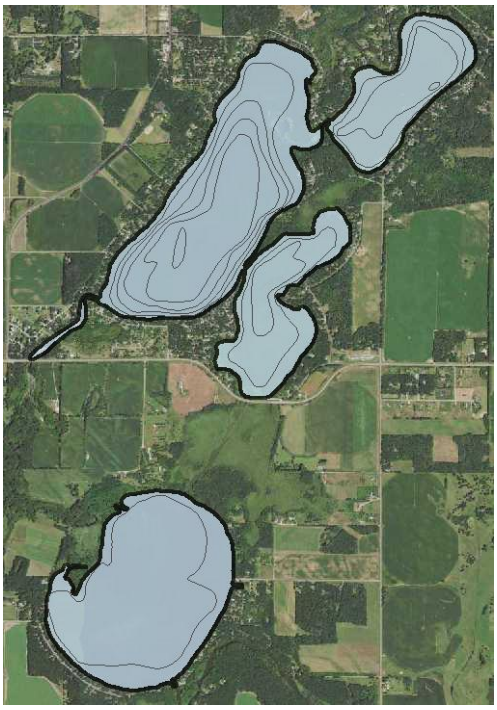
2022 Aquatic Plant Surveys for Briggs Lakes Chain

Eurasian Watermilfoil Surveys

- **Rush Lake** *(#71-0147) – June 23, Sept 14*
- **Briggs Lake** *(#71-0146) – Sept 14*
- **Julia Lake** *(#71-0145) – Sept 14*
- **Big Elk Lake** *(#71-0141) – June 23, Sept 14*

Point-Intercept Plant Surveys

- **Big Elk Lake** *(#71-0141) – June 23, Aug 23, & Sept 14*



Surveys, Analysis, and Reporting by:
James A. Johnson – *Aquatic Ecologist, Freshwater Scientific Services, LLC*

Certified Lake Manager
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Purpose of Surveys

These surveys were conducted in the summer of 2022 to (1) assess the presence, distribution, and density of any Eurasian watermilfoil (EWM) in Briggs Lake, Julia Lake, Rush Lake, and Big Elk Lake, (2) to assess plants in the trewated area of Big Elk Lake before and after herbicide treatment, and (3) to assess the plant community throughout Big Elk Lake. The results from these surveys will help to guide management of EWM in the lakes and meet DNR permit and grant requirements.

Survey Methods

EWM Delineation Surveys

Freshwater Scientific Services surveyed Rush Lake and Big Elk Lake on June 23, 2022. These two lakes have had EWM growth documented in the past and have been actively managing EWM with hand-pulling and herbicide treatments. The goal of these surveys was to determine if either of these lakes had areas of EWM that should be controlled.

We also conducted lakewide searches for EWM in all four lakes in September to look for any new areas of EWM. During each of these surveys, we navigated a meandering search path over the vegetated portion of each lake. While navigating these search paths, we used a combination of surface observations, sonar readings, and rake tosses to locate and delineate any areas of EWM growth. Sonar and visual assessments were conducted continuously, with subsequent rake tosses to assess EWM presence and abundance at locations where plants were not identifiable from the surface.

Point-Intercept Surveys in Big Elk Lake

Freshwater Scientific Services conducted three point-intercept plant surveys for Big Elk Lake in 2022 using the point-intercept survey method described by Madsen (1999). These included pretreatment and posttreatment point-intercept surveys in the treated portion of the lake (69 points, 40-m spacing; required for DNR grant), and a late-summer lakewide point-intercept survey (344 points, 65-m spacing) to establish a baseline of the lake's entire plant community.

For each of these surveys, we generated a grid of sample points and then navigated to each point on the indicated survey dates. At each designated sample location, we collected plants using a double-headed, 14-tine rake on a rope. For each rake sample, we dragged the rake over the lake bottom for approximately 5 ft before retrieving. Retrieved plants were piled on top of the rake head and assigned density scores from 1 to 4 based upon rake head coverage for each individual species and for all plants collectively.

We calculated the percentage of points where we found plants (% occurrence) for each encountered plant species, as well as survey-wide community metrics (page 7).

Results & Management Context

Rush, Briggs, & Julia

During the 2022 surveys, we did not find any areas of EWM in the northern three lakes of the chain (Briggs, Julia, or Rush; map on page 4). This strongly suggests that the past management in Rush Lake successfully controlled EWM and kept it from expanding into Briggs and Julia.

Big Elk Lake

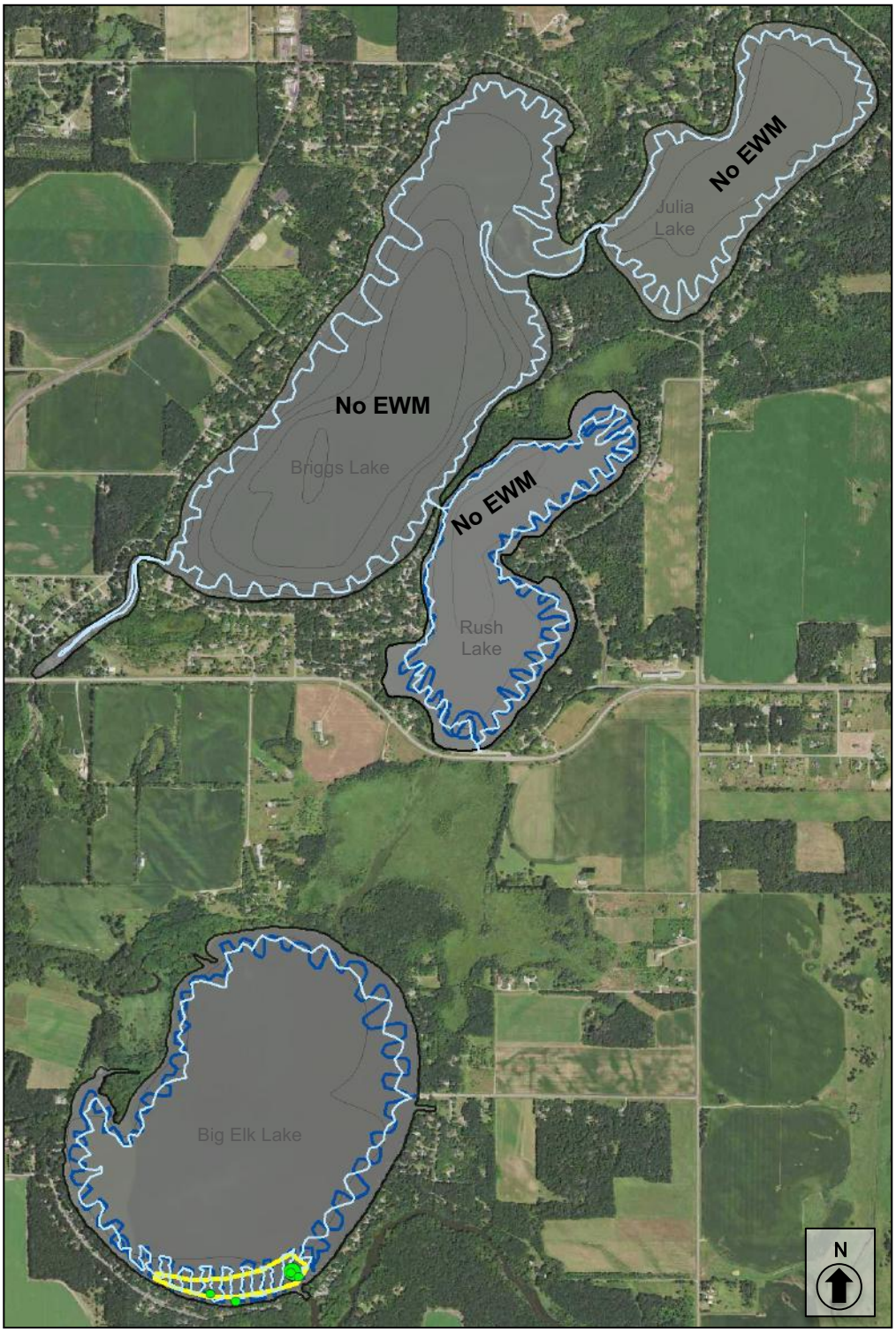
Between 2020 and 2021, the area of EWM in Big Elk Lake expanded from a few isolated patches to sporadic EWM plants found throughout a 10-acre portion of the southern end of the lake (all very light growth). This expansion prompted a herbicide treatment of 10.4 acres in late August of 2021, and the lake received a DNR control grant in 2022 to continue monitoring and management in this area.

During the June pretreatment survey, we found only a few areas of very light EWM growth; a small patch near the outlet on the southeast shore, and a few individual EWM plants immediately next to shore on the far south end of the lake (map on page 4). Although this suggests that the 2021 treatment successfully contained the expansion of EWM, a small amount of regrowth occured. Given the proximity of this area of regrowth to the lake's outlet, water flow at that site in 2021 may have reduced herbicide contact time. Although we did not find widespread EWM in 2022, the DNR allowed us to treat the same 10.4 acres again in July of 2022 to help ensure that any remaining EWM was controlled. During the posttreatment (August) point-intercept survey and September lakewide EWM search, we did not find any EWM anywhere in the lake. The DNR grant requires additional followup monitoring in 2023 to further track the effectiveness of the herbicide treatment.

Lakewide Aquatic Plant Community

We found very little plant growth during the lakewide August survey (pages 7-8). Based upon our work on the lake in past years, this near lack of vegetation is typical and is likely due to a combination of very low water clarity, very firm sandy sediments, and carp activity. Although we do not expect plant abundance to increase substantially without an improvement in water clarity, this survey establishes a useful baseline for future comparisons.

Briggs Lake Chain
2022 Eurasian Watermilfoil Search & Delineation Surveys



June Survey

Sept Survey

EWM Density

1 *(single plants)*

2 *(denser patch)*

Treated Plot *(10.4 ac)*

Surveyed: June/Sept 2022
Methods: Visual, Sonar, Rake
Surveyor: JA Johnson

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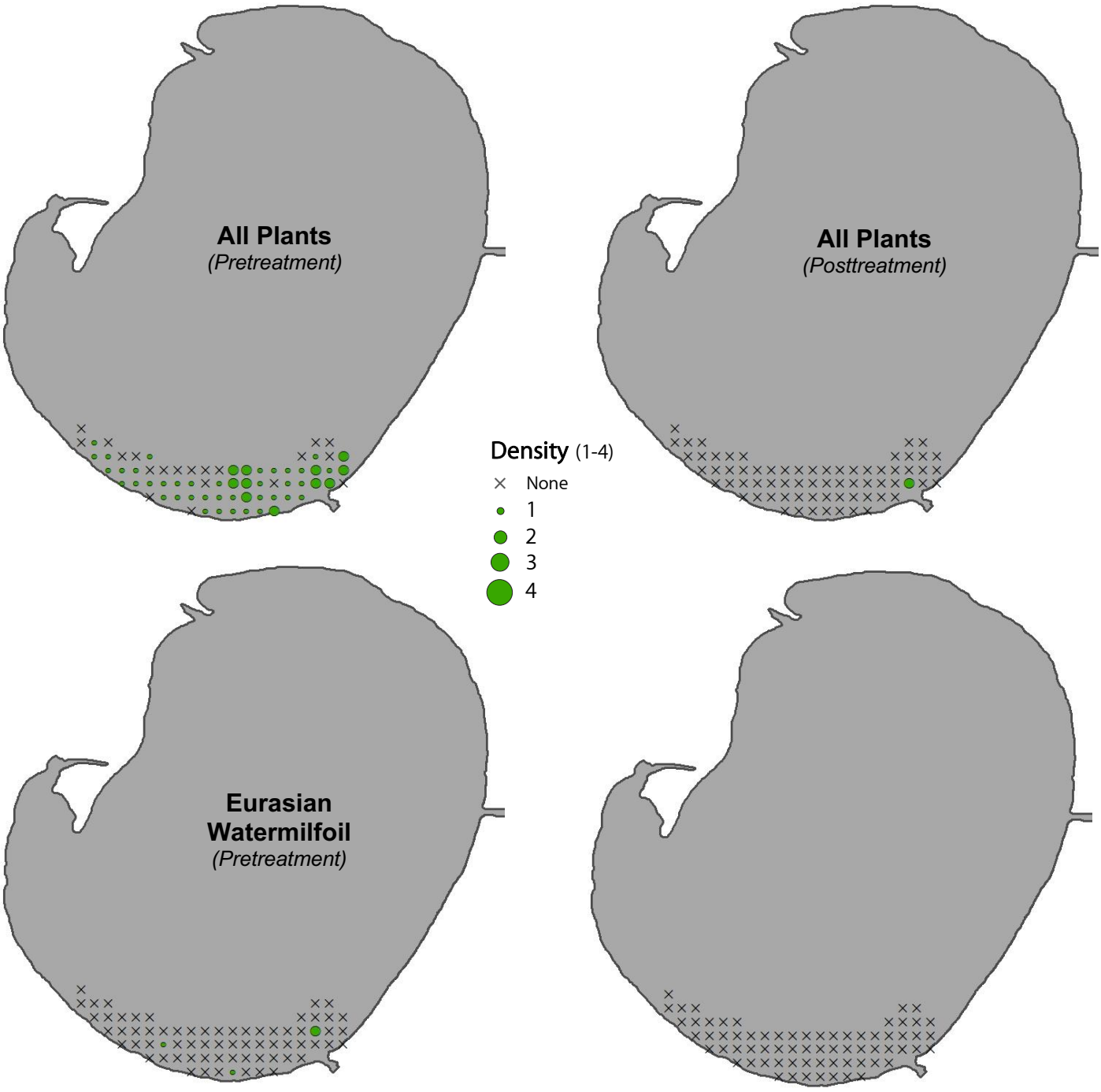
Big Elk Lake
2022 Pretreatment & Posttreatment Point-Intercept Surveys (treated area)



Surveyed: June 23 & Sept 14, 2022
Methods: Visual, Sonar, Rake
Surveyor: JA Johnson

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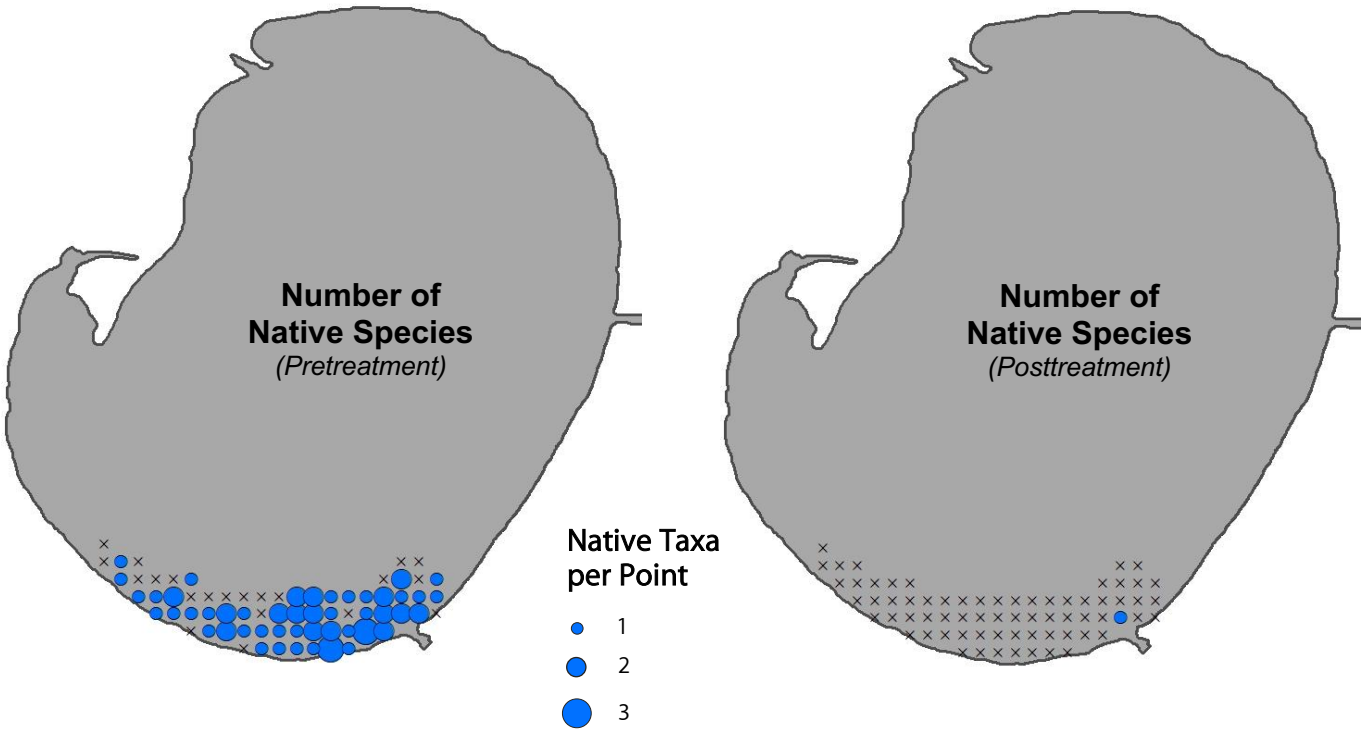
Big Elk Lake
2022 Pretreatment & Posttreatment Point-Intercept Survey (in plot only)



Pre/Post Comparison

Given that we found many EWM plants in the late summer of 2021, it appears that EWM is able to tolerate the low water clarity by growing to the surface. The complete lack of EWM in the 2022 posttreatment survey suggests that the treatments successfully controlled EWM in the lake.

Based upon past observations in Big Elk Lake and results from the 2022 lakewide point-intercept survey (see pages 7 and 8), the lake typically has very little vegetation in most summers due to the very low water clarity, sandy/rocky sediment, and carp activity. Although the maps above indicate that native plant abundance and diversity decreased greatly between the pre and posttreatment surveys, it is difficult to parse out the degree to which this decrease is attributable to the herbicide treatment and how much is attributable to the natural decrease typically seen by late summer. We may get a better idea of the impact on native plants next spring when we conduct another pretreatment point intercept survey.

Surveyed: June 23 & Sept 14, 2022
Methods: Visual, Sonar, Rake
Surveyor: JA Johnson

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Big Elk Lake
2022 Lake-Wide Point-Intercept Aquatic Plant Survey

Summary of Inputs & Results

Lake	Big Elk
Date Surveyed	8/23/22
Surveyor	JA Johnson

WHOLE BASIN		
Basin Area	359.4	acres
Total Points Sampled	344	points
% Points Vegetated	1.7	%
Max Depth of Growth (Observed)	1.3	ft
Max Depth of Growth (95%)	1.3	ft
# Points shallower than MaxDOG95	6	points
Area Vegetated	6.8	acres
% Basin Area Vegetated	1.9	%
% Points Surface-Matted	0.9	%
Area Surface-Matted	3.1	acres
% Basin Area Surface-Matted	0.9	%
LITTORAL ZONE		
Littoral Zone Boundary Depth	15	ft
Littoral Area	359.4	acres
% Littoral	100.0	%
Littoral Points Sampled	344	points
% Littoral Points Vegetated	1.7	%
Littoral Area Vegetated (Thiessen)	6.8	acres
% Littoral Area Vegetated (Thiessen)	1.9	%
% Littoral Points w/ Native Submersed	2%	%
Mean Vegetation Density Score	0.02	
Littoral Mean Depth	5.0	ft
Littoral Volume	1803.8	acre-ft
Mean Littoral Plant Height	0.0	ft
Littoral Plant Biovolume	0.1	acre-ft
Littoral % Biovolume	0.0	%

	Taxon	Common	%Occ
Pnod	Potamogeton nodosus	Long-leaf pondweed	0.6
Ecan	Elodea canadensis	Canadian waterweed	0.3
Hdub	Heteranthera dubia	Water stargrass	0.3
Pfri	Potamogeton friesii	Fries' pondweed	0.3
Spec	Stuckenia pectinata	Sago pondweed	0.3
Cdem	Ceratophyllum demersum	Coontail	Present
Nfle	Najas flexilis	Slender naiad	Present
Lmin	Lemna minor	Small duckweed	0.3
Nodo	Nymphaea odorata	White waterlily	Present
Sacu	Schoenoplectus acutus	Hardstem bulrush	Present

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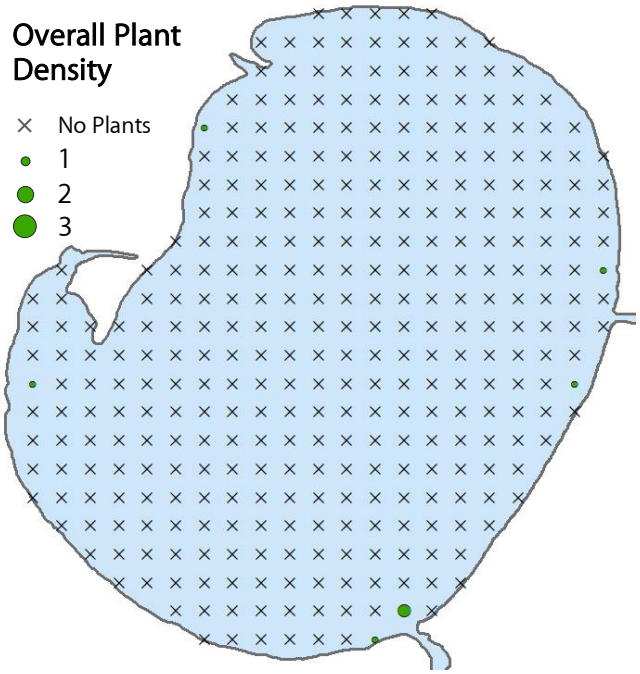
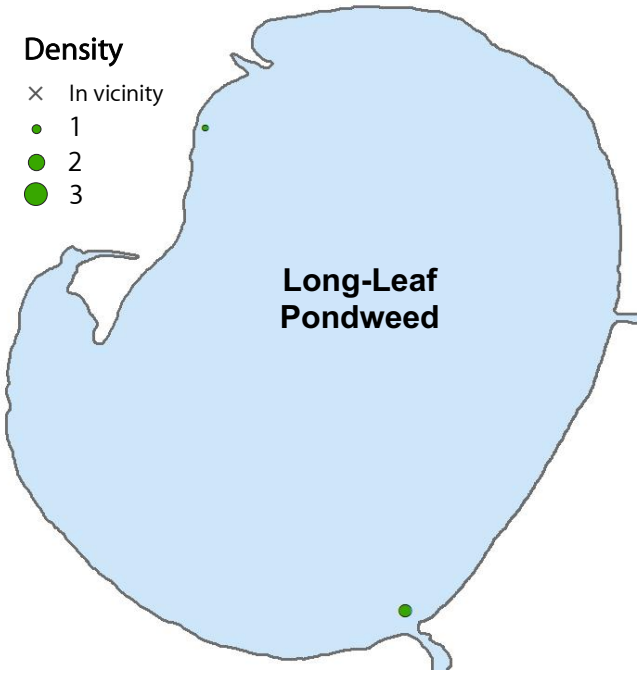
COMMUNITY METRICS	
Total Number of Taxa	10
• Submersed Taxa	7
• Floating Taxa	2
• Emergent Taxa	1
Number of Invasive Taxa	0
Number of Native Taxa	10
• Native Submersed Taxa	7
• Native Floating Taxa	2
• Native Emergent Taxa	1
Mean Native Taxa per Point	0.02
Mean Native Submersed Taxa per Point	0.02
Number of Sensitive Taxa (for AMCI)	1
Simpson Diversity	81.6
FQI	16.4
Mean Coeff of Conservatism	5.2
Aq Macrophyte Community Index (AMCI)	30.0

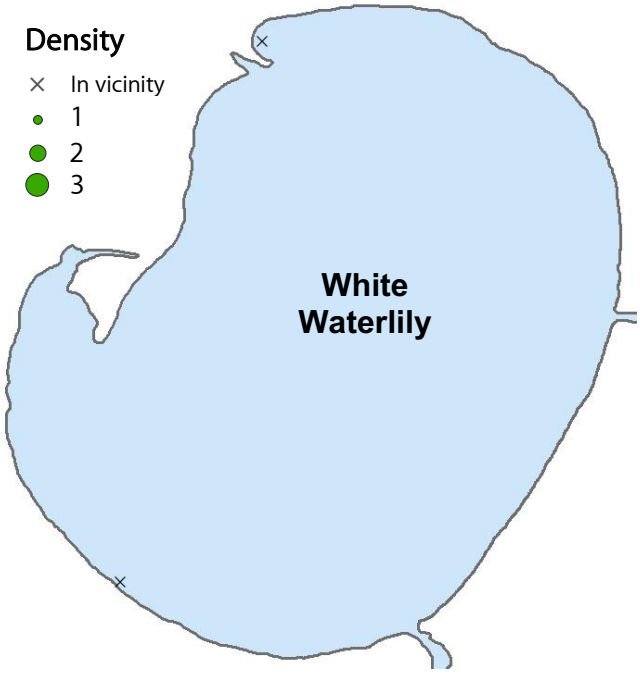
Technically, we did not find Eurasian watermilfoil during the 2022 lakewide point-intercept survey. However, it was found during the pretreatment delineation survey.

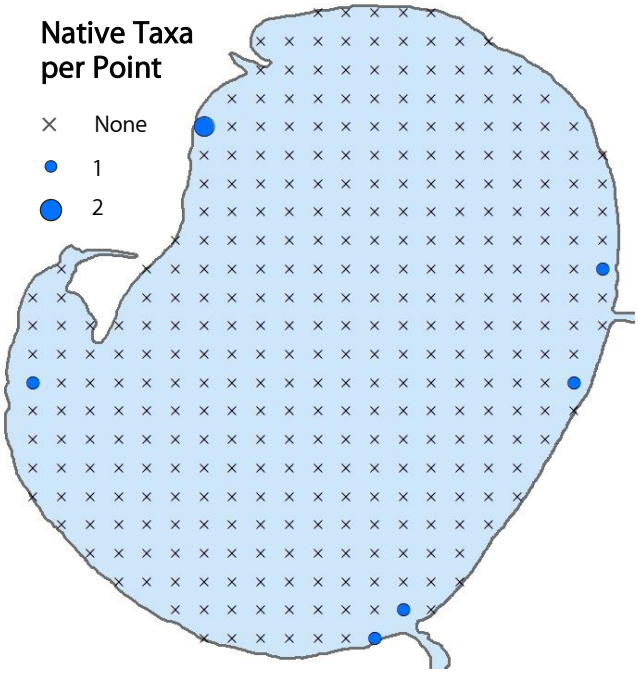
These metrics are largely based upon the number and type of plant species found. Given the near lack of plant growth in the lake, these values are misleading and suggest that the lake has a fairly diverse plant community. For the 2022 survey, these metrics should be largely ignored. If the amount of plant growth increases in the future, these metrics would provide a better assessment of the plant community.

Big Elk Lake
2022 Lake-Wide Point-Intercept Aquatic Plant Survey









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Online Resources & Contacts

Minnesota Administrative Rules for Aquatic Plant Management
https://www.revisor.mn.gov/rules/?id=6280

Minnesota DNR – Aquatic Plant Management Regulations & Permit Application Forms
http://www.dnr.state.mn.us/apm/index.html

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