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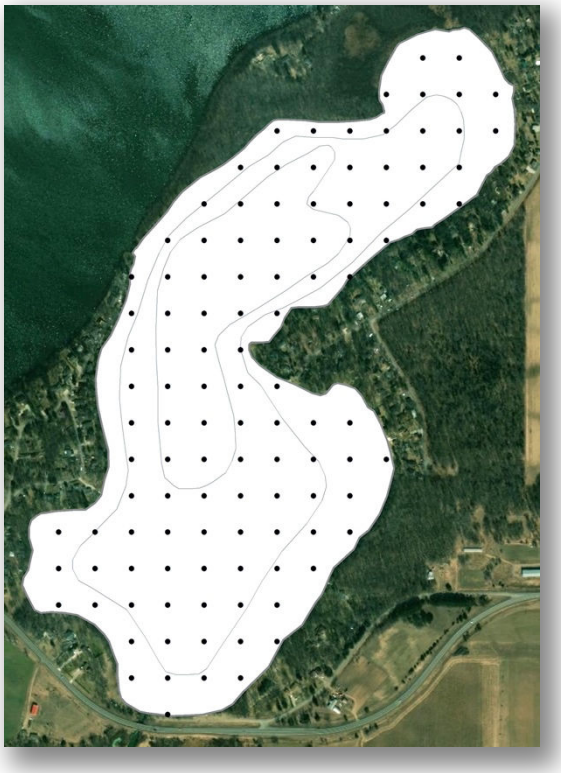
Aquatic Plant Community of Rush Lake: 2023

Rush Lake *(#71-0147)*
Sherburne County, MN

Surveyed July 31, 2023



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

Certified Lake Manager
www.NALMS.org

Funding Provided by:
Three Lake Improvement District – Clear Lake, MN

Survey & Analysis Methods

Point-Intercept Survey

Freshwater Scientific Services, LLC surveyed plants in Rush Lake on July 31, 2023 using the point-intercept method described by Madsen (1999). This survey incorporated assessments at a total of 112 sample points (all littoral; ≤15 ft) arranged in a uniform grid (75-m spacing; Figs 1 and 2). We generated these sample points using desktop GIS software to project a grid of points over an aerial images of the lake. We then loaded the selected sample locations onto a handheld GPS unit (Garmin GPSMAP-78) for navigation to each point while in the field.

At each designated sample location, we collected plants using a double-headed, 14-tine rake on a 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 (Table 3) for each individual species and for all plants collectively.

We calculated the littoral frequency (≤15 ft, % occurrence) and littoral mean density score (plant abundance) for each encountered plant species (Table 1), as well as lake-wide and littoral community metrics (Table 2). We also used desktop GIS software to map the distribution and abundance of plants in the lake (pages 5–11). Additional species that were observed floating or growing in the vicinity of a sample point but not retrieved on the rake were given a rating of zero for that location. These "zero" species were noted as being present on the plant distribution maps (shown as an "X"), but "zero" ratings were excluded from calculations of plant community metrics and statistics (not treated as denoting presence). At each location, we also documented water depth and overall plant height.

Figure 1. Designated sample locations for the 2023 Rush Lake plant survey.

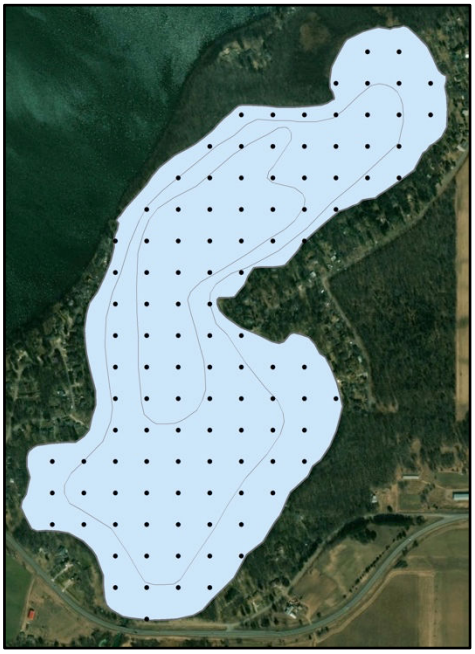
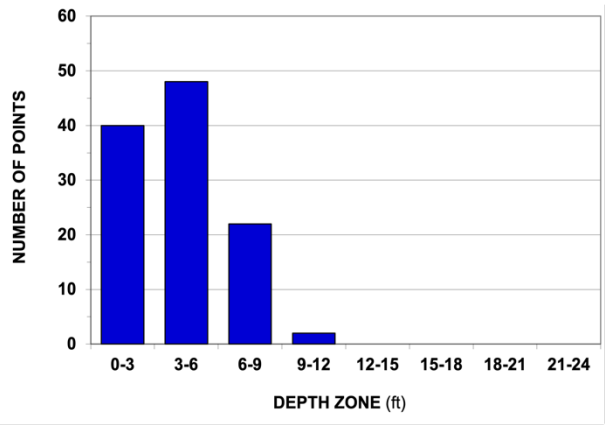


Figure 2. Sampling effort (number of locations sampled) within successive 3-ft depth zones



Results

Statistical Summary of Findings

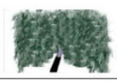
Table 1. Littoral frequency (% occurrence) and abundance (mean density score) of plant species found in Rush Lake (Sherburne Co., MN) during the 2023 survey. *% Occurrence* and *Mean Density* (1-4 scale) were calculated using all littoral points (water depth ≤15 ft).

PLANT TAXA	COMMON NAME	% OCCUR	MEAN DENSITY
ALL TAXA (combined)		**85**	**1.9**
SUBMERSED TAXA			
Ceratophyllum demersum	Coontail	80	1.5
Elodea canadensis	Canadian waterweed	32	0.4
Najas flexilis	Slender naiad	21	0.3
Heteranthera dubia	Water stargrass	19	0.2
Stuckenia pectinata	Sago pondweed	16	0.2
Potamogeton pusillus	Small pondweed	12	0.1
Myriophyllum sibiricum	Northern watermilfoil	9	0.1
Chara sp.	Muskgrass	7	0.1
Potamogeton crispus	Curly-leaf pondweed	3	<0.1
Potamogeton richardsonii	Clasping-leaf pondweed	1	<0.1
Vallisneria americana	Wild celery	1	<0.1
FLOATING TAXA			
Wolffia columbiana	Common watermeal	10	0.1
Lemna minor	Small duckweed	9	0.1
Nymphaea odorata	White waterlily	8	0.1
Spirodela polyrhiza	Large Duckweed	7	0.1
EMERGENT TAXA			
Schoenoplectus acutus	Hardstem bulrush	P	–
Typha sp.	Cattail	P	–

Table 2. Summary of Rush Lake plant community metrics from 2023 survey.

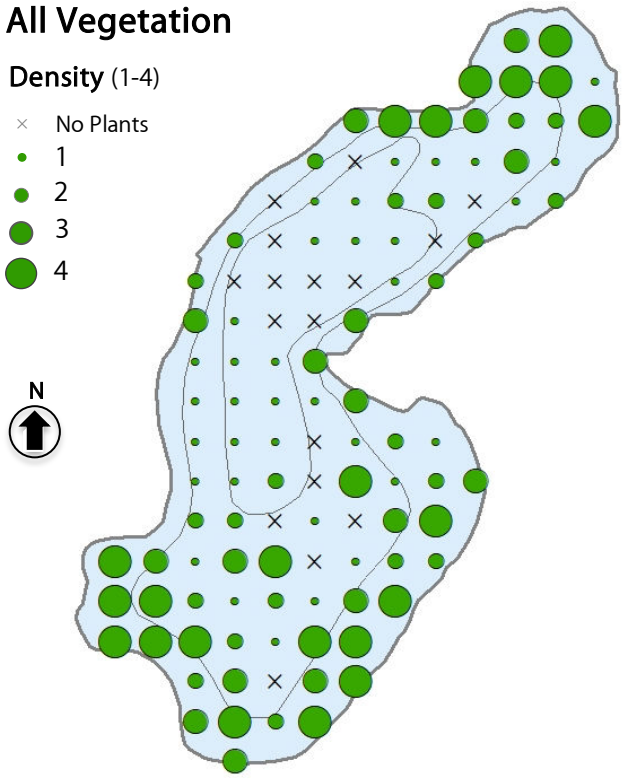
	RUSH LAKE
WHOLE-LAKE METRICS	**2023**
Lake Area (acres)	160
Total Points Sampled	112
% Points Vegetated	85%
% Points Veg. to Surface	25%
Max Depth of Growth (95%)	6.9 ft
Native Submersed Taxa	10
Native Floating/Emergent Taxa	6
Non-Native Submersed Taxa	1
LITTORAL METRICS *(≤15 ft)*	
Littoral Area (acres)	160
Littoral Points Sampled	112
% Littoral Points Vegetated	85%
Mean Plant Height (ft)	1.1
% of Max Littoral Biovolume	22%
Mean Native Taxa / Point	2.3
Simpson's Diversity ((1-D)*100)	83
Floristic Quality (FQI)	16.8
AMCI Score (Nichols et al. 2000)	33.0

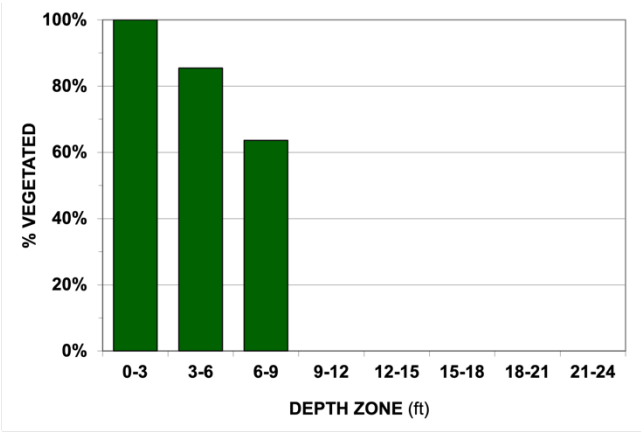
Table 3. Overview of rake density scores used to document plant abundance during point-intercept surveys.

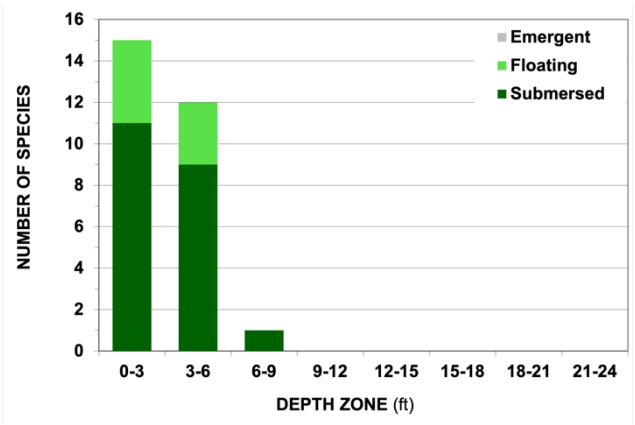
Density Score	Rake Coverage	Description
1		Only a few plants retrieved
2		Full length of rake head covered, but tines only partially covered
3		Plants completely cover the rake head and tines
4		Enough plants to cover rake head and tines multiple times

Rush Lake – Aquatic Plant Community

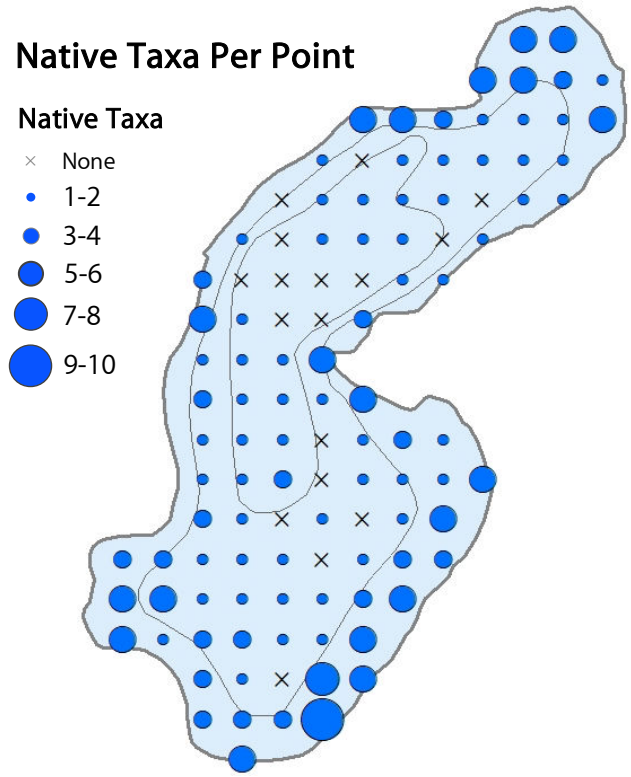
All Vegetation







Native Taxa Per Point



Surveyed: July 31, 2023
Methods: Rake, Sonar
Surveyor: JA Johnson

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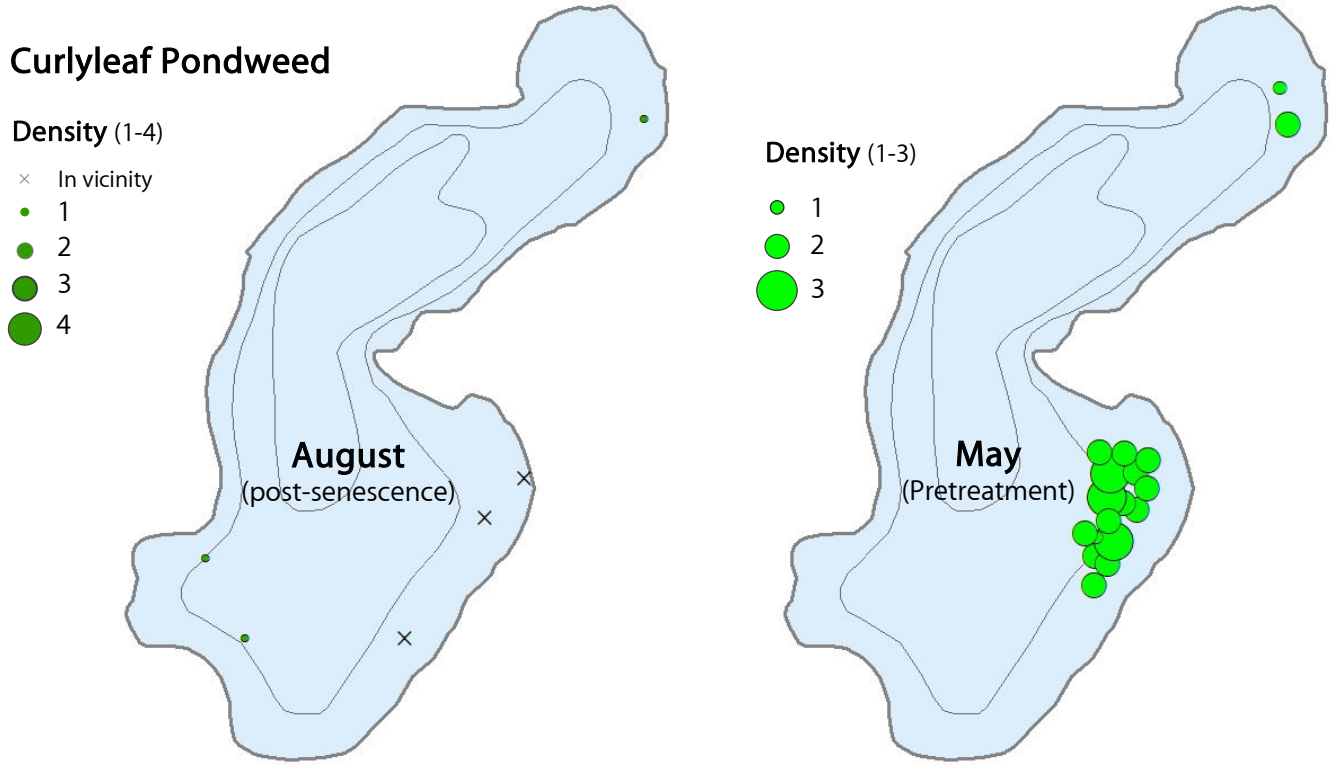
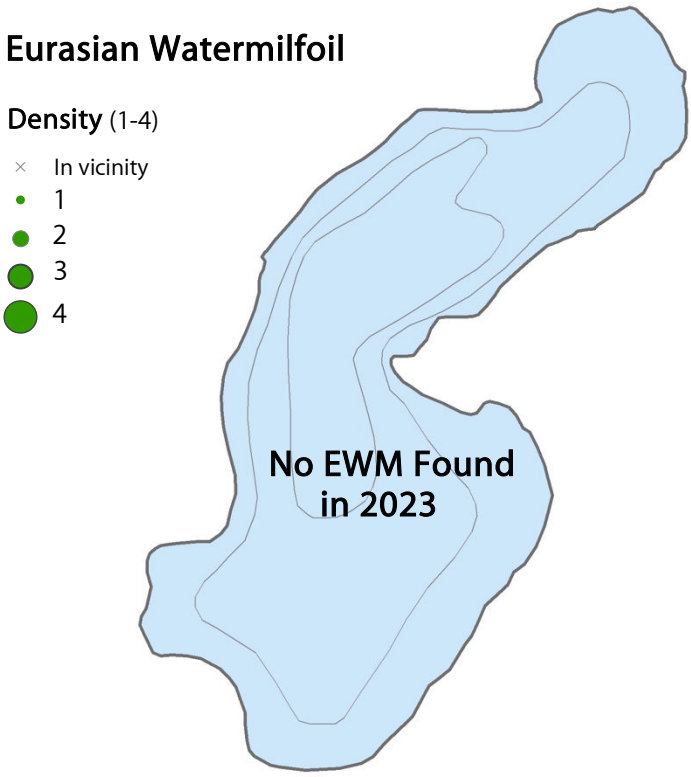
Rush Lake – Invasive Aquatic Plants

Curlyleaf Pondweed

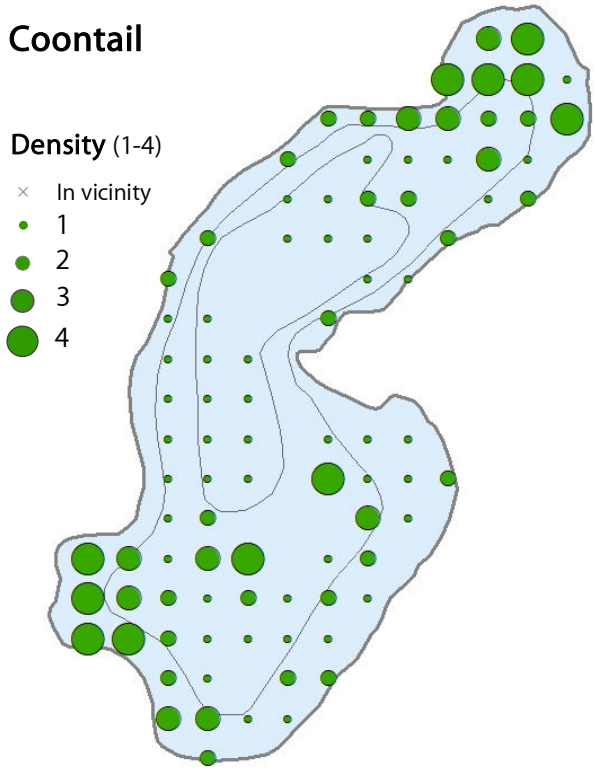


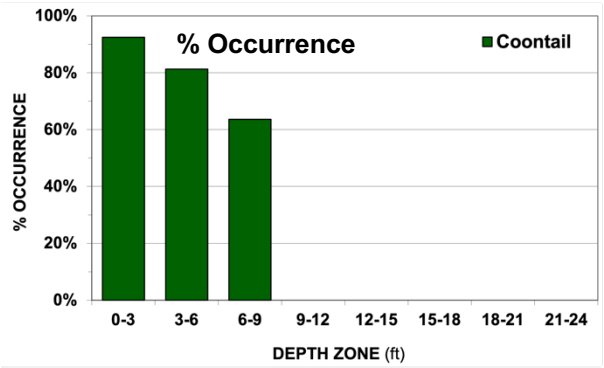
Eurasian Watermilfoil

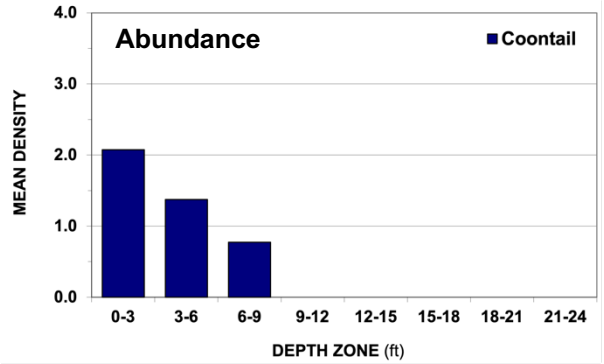


Rush Lake – Native Aquatic Plants

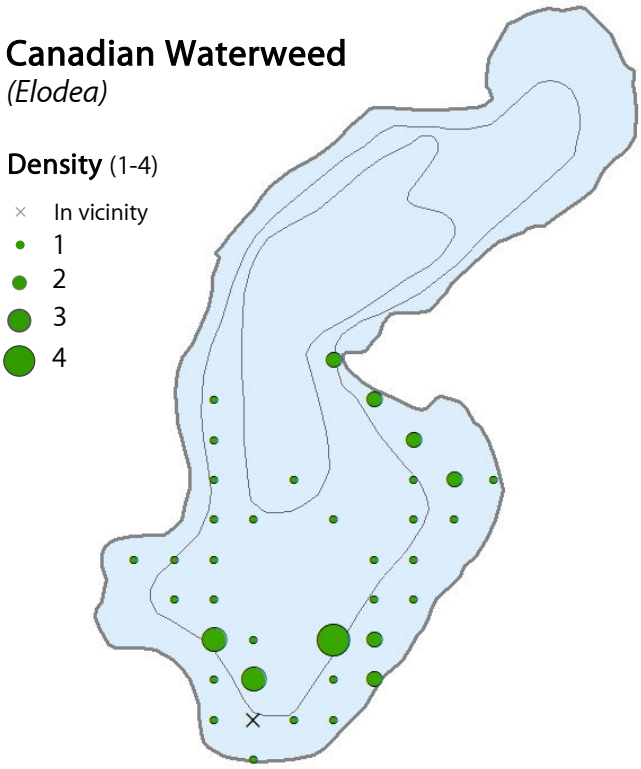
Coontail

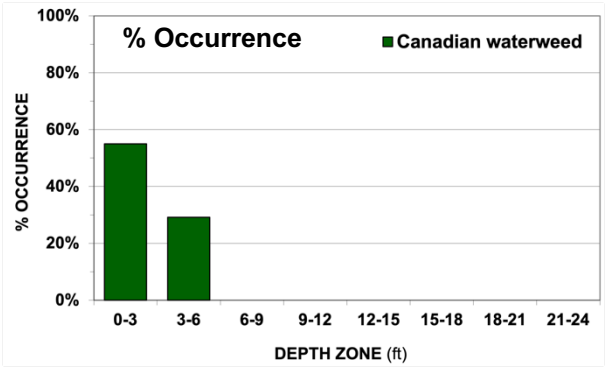


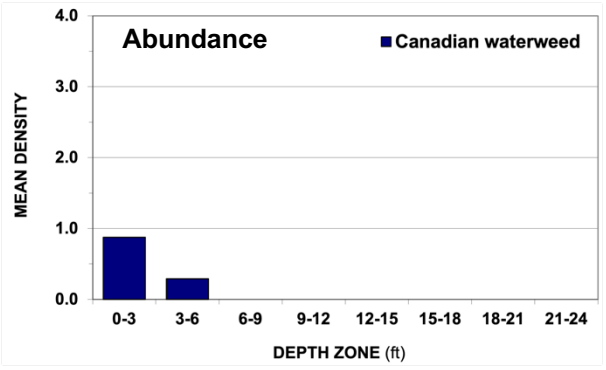




Canadian Waterweed
(Elodea)





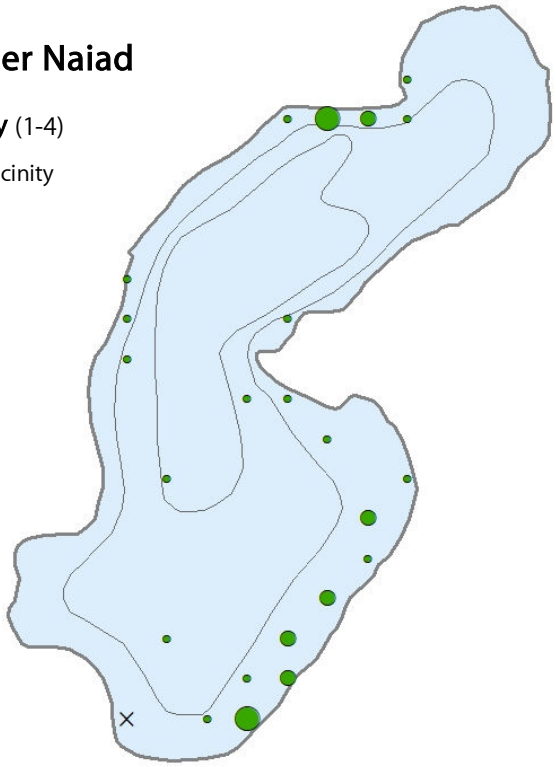


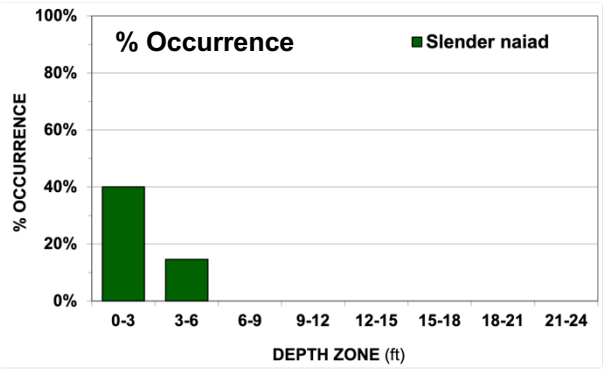
Rush Lake – Native Aquatic Plants

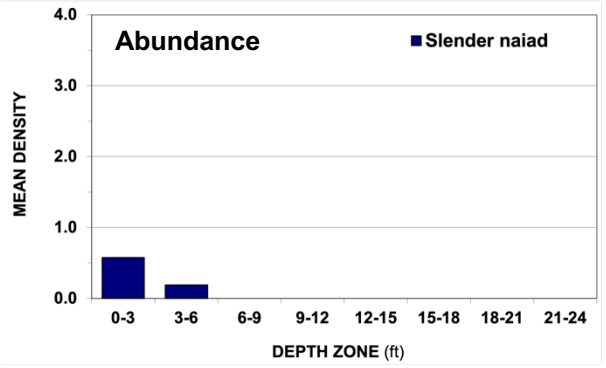
Slender Naiad

Density (1-4)

- In vicinity
- 1
- 2
- 3
- 4



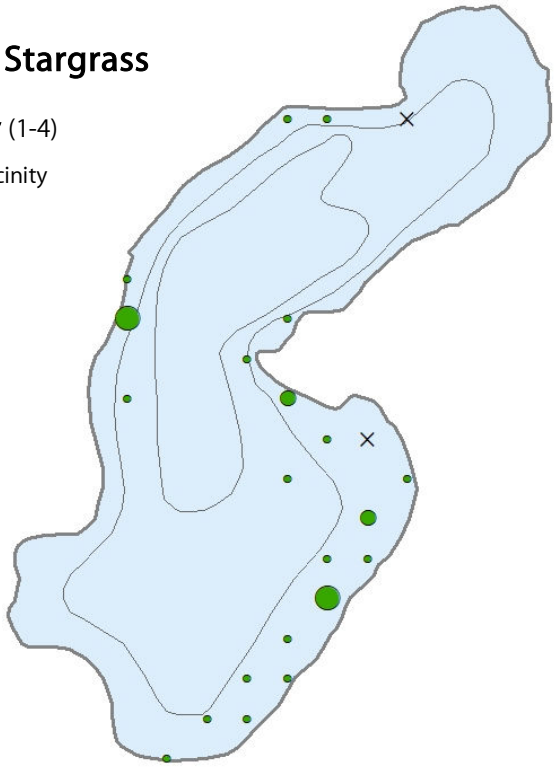


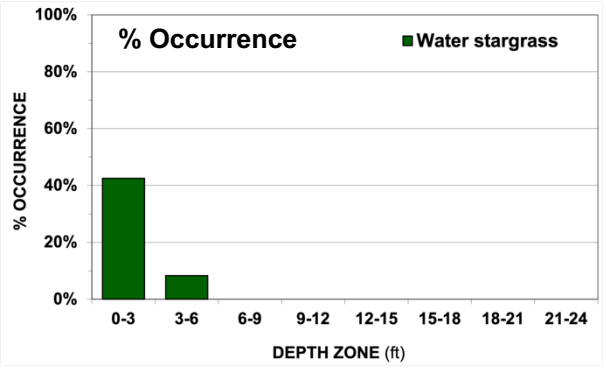


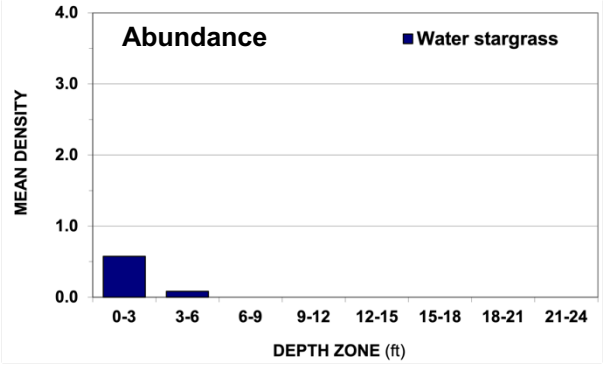
Water Stargrass

Density (1-4)

- In vicinity
- 1
- 2
- 3
- 4

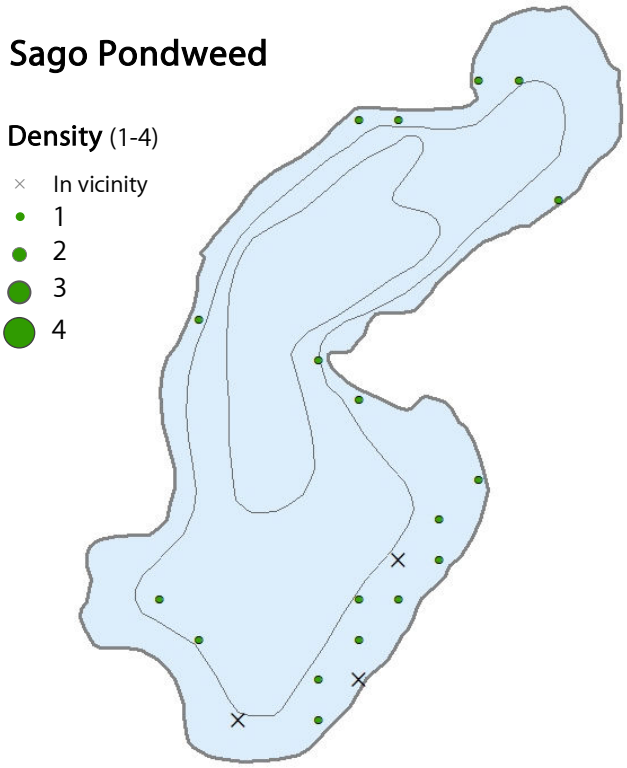




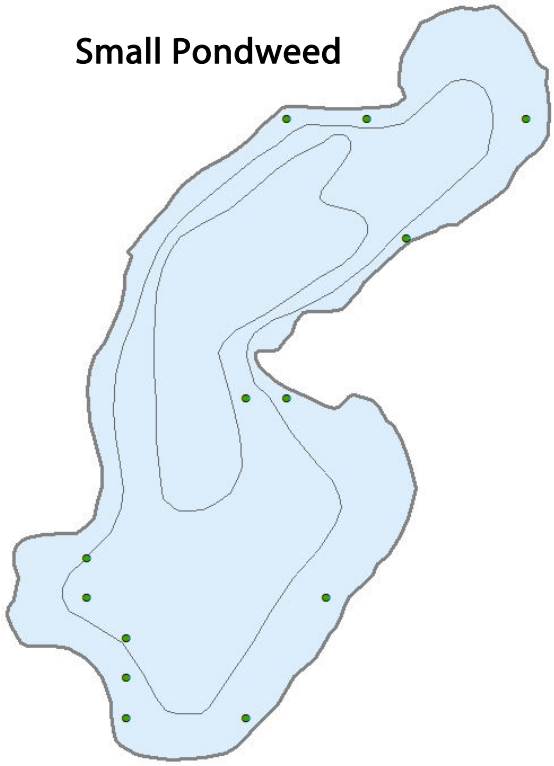


Rush Lake – Native Aquatic Plants

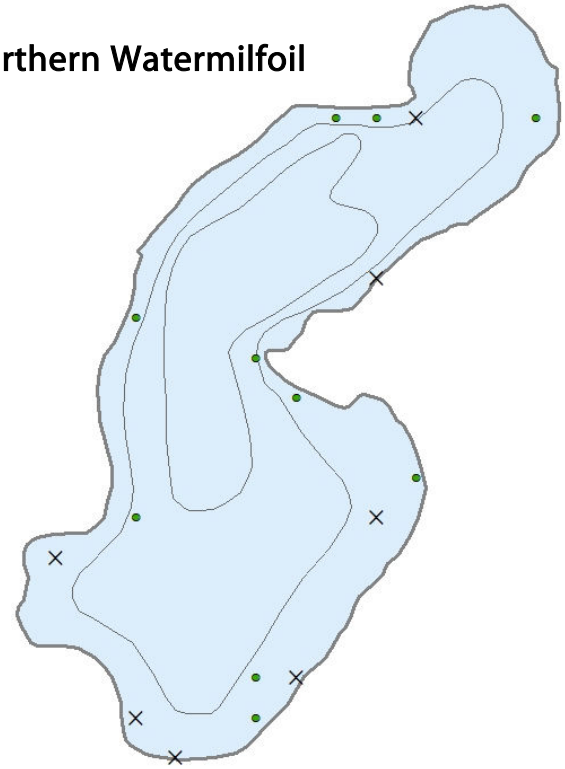
Sago Pondweed



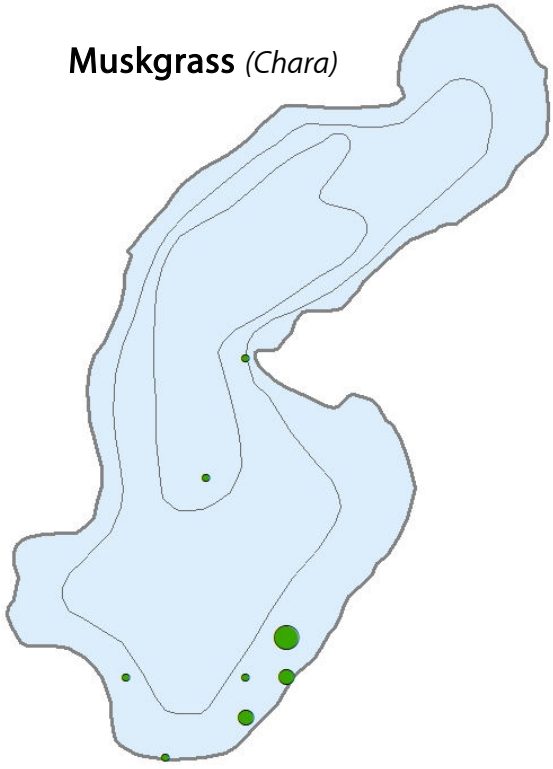
Small Pondweed



Northern Watermilfoil

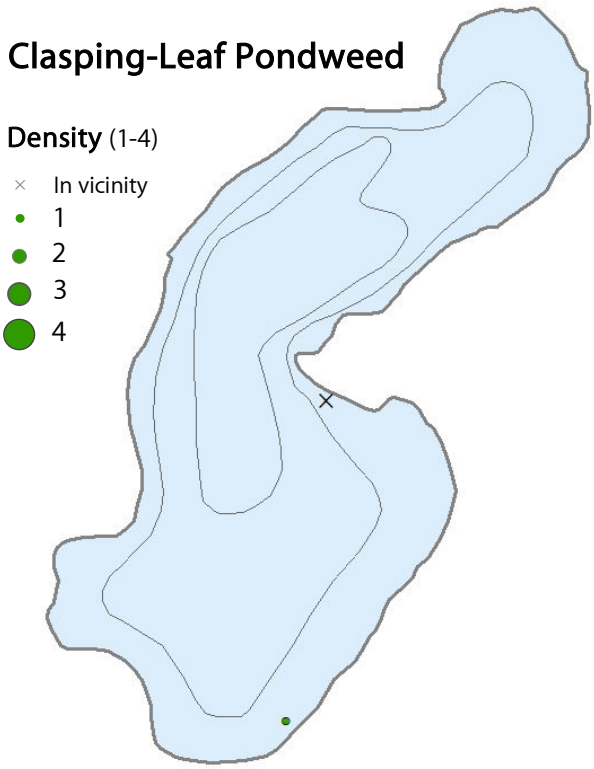


Muskgrass *(Chara)*

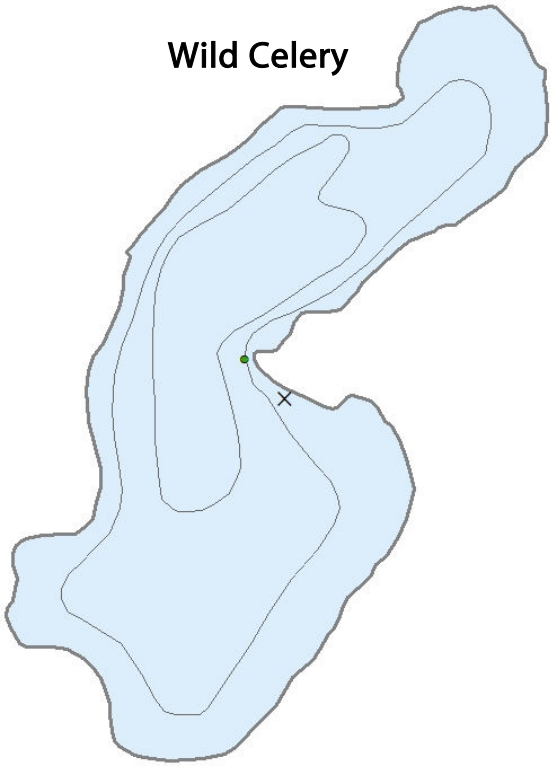


Rush Lake – Native Aquatic Plants

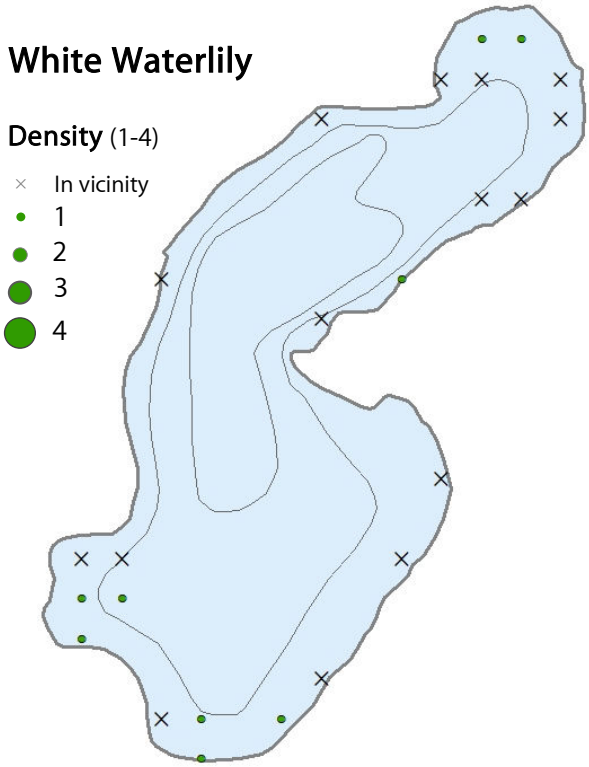
Clasping-Leaf Pondweed



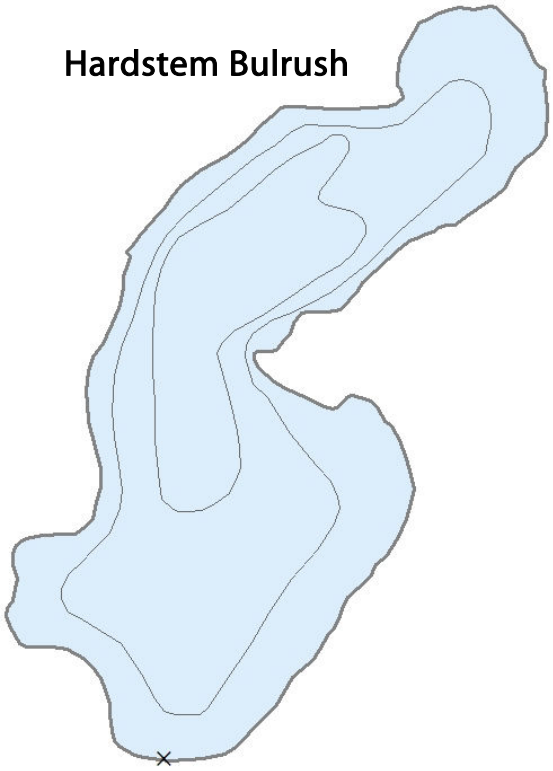
Wild Celery



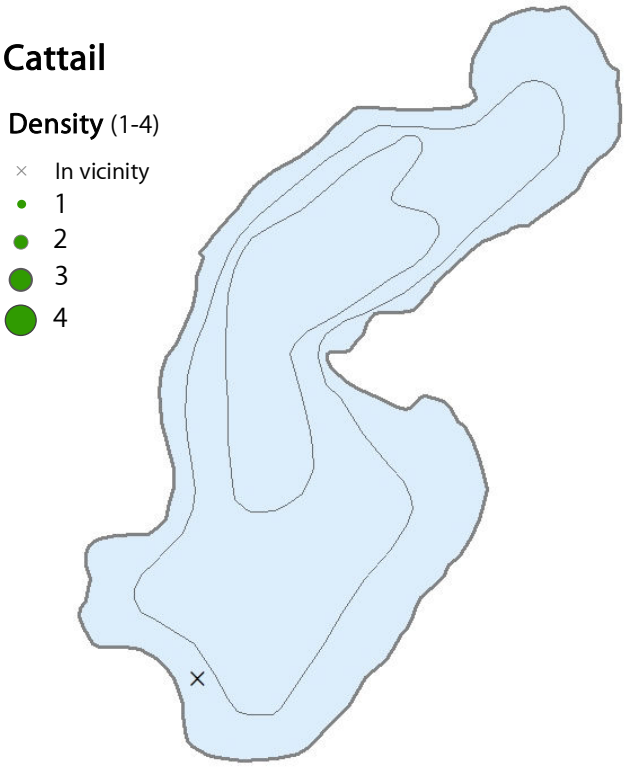
White Waterlily



Hardstem Bulrush



Rush Lake – Native Aquatic Plants



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Nichols SA, Weber S, Shaw B. 2000. A proposed aquatic plant community biotic index for Wisconsin Lakes. Env Manage 26: 491-502.