Aquatic Invasive Species Consulting Services

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Aquatic Plant Survey Report
Big Pine Lake (Aitkin Co.)

Point-Intercept Method

August 7, 2026

DOW# 01015700

Field Survey Completed by: Tom Langer

Data Analysis & Report Completed by: Eric Fieldseth

Report Date: August 20, 2026 — Eric Fieldseth, AIS Consulting Services

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Introduction

An aquatic plant point-intercept survey was conducted on Big Pine Lake on August 7, 2026 by AIS Consulting Services. The purpose of the survey was to characterize the aquatic plant community in the lake and look for the presence of invasive aquatic plants. Big Pine Lake is listed as infested with zebra mussels, but no invasive aquatic plants have been observed to date.

Summary of Results

During the survey we observed 26 unique aquatic plant species in the lake, of which 19 were submerged aquatic plant species. No invasive plants were observed during this survey.

Aquatic plants were found growing out to a depth of 23.4 feet. Frequency of occurrence for each species was calculated off of both the legal definition of littoral area, which is up to 15 feet of water, and the actual observed littoral area during the survey which is the depth zone where aquatic plants were found growing, which was 23.4 feet.

There is a good diversity of native aquatic plants in Big Pine Lake, with 14 species being found at greater than 10% of sample points and dominating the aquatic plant community in the lake. The most common species found were Northern watermilfoil, being found at 52.5% of sample points; followed by Flatstem Pondweed (42%), Chara (36.1%), Coontail (34.7%), Variable Pondweed (29.7%), Elodea (28.8%), Clasping Leaf Pondweed (27.4%), Wild Celery (25.1%), Large-leaf Pondweed (22.8%), Water Stargrass (20.6%), Bushy Pondweed (19.6%), Sago Pondweed (18.7%), Robbins Pondweed (17.4%) and Fries Pondweed (14.6%). The remaining 12 species were all found at less than 10% of sample points, with submerged species including Small Pondweed, White-stem Pondweed, Floating-leaf Pondweed, Southern Naiad and Water Marigold. Emergent plants found include White waterlily, Watershield, Bullhead Pondlily, Common Bur-reed, Cattail, Bulrush and Sagittaria.

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Methods

Point-Intercept Survey

Sample points were created in ArcGIS and spaced 65 meters apart across the lake. We uploaded bathymetric contours for the lake from the Minnesota Geospatial Commons and overlayed the sample points. Waypoints that appeared deeper than 30 feet were then deleted, leaving a total of 335 sample points. These sample points were then uploaded to a GPS unit and used to navigate to each sample point in the field. If points were inaccessible due to shallow depth or dense emergent vegetation, 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)*

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Figure 1. Big Pine Lake Point-Intercept Survey Grid, 65 meter spacing (335 sample points)

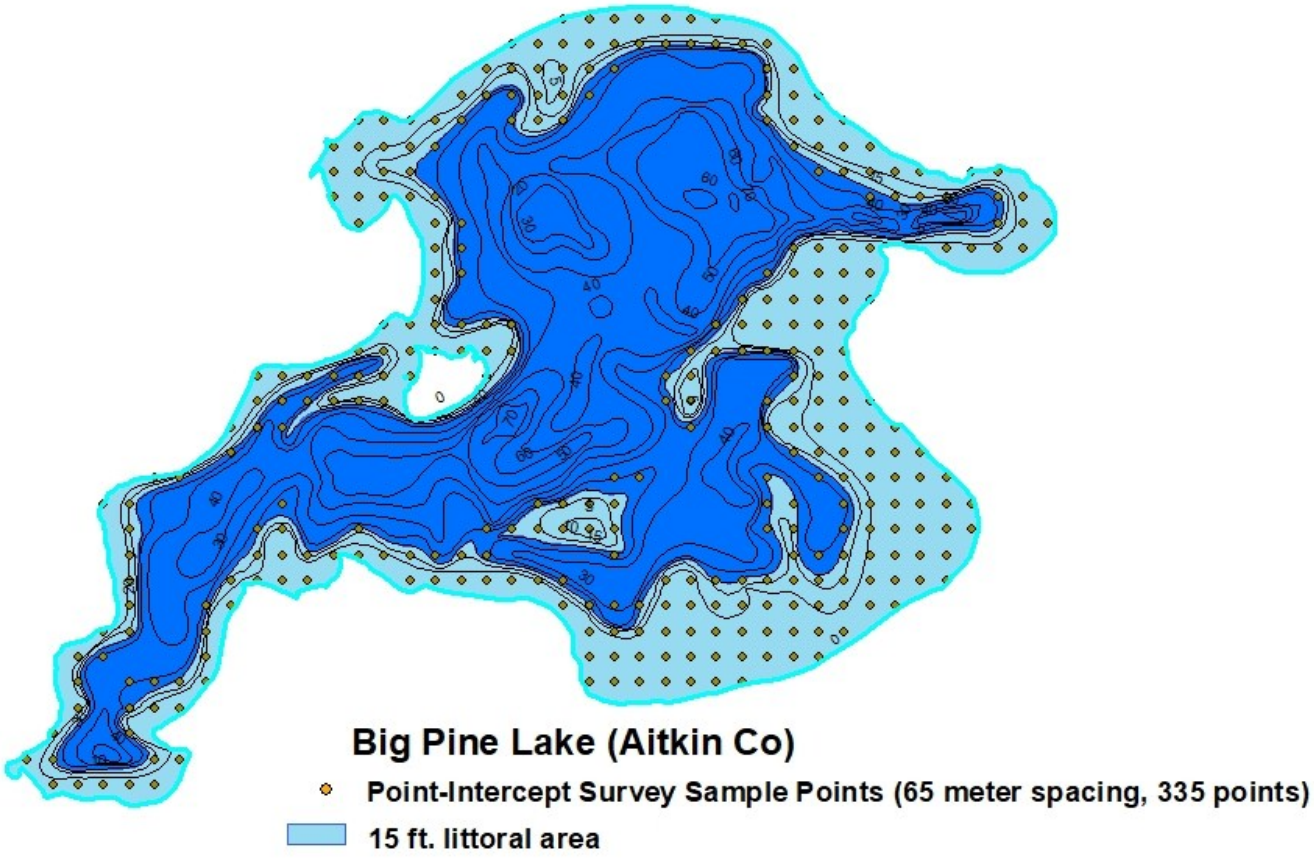

Figure 2. Number of sample points by depth range

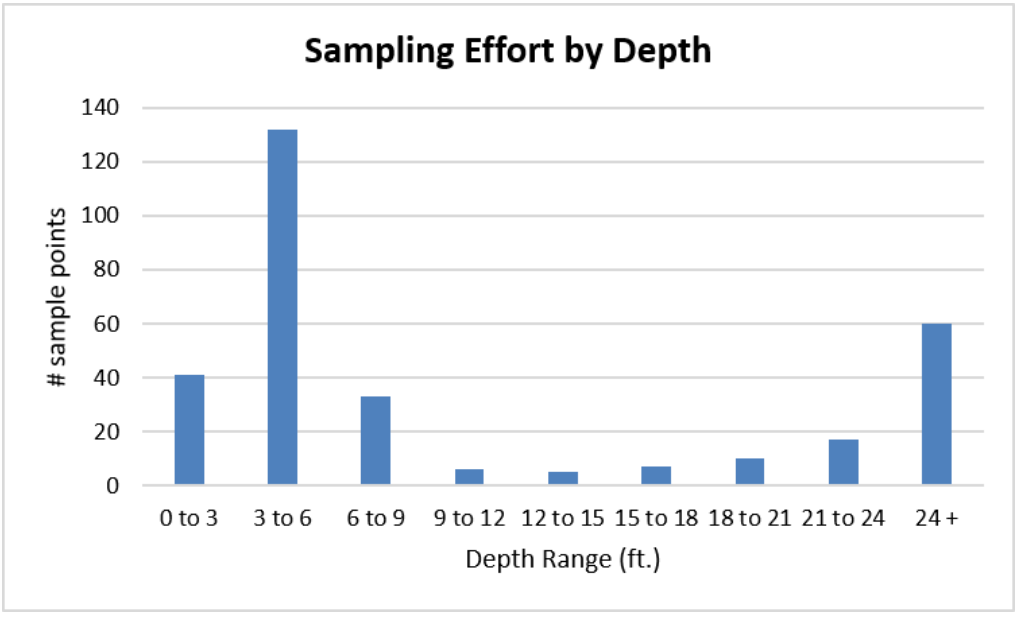

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Figure 3. Summary of aquatic plant community metrics from Big Pine Lake Survey August 7, 2026

Surface Area (acres)	638.03
Littoral Area (≤ 15 ft.) (acres)	259
Maximum Depth (ft.)	78
Number of sample points	335
Points Inaccessible	24
Points Actually Sampled	311
Max. Depth of Plant Growth (ft.)	23.4
Species Richness (all species)	26
Species Richness (submerged plants)	19

	15 ft. littoral	observed littoral (23.4 ft.)
Littoral Points Sampled (≤ 15 ft.)	219	251
% Littoral Points Vegetated	95.4%	93.6%
Mean Number of Native Species/Littoral Point	4.20	3.83
Mean number of Species/Littoral Point	4.20	3.83

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

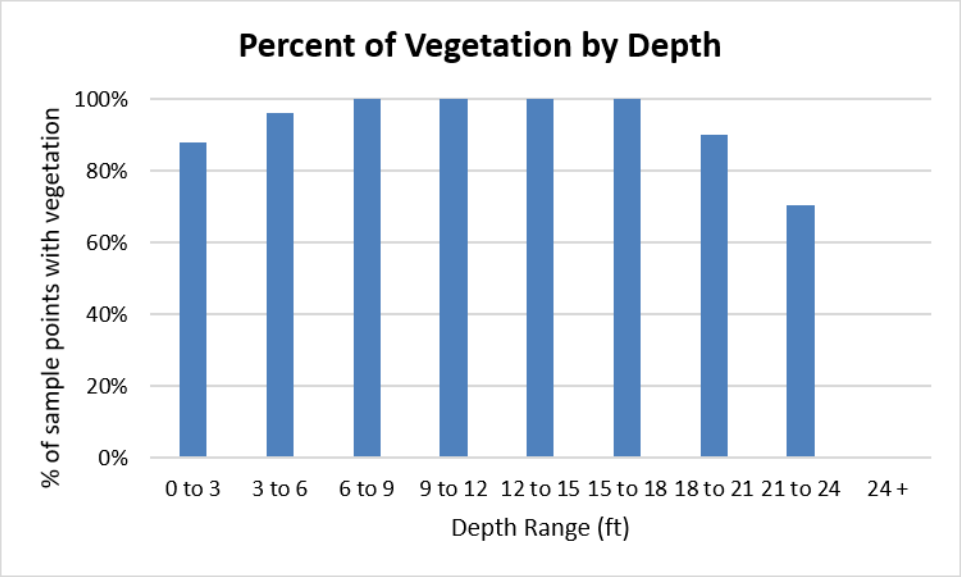

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Figure 5. Overall vegetation density from August 7, 2026 point-intercept survey

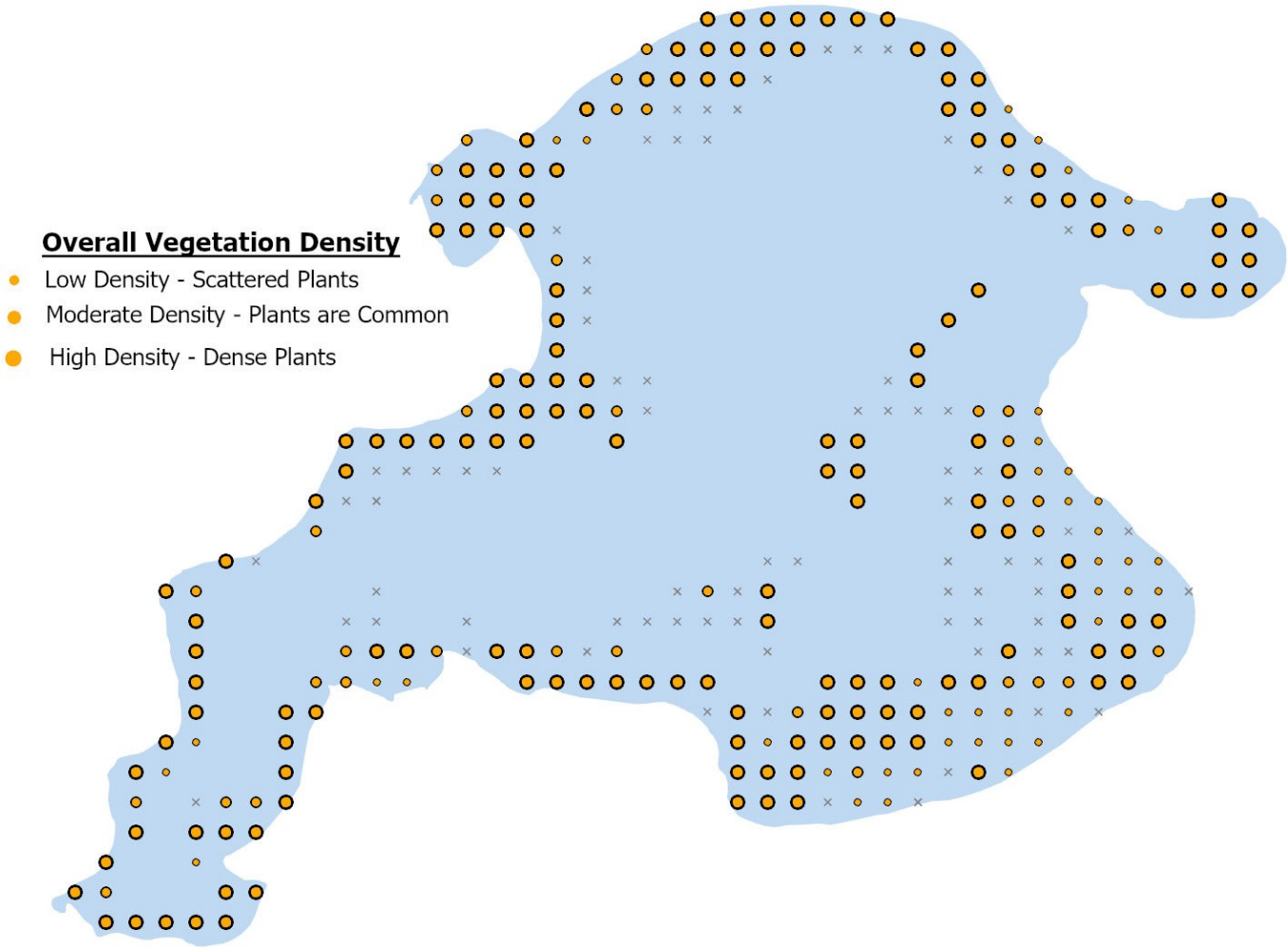

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Figure 6. Percent frequency of occurrence for plant species observed during Big Pine Lake August 2026 point-intercept survey & July 2021 survey.

Calculated using 15 ft. littoral and observed littoral.

		8/7/2026		7/18/2021	
		15 ft. littoral	observed littoral (23.4 ft.)	15 ft. littoral	observed littoral (22 ft.)
Common Name	**Scientific Name**	**% Occurrence**	**% Occurrence**	**% Occurrence**	**% Occurrence**
Submersed Plants					
Northern Watermilfoil	*Myriophyllum sibiricum*	52.5%	48.3%	37.7%	33.8%
Flatstem Pondweed	*Potamogeton zosteriformis*	42.0%	38.3%	30.0%	26.3%
Chara	*Chara sp.*	36.1%	32.9%	33.3%	28.8%
Coontail	*Ceratophyllum demersum*	34.7%	42.1%	14.5%	16.3%
Variable Pondweed	*Potamogeton gramineus*	29.7%	27.1%	13.0%	11.3%
Elodea	*Elodea Canadensis*	28.8%	26.3%	10.1%	8.8%
Clasping Leaf Pondweed	*Potamogeton richardsonii*	27.4%	25.0%	11.1%	9.6%
Wild Celery	*Vallisneria americana*	25.1%	22.9%	13.0%	11.3%
Large-leaf Pondweed	*Potamogeton amplifolius*	22.8%	20.8%	7.7%	6.7%
Water Stargrass	*Heteranthera dubia*	20.6%	18.8%	8.7%	7.5%
Bushy Pondweed	*Najas flexilis*	19.6%	17.9%	4.4%	3.8%
Sago Pondweed	*Stuckenia pectinata*	18.7%	17.1%	5.8%	5.0%
Robbins Pondweed	*Potamogeton robbinsii*	17.4%	15.8%	13.0%	11.7%
Narrow Leaf Pondweed	*Potamogeton sp.*			33.3%	30.4%
Fries Pondweed	*Potamogeton friesii*	14.6%	13.3%		
Small Pondweed	*Potamogeton pusillus*	5.9%	5.4%		
White-stem Pondweed	*Potamogeton praelongus*	5.0%	4.6%	1.5%	1.3%
Floating-Leaf Pondweed	*Potamogeton natans*	0.5%	0.4%		
Southern Naiad	*Najas guadalupensis*	0.5%	0.4%	1.0%	0.8%
Water marigold	*Bidens beckii*	0.5%	0.4%	1.0%	0.8%
Nitella	*Nitella sp.*				1.3%
White water crowfoot	*Ranunculus aquatilis*			1.0%	0.8%
Emergent					
White waterlily	*Nymphaea odorata*	9.6%	8.8%	1.5%	1.3%
Watershield	*Brasenia schreberi*	8.2%	7.5%	4.8%	4.2%
Bullhead Pondlily	*Nuphar variegata*	7.3%	6.7%	1.0%	0.8%
Common Bur-reed	*Sparganium eurycarpum*	Present	Present		
Cattail	*Typha sp.*	Present	Present		
Bulrush	*Schoenoplectus sp.*	Present	Present	present	present
Sagittaria sp.	*Sagittaria sp.*	Present	Present	present	present

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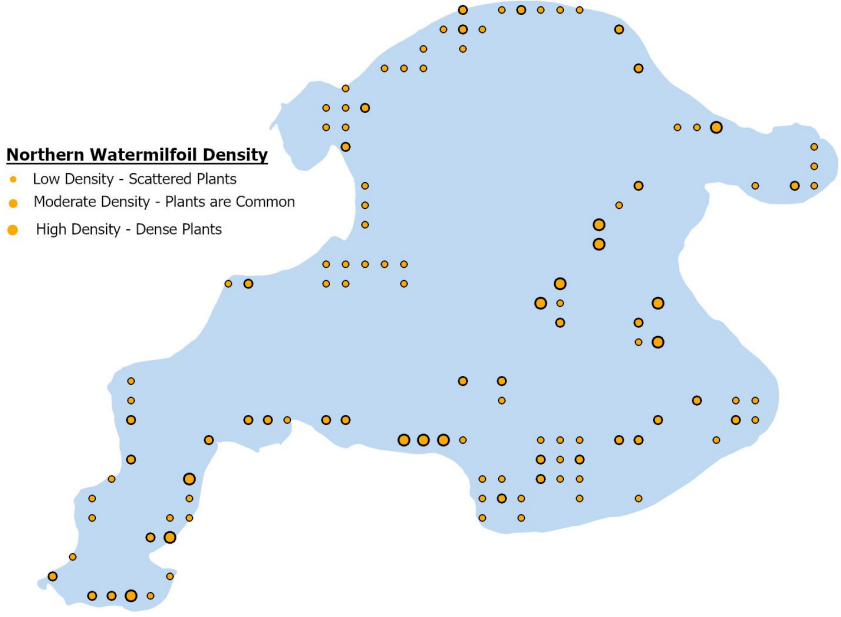
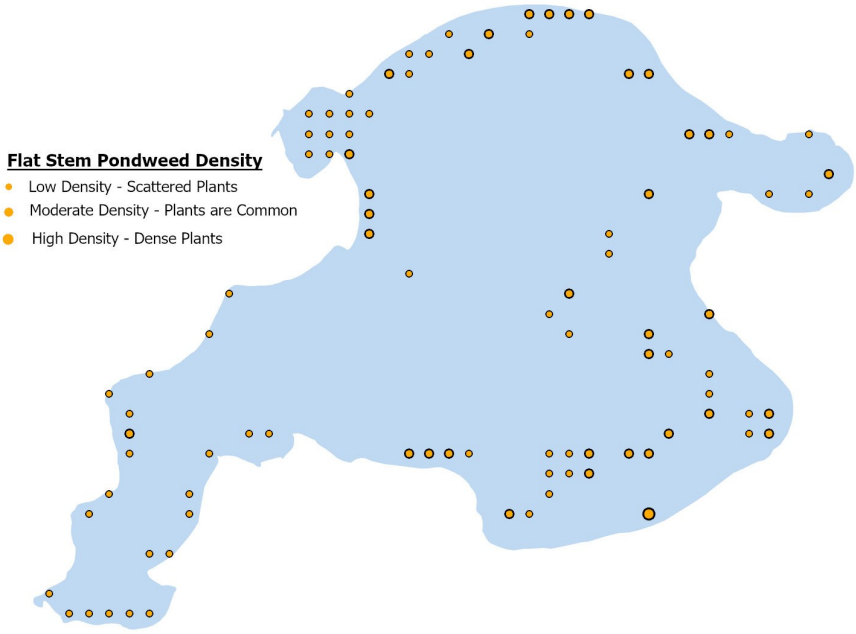
Distribution Maps of Aquatic Plants Observed in Big Pine Lake during August 7, 2026 Point-intercept Survey

Northern watermilfoil (*Myriophyllum sibiricum*)



Flatstem Pondweed (*Potamogeton zosteriformis*)



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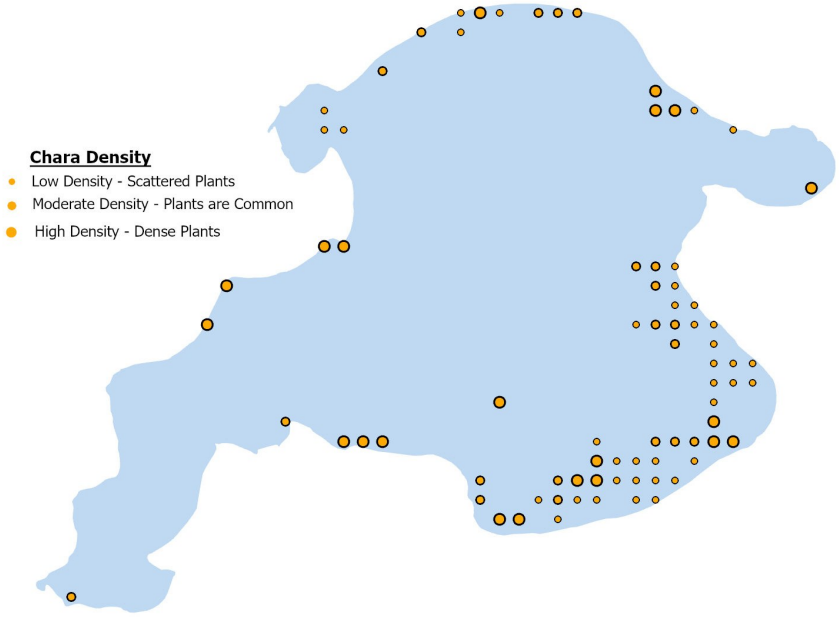
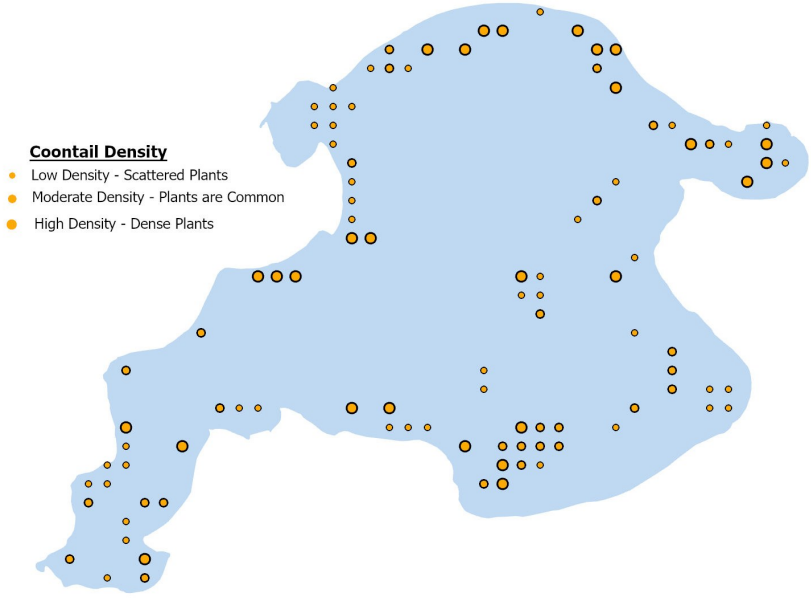
Chara (*Chara sp.*)



Coontail (*Ceratophyllum demersum*)



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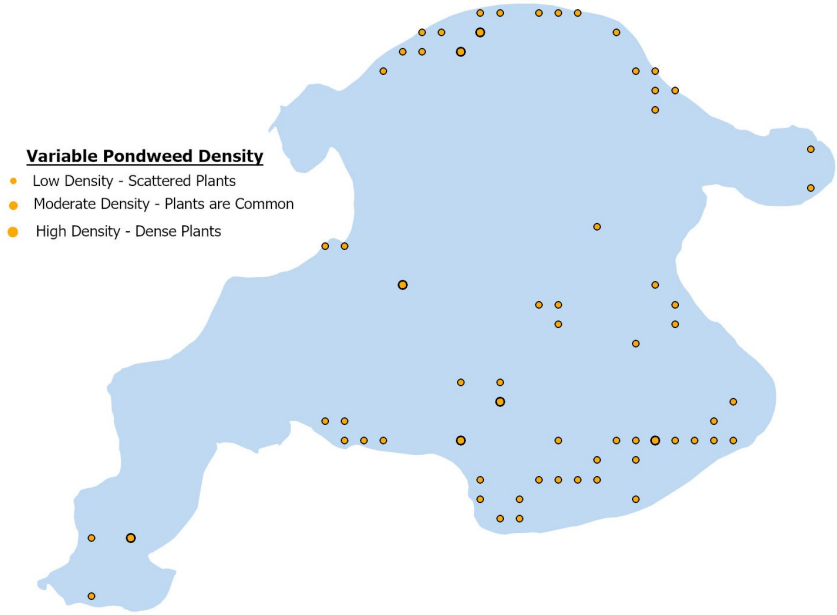
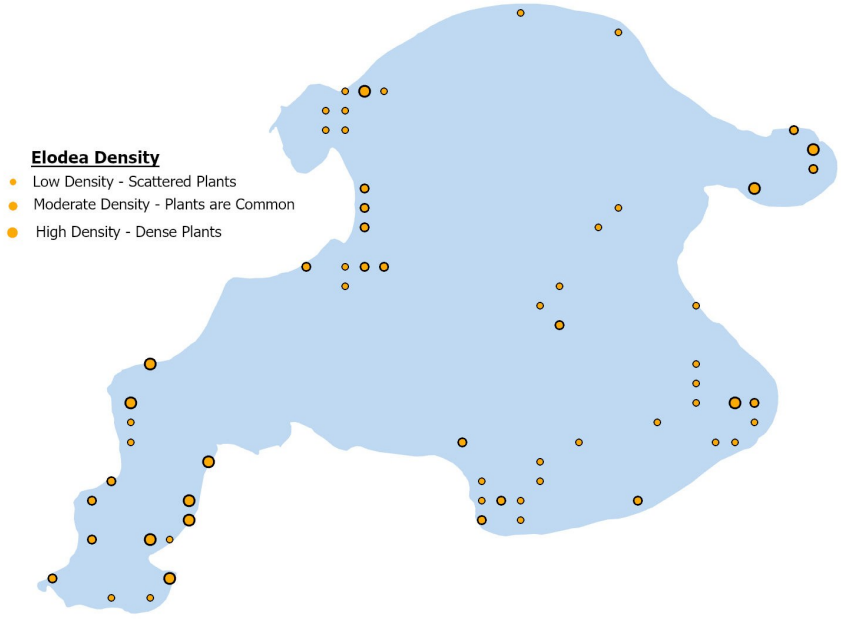
Variable Pondweed (*Potamogeton gramineus*)



Elodea (*Elodea canadensis*)



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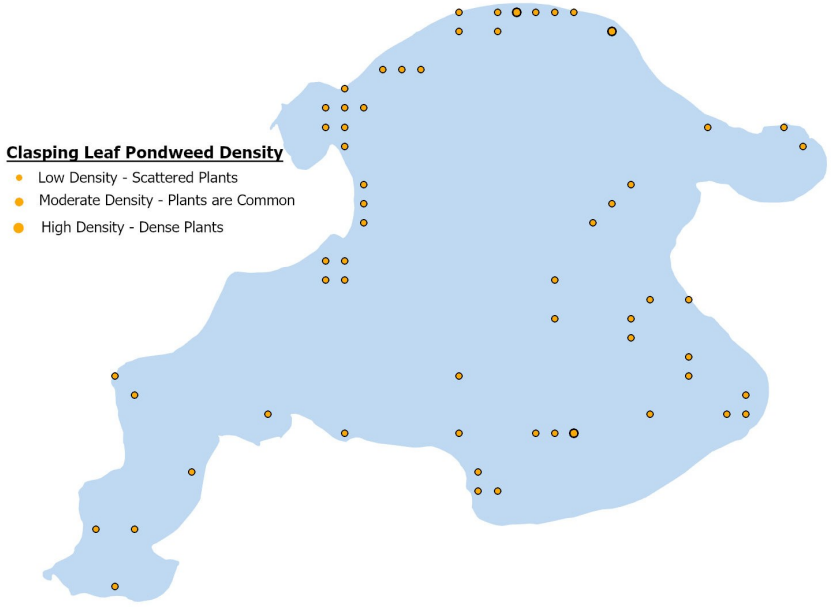
Clasping Leaf Pondweed (*Potamogeton richardsonii*)



Wild Celery (*Vallisneria americana*)

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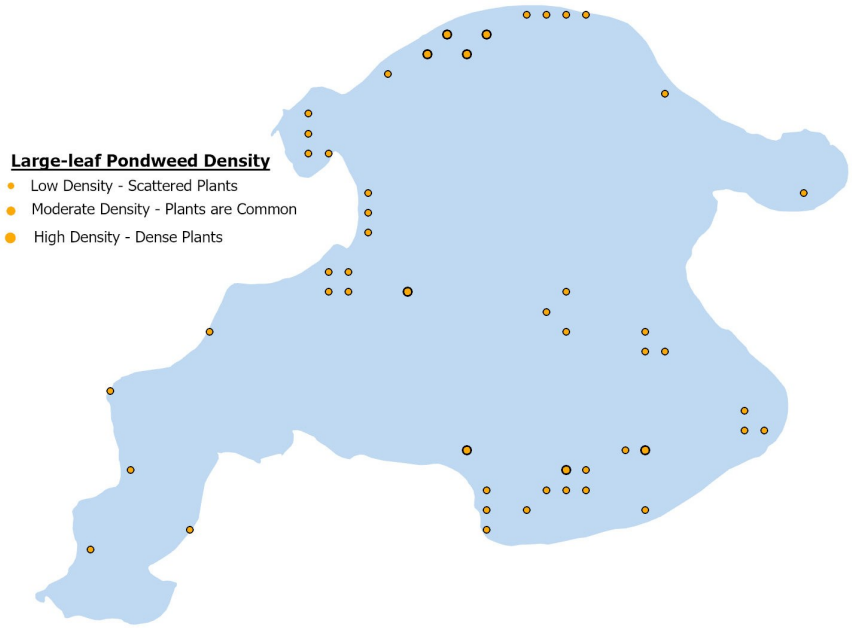
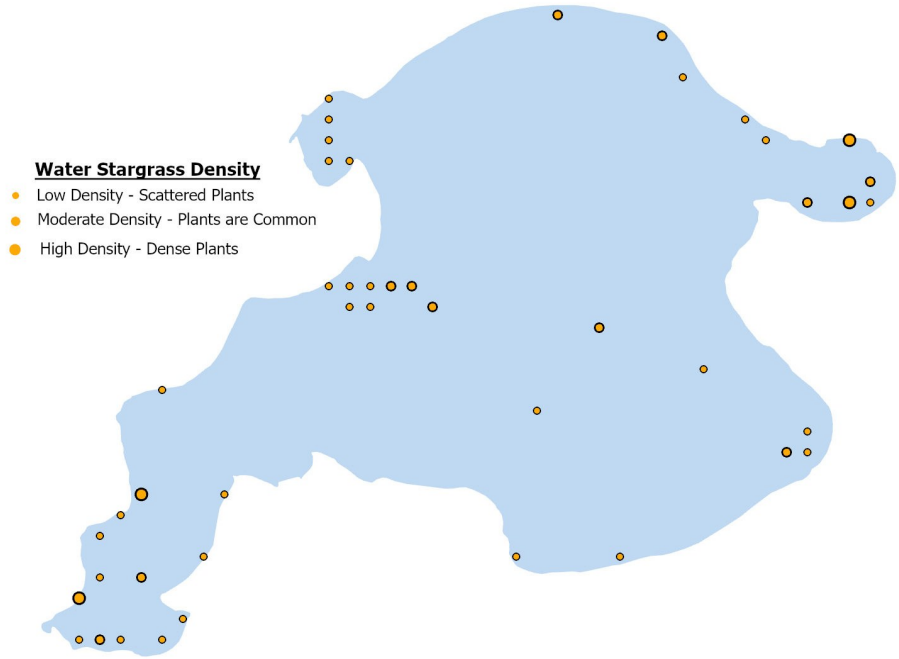
Large Leaf Pondweed (*Potamogeton amplifolius*)



Water Stargrass (*Heteranthera dubia*)



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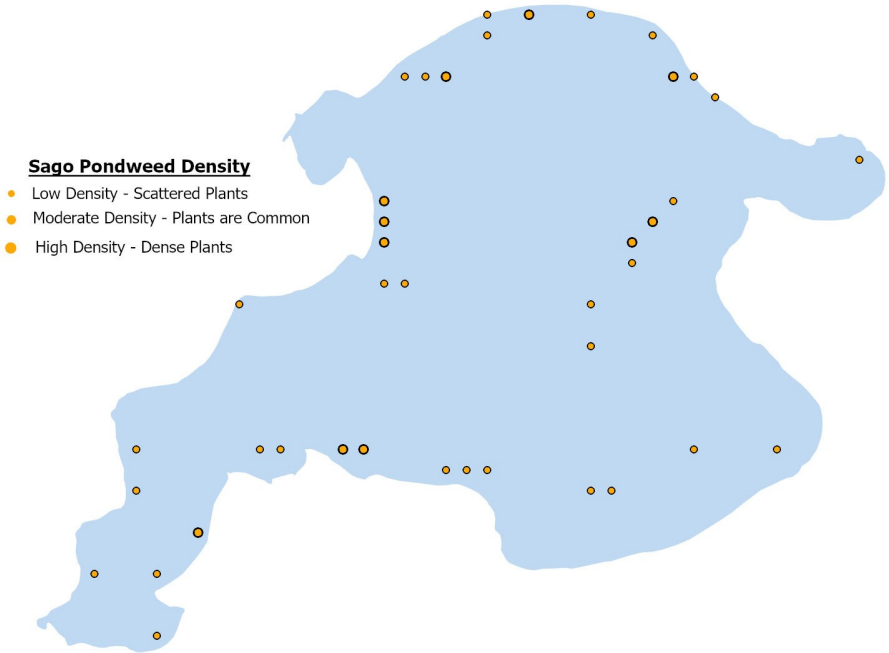
Bushy Pondweed (*Najas flexilis*)

Sago Pondweed (*Stuckenia pectinata*)



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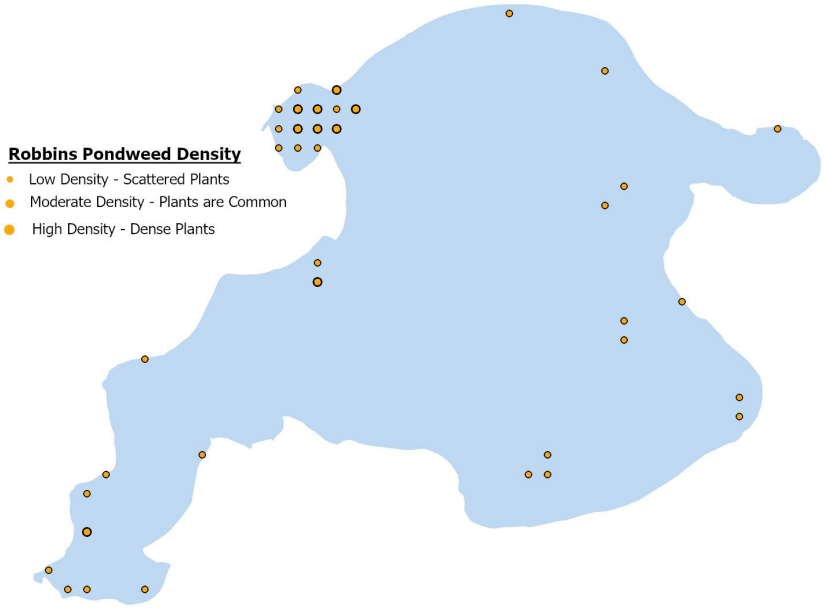
Robbins Pondweed (*Potamogeton robbinsii*)



Fries Pondweed (*Potamogeton friesii*)

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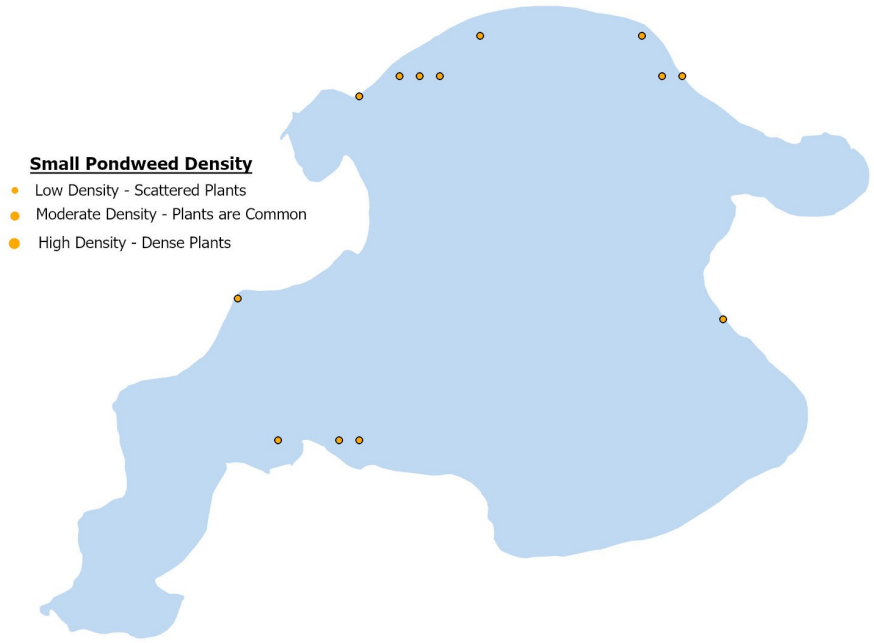
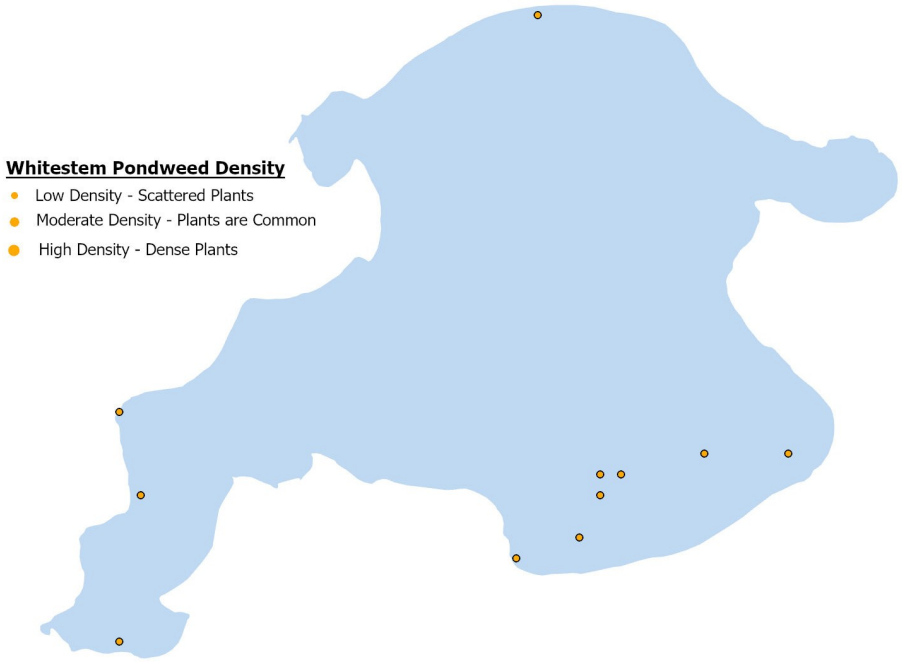
Small Pondweed (*Potamogeton pusillus*)



Whitestem Pondweed (*Potamogeton praelongus*)



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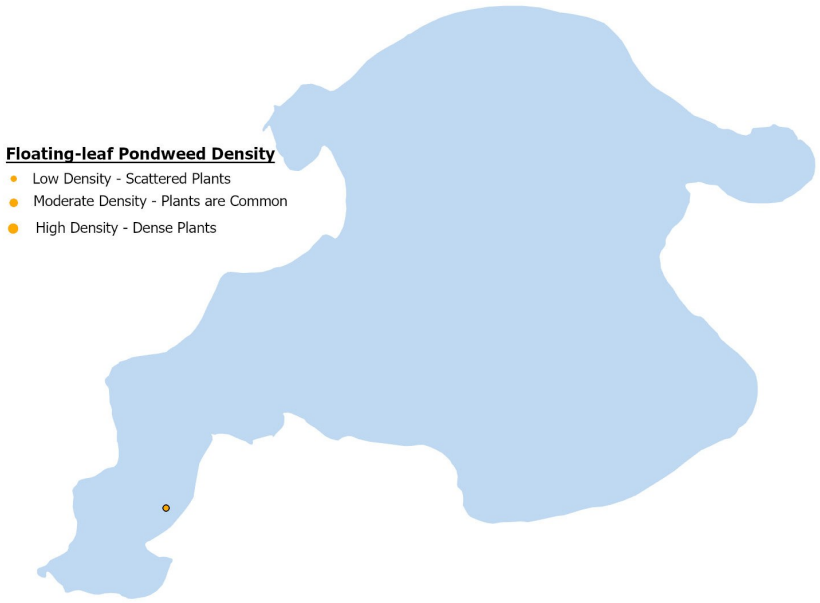
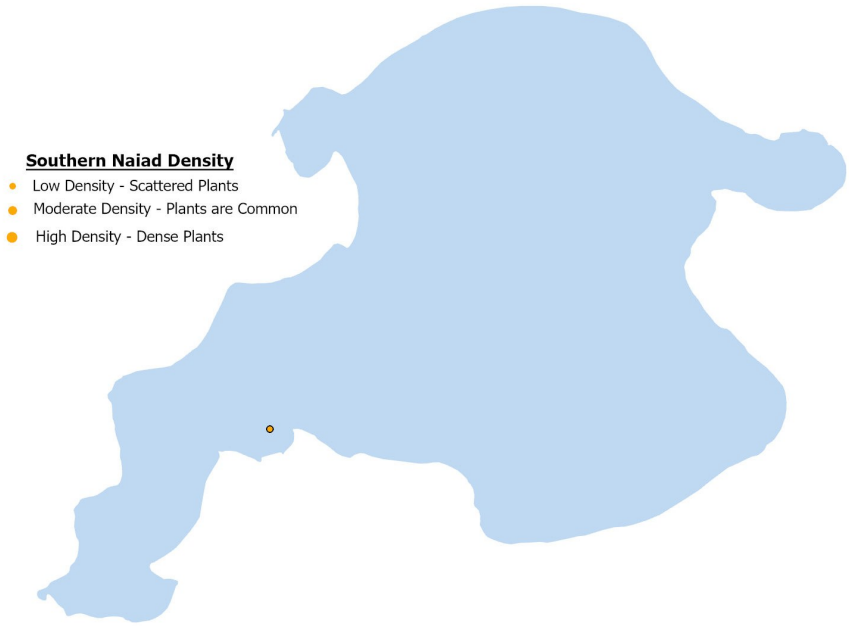
Floating-leaf Pondweed (*Potamogeton natans*)



Southern Naiad (*Najas guadalupensis*)



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Water Marigold (*Bidens beckii*)

White Waterlily (*Nymphaea odorata*)

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Watershield (*Brasenia schreberi*)

Bullhead Pond Lily (*Nuphar variegata*)

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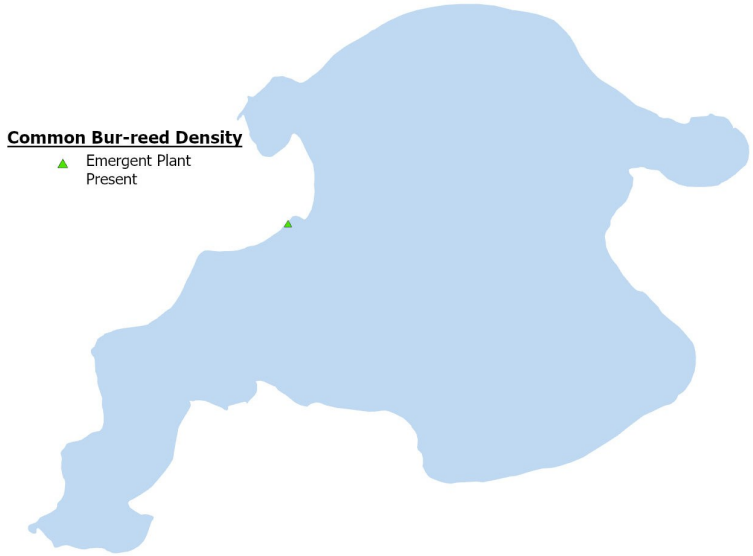
Common Bur-reed (*Sparganium eurycarpum*)



Cattail (*Typha sp.*)

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Bulrush (*Schoenoplectus sp.*)

Sagittaria (*Sagittaria sp.*)