
Fox Lake, Becker County, MN 2022 Aquatic Vegetation Management Report



Prepared by:

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Project Details

Lake: Fox (EQUIS# 03-0358-00-201)

Lake Surface Area: 69 acres **Littoral Area:** 86 acres **County:** Becker

Survey Type: Point-intercept aquatic plant surveys (2022)

Date of Survey (most recent): August 11, 2022 (PRWD)

Surveyor[s]: Beatrice Jaszczak & Blaine Henderson

Report Updated: December 2022

Author[s]:

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Report Details

G. L. Kemper. 2022. Fox Lake, Becker County: 2022 Aquatic Vegetation Management Report. Water Resource Coordinator Pelican River Watershed District, 211 Holmes Street W., Detroit Lakes, MN 56501. 16 pp.

Summary

The purpose of this report is to provide an overview of aquatic plant distribution and the management of invasive aquatic plants in Fox Lake, Becker County in 2022. Historical data on water quality, invasive aquatic plant management permits and point-intercept surveys are all summarized in this report. This summary will guide future invasive aquatic plant control projects and can evaluate changes in native plant communities.

Lake Description

Fox lake is a small, heavily developed lake. Approximately 60% (86 acres) of the 143.34-acre lake is considered littoral and less than 15 feet. There is no surface water inlet, and the lake receives water primarily from stormwater runoff and groundwater interactions. There is one outlet to the lake which flows south through a wetland to Lake Sallie.

The majority of residential lake development occurred between the 1960s and 1990 where the number of homes more than doubled from 24 to 55. The MN DNR owns a 3 acres tract of land that contains approximately 1300 feet of shoreline on the north side of the lake that remains protected.

Prior to 2004, a 40-acre parcel just north of the lake was used for ag purposes with turkey manure being applied to the land periodically. The lake showed signs of degradation with nuisance algal bloom and poor water clarity. When the turkey manure application ceased, the lake responded with drastic and immediate increases in water clarity and reductions of in-lake phosphorus levels. Currently, water quality is good and increasing, with clarity an average of 14-ft over the last ten years, and a stable phosphorus concentration of 12ppb.

Management History

The lake has no known Aquatic Invasive Plant Species (AIS) currently (2022), PRWD will continue to monitor the lake for AIS.




Survey Objectives

In 2022, a Point-intercept Survey assessed the distribution of aquatic plants in Fox Lake. The primary purpose for this type of survey is to 1) develop baseline knowledge of the current plant community in a lake, and over time, 2) compare year to year plant variation (in plant presence and spatial location) and 3) track invasive aquatic plants. Moreover, this survey will help the PRWD and our partners to monitor native plant communities and evaluate possible responses to invasive aquatic plant management via herbicide control. It is important to note that distributions and occurrences of aquatic plants may vary from year to year due to natural variations (water clarity, snow cover, water temperatures, and natural fluctuation in plant species) or human induced alterations, such as, herbicide and shoreline management activities.

Survey Methods

PRWD surveyors used a point-intercept survey method developed by John Madsen in “Aquatic Plant Control Technical Note MI-02, 1999” during the 2022 Survey. Points were placed 72 meters apart using a Geographic Information System (GIS), comprising of 153 points on a grid (Figure 1). Plant samples were collected by throwing and dragging a double-sided rake along the lake bottom at each point. All plant taxa (submerged, floating-leaf, emergent and free floating) were recorded to species or genera during the survey following Skawinski (2018). Plant samples were assessed on the boat to determine species presence/absence and abundance. The abundance rake rating are as follows: 1: sparse, 2: common/frequent/ occasional, and 3: abundant/matted (Table 3). Frequencies of occurrence percentages (i.e., how often a plant species was sampled in the lake) were calculated based on the littoral zone.

Table 1 - Quantitative rake abundance ranking (0-3) used to estimate plant abundance for each species based on rake coverage and/or visual observation (PRWD). A zero (0) ranking indicates no target plants were retrieved or observed in a sample.

Abundance Ranking	Rake Coverage	Description
1		Sparse; plants covering <25% of the rake head
2		Common; plants covering 25%-75% of the rake head
3		Abundant; plants covering >75% of the rake head

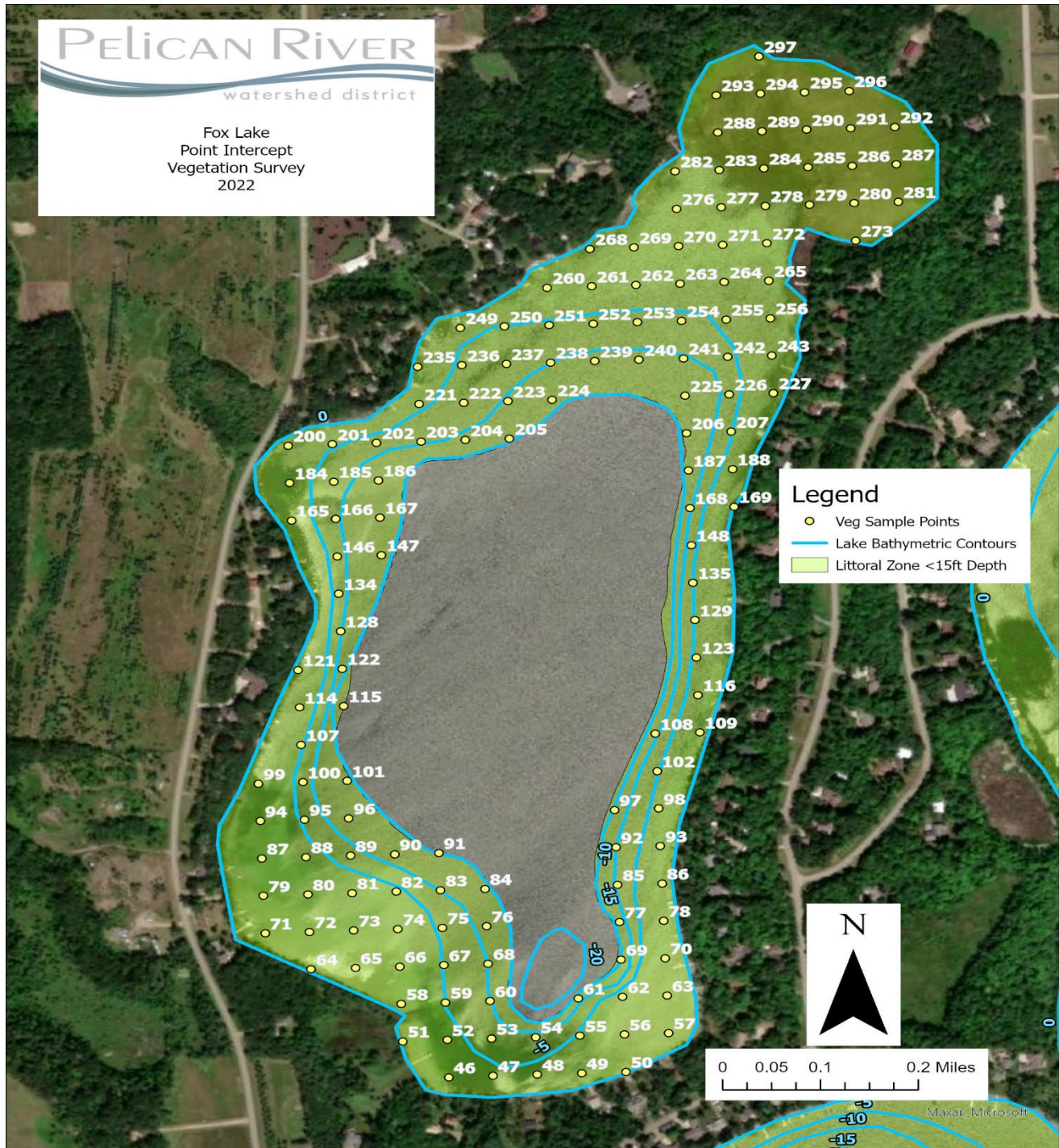


Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Fox Lake, Becker County (EQuIS# 03-0358-00-201). A total of 153 points were surveyed in 2022 at 72 meters apart.

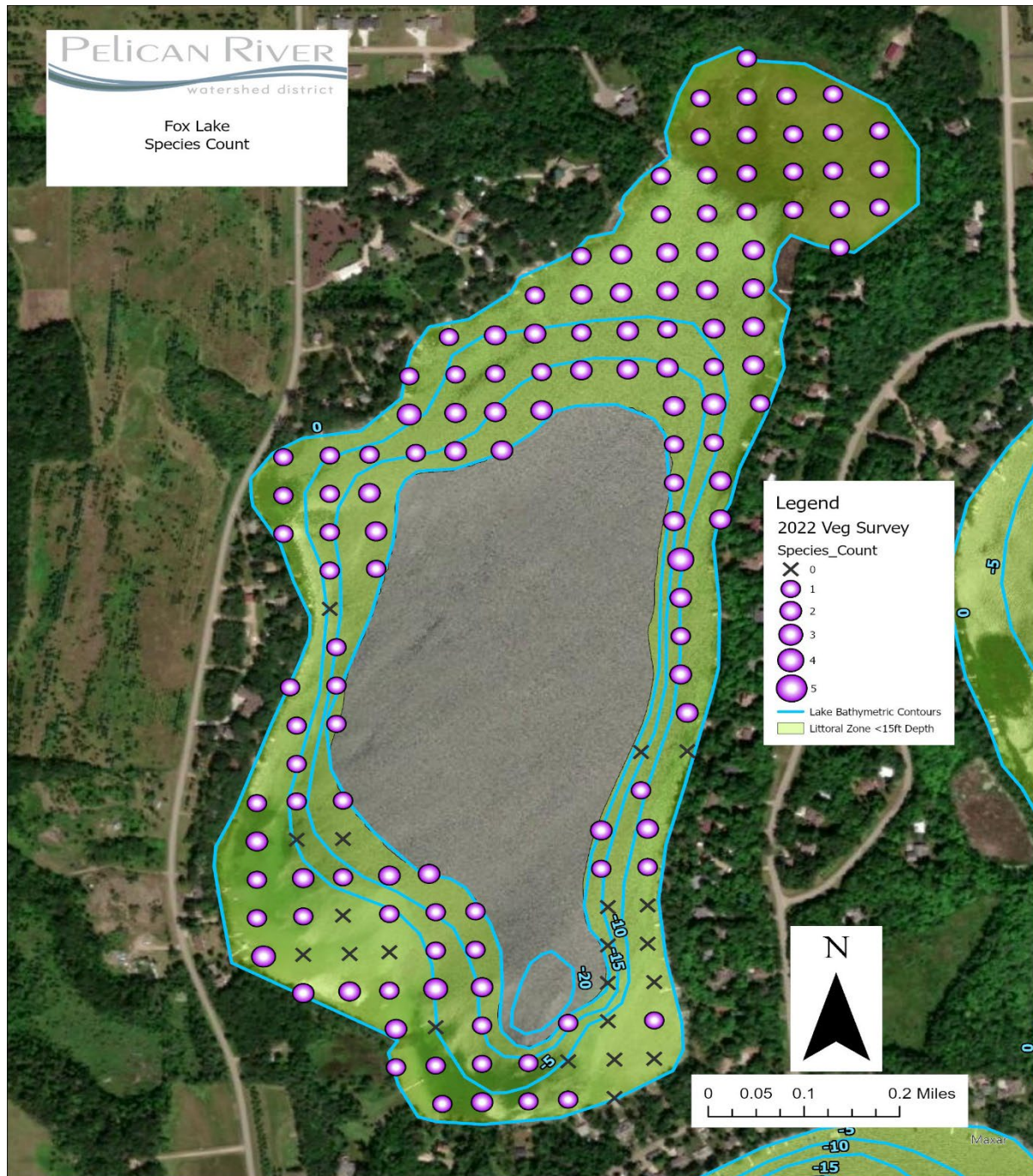


Figure 2 – Species Richness Distribution. Number of species at each site from the 2022 point-intercept survey in Fox Lake, Becker County (EQuIS# 03-0358-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating the richness in species presence and 0 indicating no species.

Survey Observations

The first vegetation point-intercept survey of Fox Lake (EQuIS# 03-0358-00-201 conducted by the PRWD occurred on August 11th, 2022. Plants were rooted to a maximum depth (95%) of 15.1 feet, with depths ranging from 0 – 24 feet. However, since 86 acres is considered the littoral zone (< 15 feet deep and where aquatic plants are likely to be found) it was very rare to find any rooted plants deeper than 15 feet. 69% of the points had submersed native vegetation (Table 2) with a mean submersed native taxa per point of 2.1. Fox Lake has up to 4 submersed native taxa (Table 3).

Table 2 - Point-intercept Metrics. Summary of PRWD point-intercepts Fox Lake, Becker County (EQuIS# 03-0358-00-201). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	August 2022
Surveyor	PRWD
Total # Points Sampled	153
Max depth of growth	15
Depth Range of Rooted Veg (ft.)	0.0 – 15.0
Max Depth of Growth (95%) (ft.)	15
# of Vegetated Points in Max Depth Range	132
# Points in Littoral (0-15 feet)	153
% Points w/ Submersed Native Taxa	69
Mean Submersed Native Taxa/ Point	2.1
# Submersed Native Taxa	4
# Submersed Non-Native Taxa	0
% Points w/ Submersed Non- native Taxa	0

Based on the 2022 point-intercept survey, the native plant community within the littoral area in Fox Lake was primarily dominated by Chara (*Chara sp.*) 65%, Coontail (*Ceratophyllum demersum*) 17%, Sago Pondweed (*Stuckenia pectinate*) 7%, and Claspingleaf Pondweed (*Potamogeton richardsonii*) (Figures 3,4,5, and 6). These aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Fox Lake also has the following emergents: Cattail (*Typha sp.*) 17%, Bulrush (*Schoenoplectus sp.*) 9% and Wild Rice (*Zizania palustris*) (Figures 7, 8 and 9) These emergent plants are especially good at preventing shoreline erosion, habitat and providing food sources for waterfowl. Plants also absorb nutrients and reduce algae, thereby improving water quality.

Fox Lake has an average of three species per sampling site. Figure 2 displays the spatial distribution and species richness (# of species per sample point) of all native species from the 2022 point-intercept survey.

Table 3 - Plant Frequency Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in intercepts Fox Lake, Becker County (EQuIS# 03-0358-00-201).

August 22 ^b		
Taxonomic Name	Common Name	Frequency (%)
SUBMERSED NON-NATIVE		
<i>These plants spread or have been introduced beyond its native range and are either causing harm or have the potential to cause harm.</i>		
	None Observed	
SUBMERSED NATIVE		
<i>These plants are rooted plants with flaccid or limp stems and most of their vegetative mass is below the water surface, although small portions may stick above the water.</i>		
<i>Ceratophyllum demersum</i>	Coontail	17%
<i>Chara</i> sp.	Chara	65%
<i>Potamogeton richardsonii</i>	clasping-leaved pondweed	1%
<i>Stuckenia pectinata</i>	Sago Pondweed	7%
FLOATING LEAF		
<i>These plants are rooted in the lake bottom and have leaves that float on the water surface. Many have colorful flowers that extend above the water.</i>		
	None Observed	
EMERGENT		
<i>These plants extend well above the water surface and are usually found in shallow water, near shore.</i>		
<i>Schoenoplectus</i> sp.	Bulrush Species	9%
<i>Typha</i> sp.	Cattail Species	17%
<i>Zizania palustris</i>	Wild Rice	3%
EMERGENT NON-NATIVE		
<i>These plants spread or have been introduced beyond its native range and are either causing harm or have the potential to cause harm.</i>		
	None Observed	
FREE FLOATING		
<i>These plants float freely on the water surface. The entire plant is suspended on the water, allowing the plant to be moved around the pond by wind and water currents.</i>		
	None Observed	

^b Percent frequency for 2022 (PI Survey Method) calculated for 0-15 feet zone.

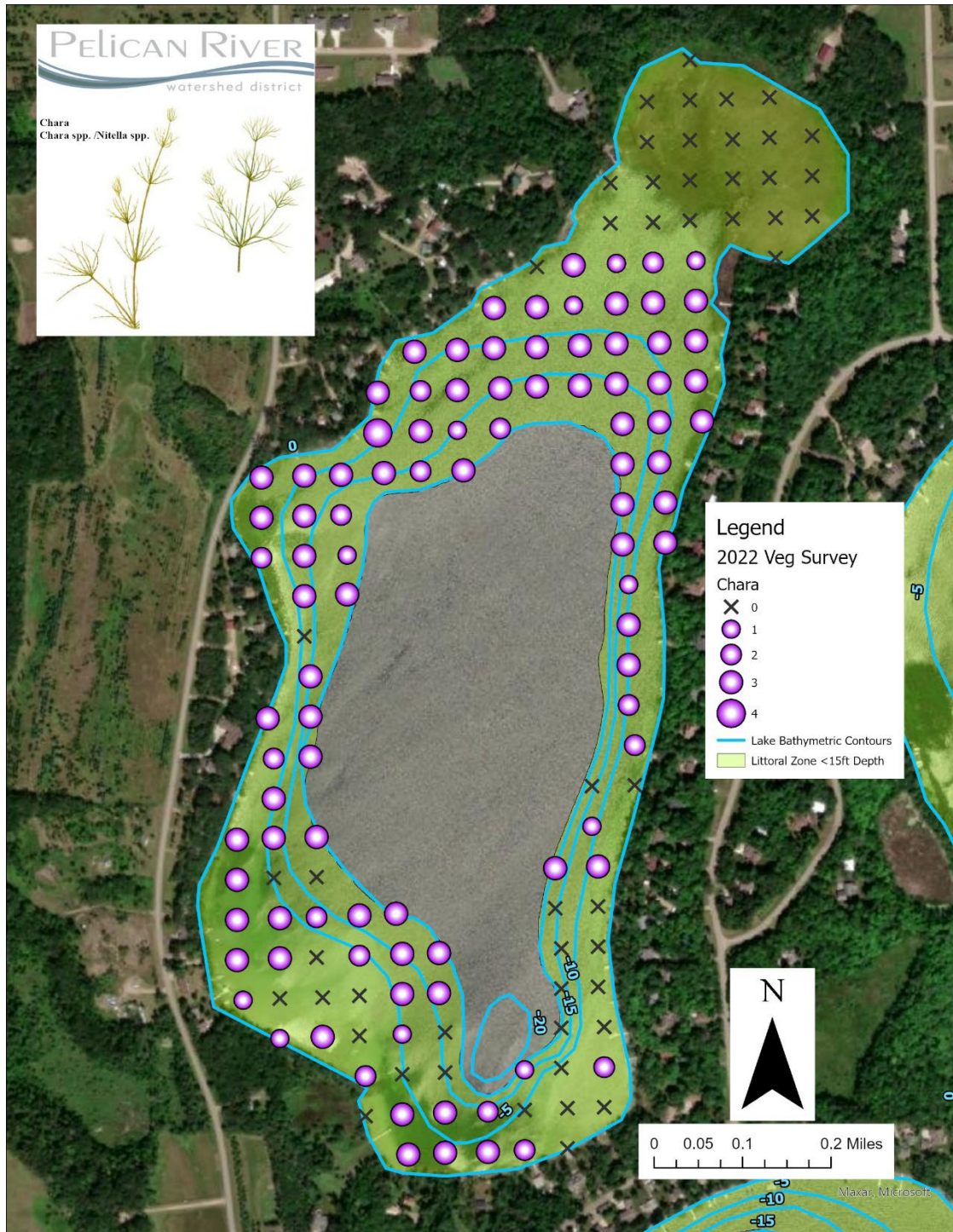


Figure 3 – Chara Distribution. Plant distribution from the 2022 point-intercept survey for Chara in intercepts Fox Lake, Becker County (EQuIS# 03-0358-00-201). Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.

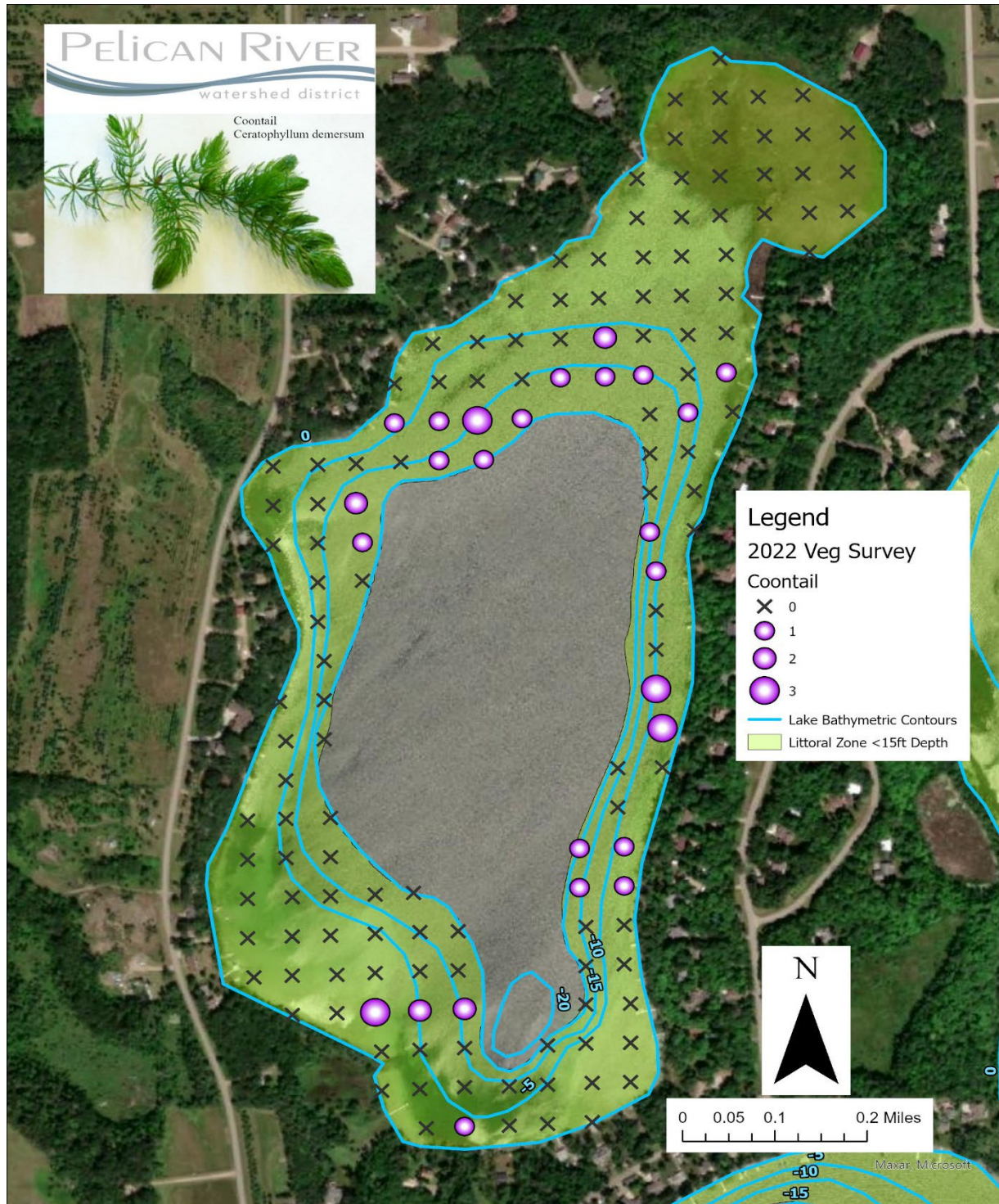


Figure 4 – Coontail Distribution. Plant distribution from the 2022 point-intercept survey for Coontail in intercepts Fox Lake, Becker County (EQuIS# 03-0358-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.

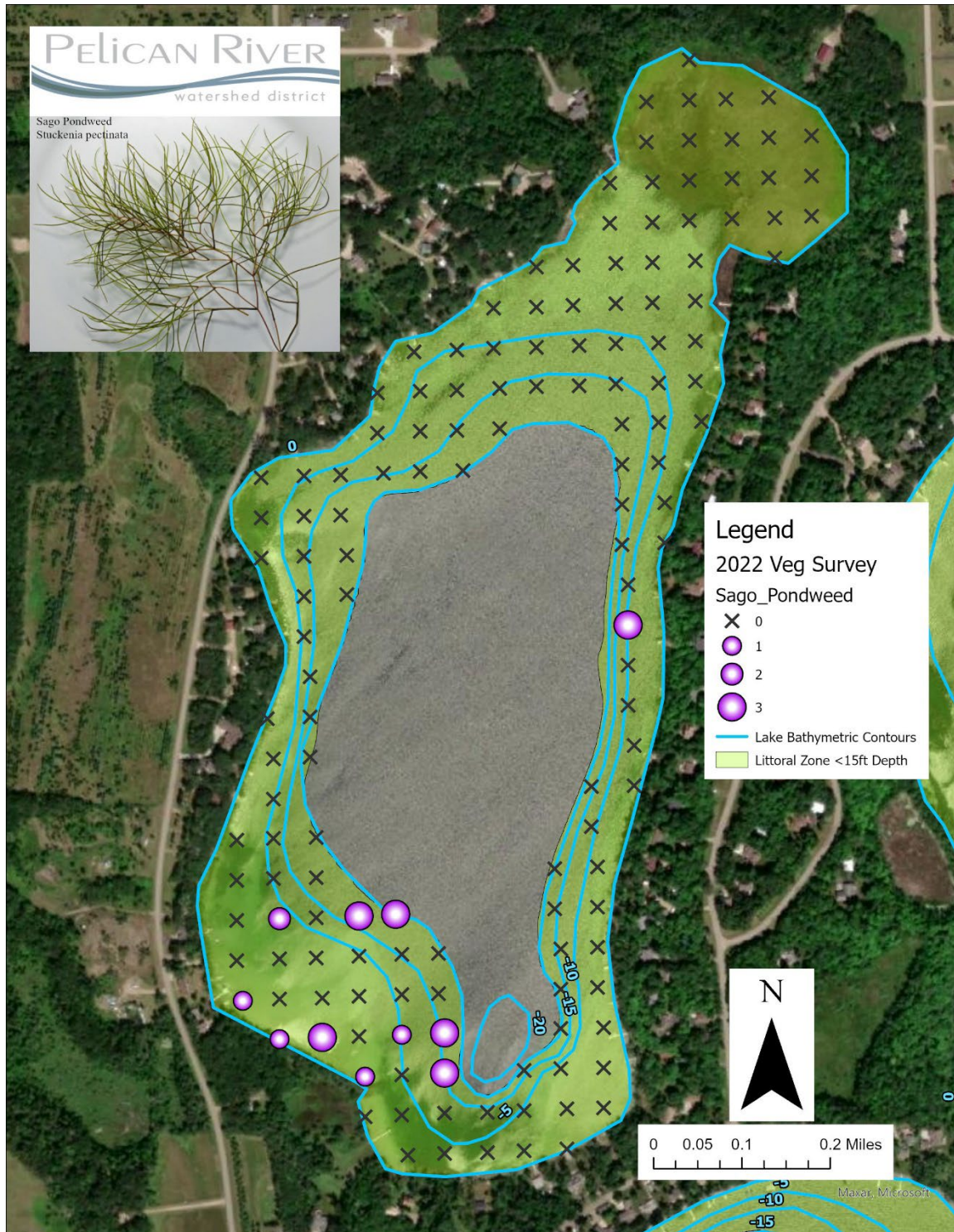


Figure 5 – Sago Pondweed Distribution. Plant distribution from the 2022 point-intercept survey for Sago Pondweed in intercepts Fox Lake, Becker County (EQuIS# 03-0358-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.

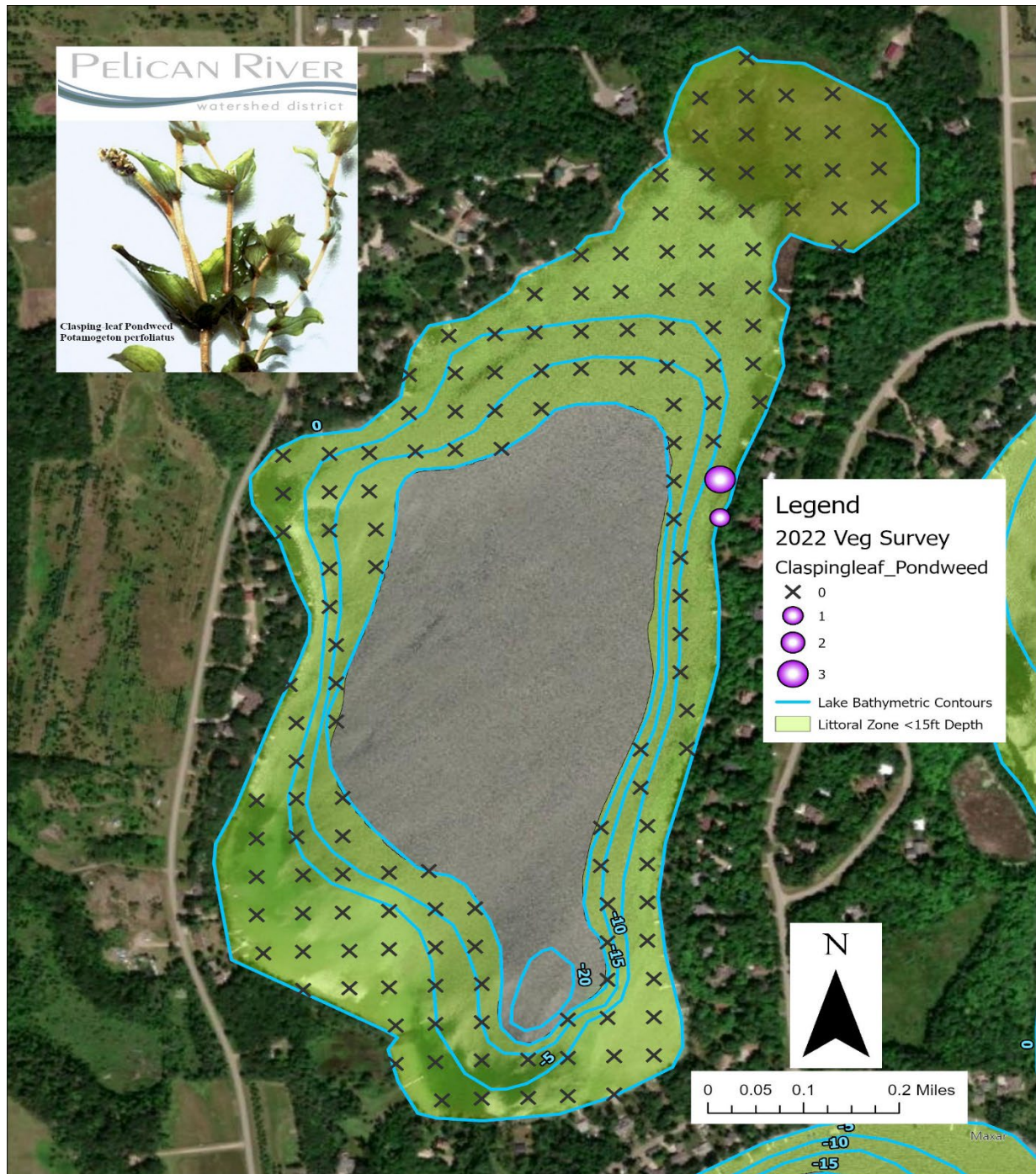


Figure 6 – Claspingleaf Pondweed Plant distribution from the 2022 point-intercept survey for Claspingleaf Pondweed in intercepts Fox Lake, Becker County (EQUIS# 03-0358-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.

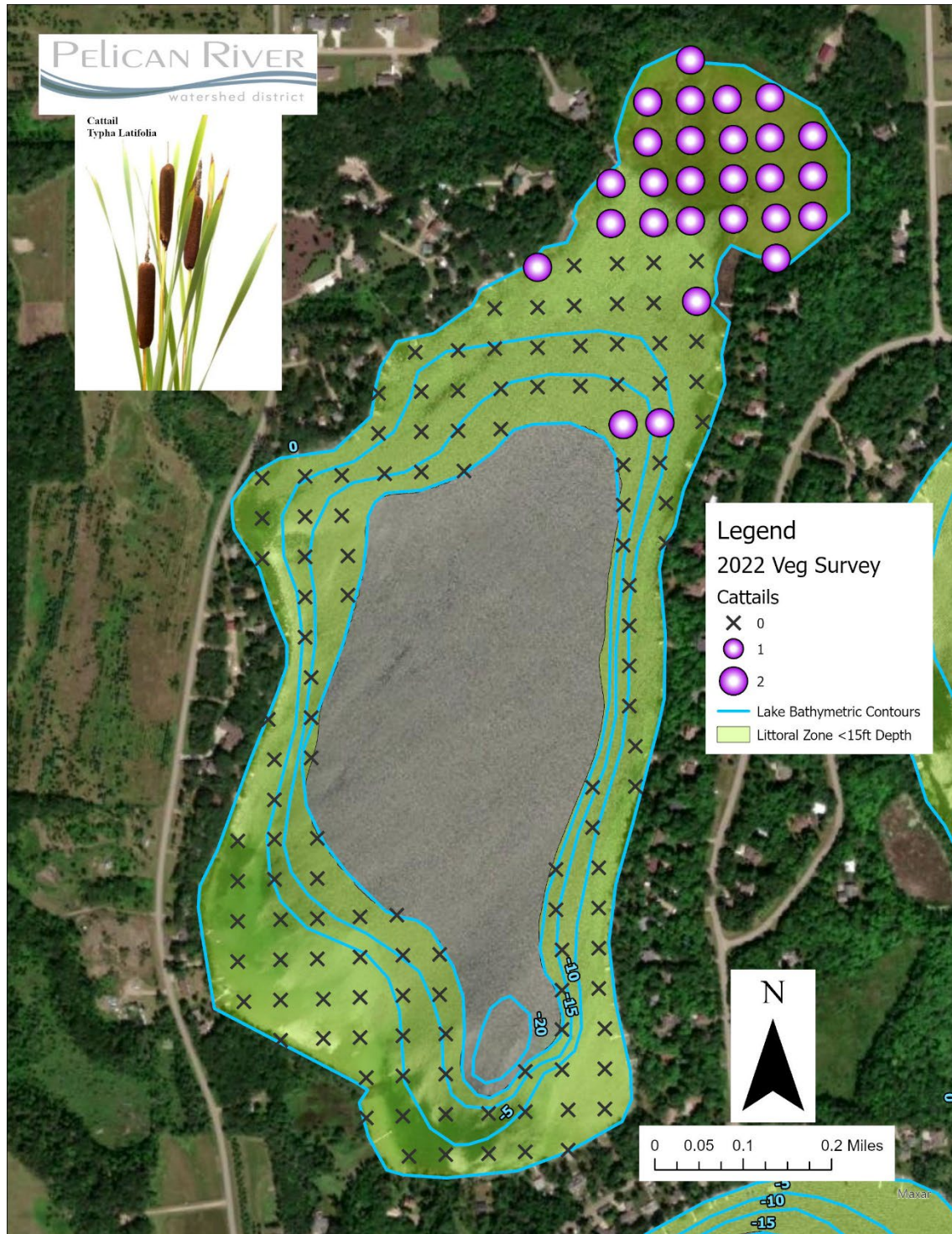


Figure 7 – Cattail Distribution. Plant distribution from the 2022 point-intercept survey for Cattail in intercepts Fox Lake, Becker County (EQUIS# 03-0358-00-201). Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.

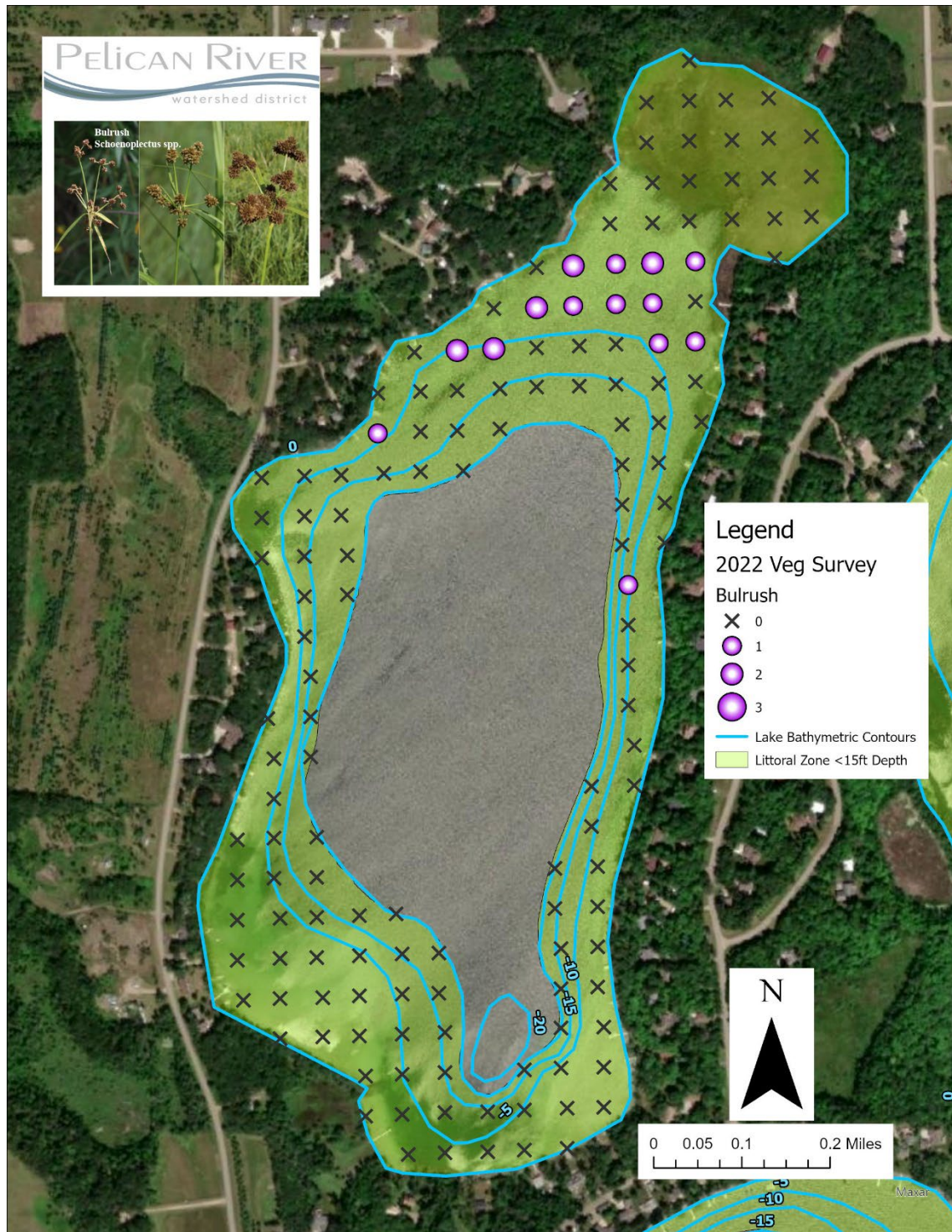


Figure 8 – Bulrush Distribution. Plant distribution from the 2022 point-intercept survey for Bulrush in intercepts Fox Lake, Becker County (EQuIS# 03-0358-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.

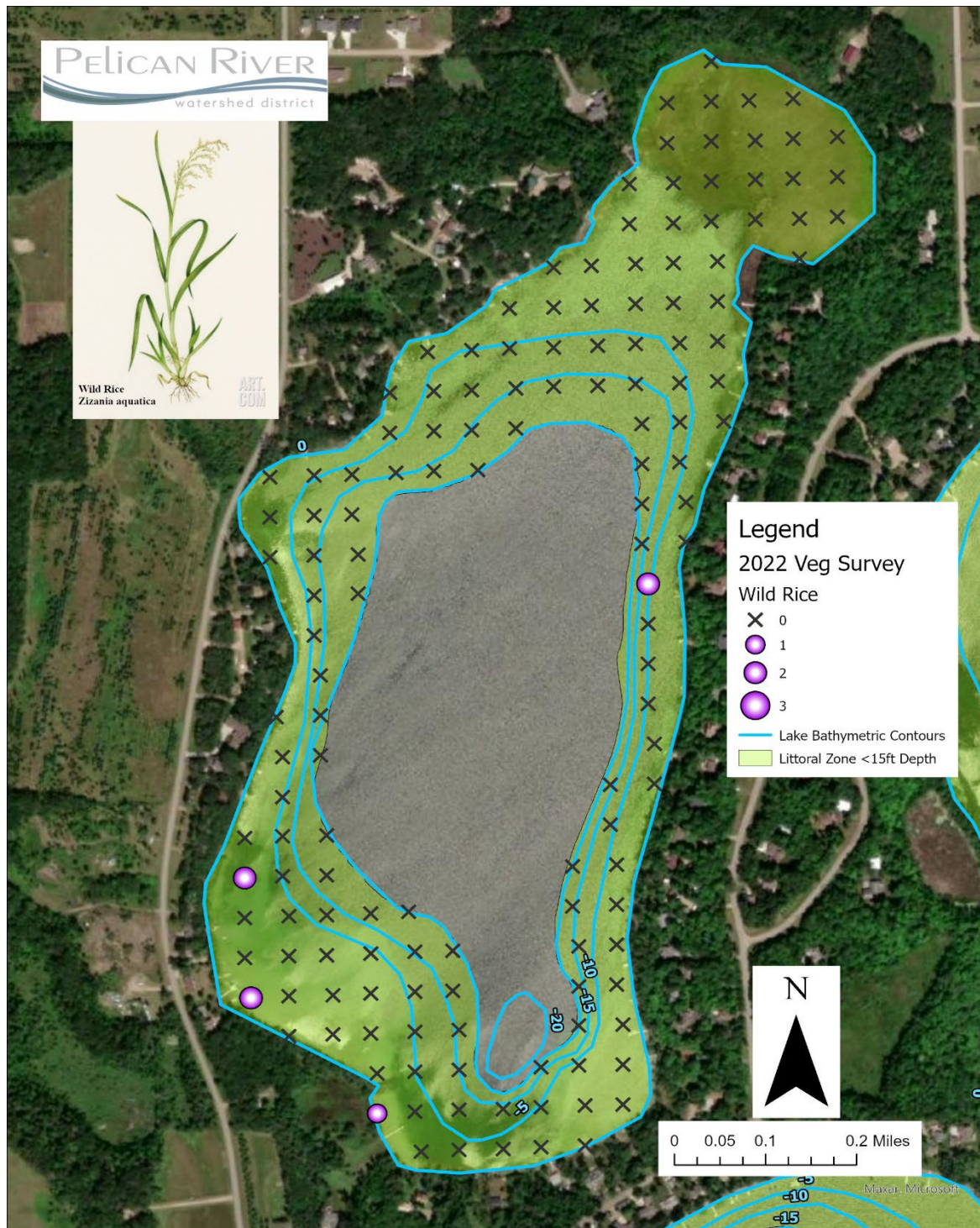


Figure 9 – Wild Rice Distribution. Plant distribution from the 2022 point-intercept survey for Wild Rice in intercepts Fox Lake, Becker County (EQuIS# 03-0358-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.

Literature Cited

Skawinski, Paul M. (2018). *Aquatic Plants of the Upper Midwest*. (Third Edition). Wisconsin: Paul M. Skawinski.

Madsen, J. (1999). *Point-intercept and line intercept methods for aquatic macrophytes management*. APCRP Technical Notes Collection (TN APCRP-M1-02). Vicksburg, MS: U.S. Army Engineer Research and Development Center.