Pearl Lake, Becker County, MN
2023 Aquatic Vegetation Management Report

Prepared by:
Gina L. Kemper
Water Resource Coordinator
Pelican River Watershed District

Project Details

Lake: Pearl (EQuIS# 03-0486-00-201)

Lake Surface Area: 282 acres **Littoral Area:** 168.2 acres **County:** Becker

Survey Type: Point-intercept aquatic plant surveys (2023)

Date of Survey (most recent): July 18, 2023 (PRWD)

Surveyor[s]: Owen Reding & Oliver Kritzberger

Report Updated: January 8, 2024

Author[s]:

Gina L. Kemper, Water Resource Coordinator (PRWD), prwdmonitor@arvig.net, 218-846-0436

Report Details

G. L. Kemper. 2023. Pearl Lake, Becker County: 2023 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 Pearl Lake, Becker County in 2023. 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

Pearl Lake is a 281-acre recreational development lake located along the western edge of the Pelican River Watershed District boundary. It has a littoral area (<15feet) accounting for 60% (168 acres) of its surface area. The drainage area of Pearl Lake includes several other small lakes and wetlands including Little Pearl, Dart, Bijou, and Holstad Lakes. Other than the lakes within its drainage area, Pearl is poorly connected to any downstream lake or other lakes within the watershed. Historically, Pearl Lake experiences large fluctuations in water levels, with a recorded range of 3.4 feet. A well-defined outlet was constructed in the southwest corner of the lake and maintains water levels at a more constant elevation.

The MN DNR maintains an asphalt public boat access ramp along the southern shoreline, allowing both public and private use of the lake. Curly leaf pondweed was first observed in a 0.20-acre area in 2010. A permit to chemically treat the plant was applied for but was denied by the MN DNR. By 2011, populations were widespread and now are found in all portions of the lake.

Residential development has substantially increased in the past 20 years. In 1983, there were only two riparian residences. By 2003, that number grew to 32, and by 2013, there were a total of 57 riparian residences. The remaining undeveloped riparian properties are not suitable for development due to wetlands and poor drainage.

Water quality exhibits large year-to-year fluctuations with a 10-year average of 28 µg/L phosphorus and clarity of 9.5 feet. A diagnostic study of Pearl Lake was completed in 2012, which determined that the primary source of in-lake phosphorus was from internal loading from nutrient rich sediments. The lake stratifies strongly between 4-6 meters and develops anoxia in the lower layer, further increasing release of phosphorus from lake bottom sediments into the lower water layer.

There is cultivated cropland on both the east and west sides of the lake that drain via private ditch to Pearl Lake. Study work from 2010 and 2011 shows that during dry periods, there is very limited input from those sources to the lake, but during wet periods, a significant amount of sediment loads are observed. Due to the flashy nature of the monitoring locations, annual loads from those sources could not be determined.

Management History

Long Lake has no known Aquatic Invasive Plant Species (AIS) currently (2023) PRWD will continue to monitor the lake for AIS.

Survey Objectives

In 2023, a Point-intercept Survey assessed the distribution of aquatic plants in Pearl 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 2023 Survey. Points were placed 72 meters apart using a Geographic Information System (GIS), comprising of 172 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

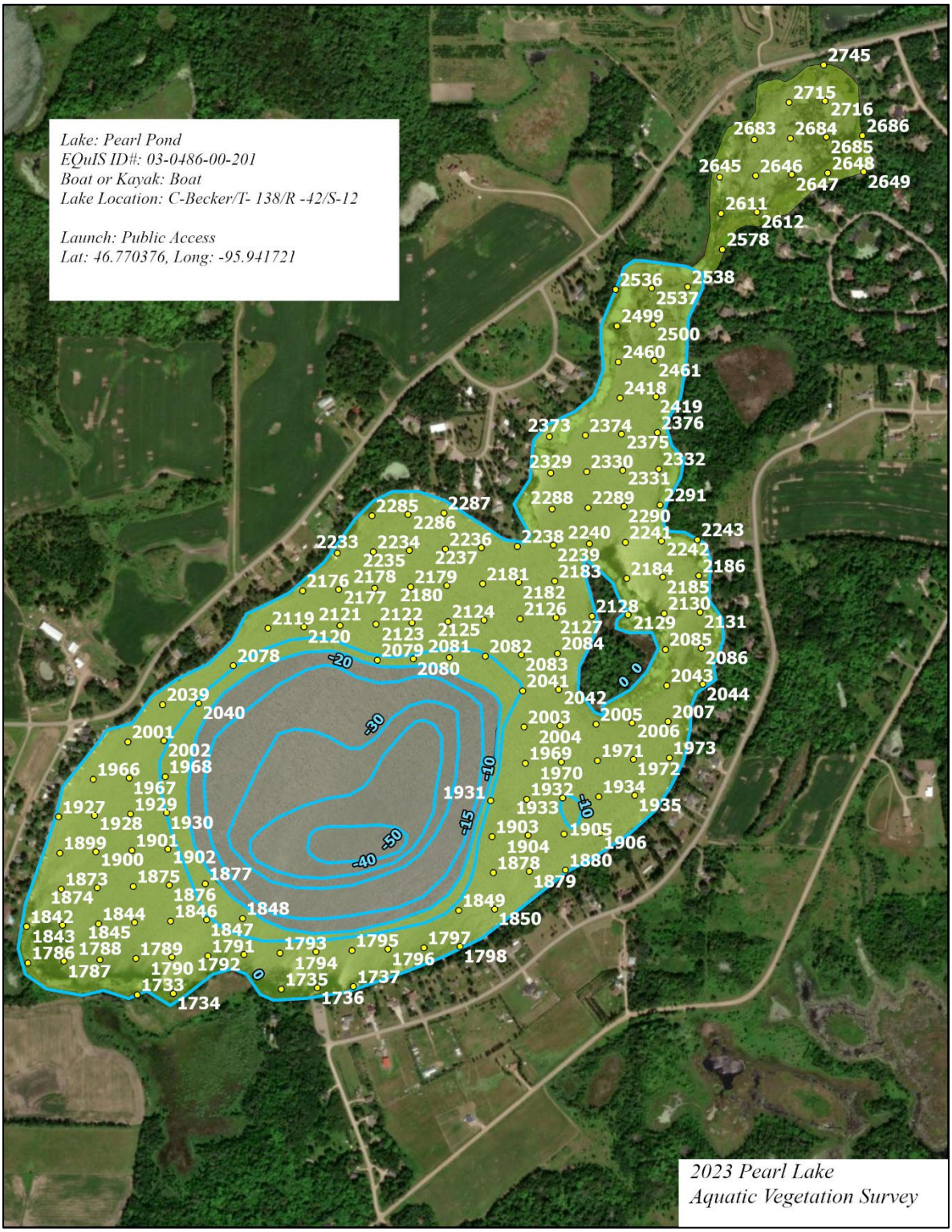

Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Pearl Lake, Becker County (EQuIS# 03-0486-00-201). A total of 172 points were surveyed in 2023 at 72 meters apart.

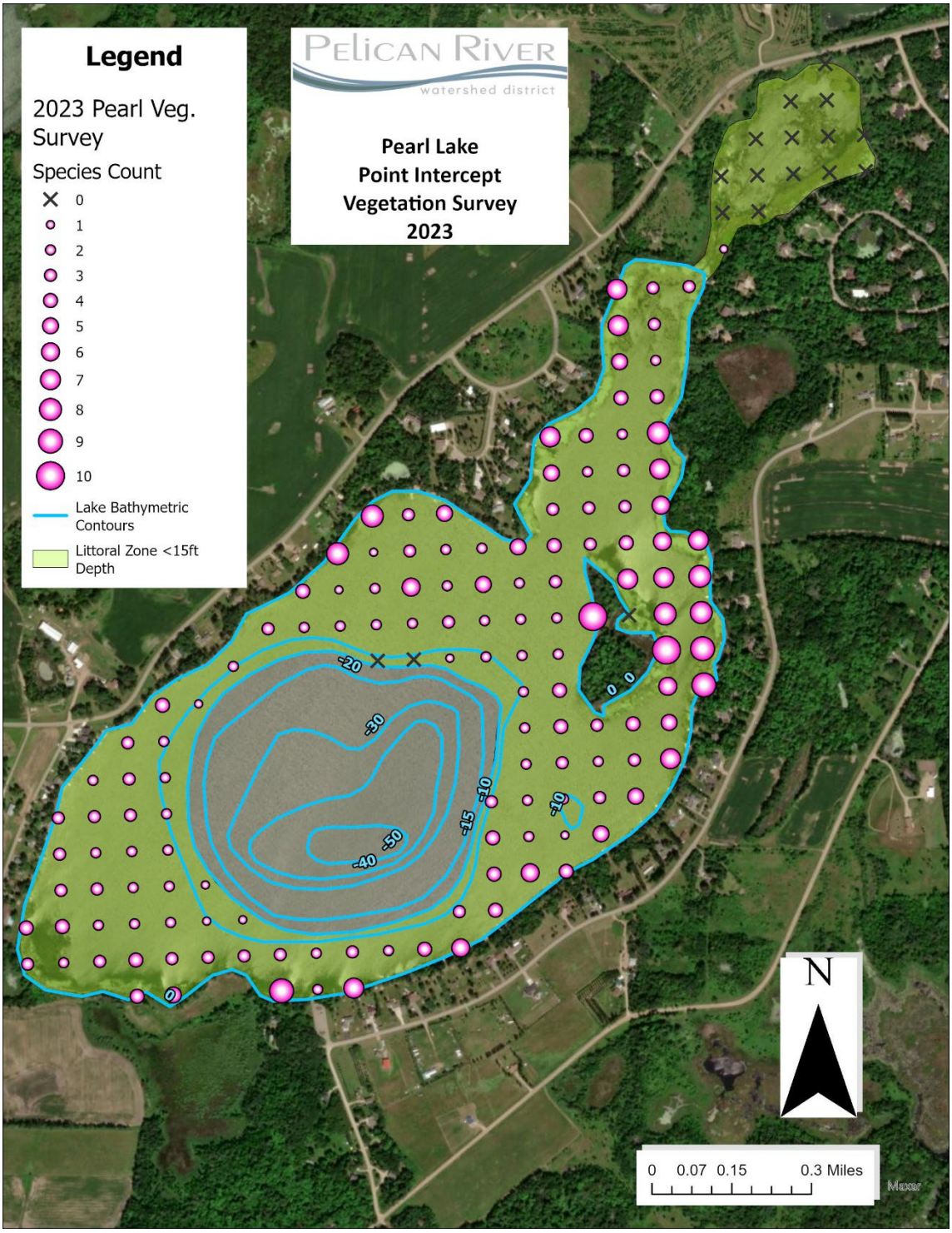

Figure 2 – Species Richness Distribution. Number of species at each site from the 2023 point-intercept survey in Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Densities ranged from 0 to 10 at each point, with a 10 indicating the richness in species presence and 0 indicating no species.

Survey Observations

The first vegetation point-intercept survey of Pearl Lake (EQuIS# 03-0486-00-201 conducted by the PRWD occurred on July 18, 2023. There are 168.2 acres of the littoral zone (< 15 feet deep and where aquatic plants are likely to be found) for Pearl Lake. Of the 172 points sampled, 86% of the points had submersed native vegetation (Table 2) with a mean of 2.4 submersed native taxa per point (Table 2).

Table 2 - Point-intercept Metrics. Summary of PRWD point-intercepts Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	July 2023
Surveyor	PRWD
Total # Points Sampled	172
Max depth of growth	NA
Depth Range of Rooted Veg (ft.)	NA
# Points in Littoral (0-15 feet)	172
# of Vegetated Points in Littoral Zone	139
% Points w/ Submersed Native Taxa	80%
Mean Submersed Native Taxa/ Point	2.4
# Submersed Native Taxa	11
# Submersed Non-Native Taxa	0
% Points w/ Submersed Non- native Taxa	0%

Based on the 2023 point-intercept survey, there are 11 Submergent Native Taxa (Table 3) within the littoral area of Pearl Lake. The dominating Submergent species are Coontail (*Ceratophyllum demersum*) 68% (Figure 3), Flat-stem Pondweed (*Potamogeton zosteriformis*) 63% (Figure 4), Slender Waternymph (*Najas gracillima)* 27% (Figure 5), and Whorled Watermilfoil (*Myriophyllum verticillatum)* 26% (Figure 6). These aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Pearl Lake also has the following Emergent Taxa: Giant Bur-reed (*Sparganium eurycarpum*) 1%, Bulrush (*Schoenoplectus* sp.) 6%, and Cattail (*Typha sp.*) 8% (Figure 7). Floating-leaf Taxa: Yellow Pond Lilly (*Nuphar lutea*) 37% (Figure 8) and Floating-leaf Pondweed (*Potamogeton natuns)* 13%. Free-floating Taxa: Greater Duckweed (*Lemna polyrrhiza*) 3% (Figure 9), and Star Duckweed (*Lemna trisulca*) 2%. These emergent and floating 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.

Pearl Lake has an average of 5.2 species per sampling site. Figure 2 displays the spatial distribution and species richness (# of species per sample point) of all native species from the 2023 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 Pearl Lake, Becker County (EQuIS# 03-0486-00-201).

July 23 b

Taxonomic Name	Common Name	Frequency (%)
SUBMERSED NON-NATIVE *These plants spread or have been introduced beyond its native range and are either causing harm or have the potential to cause harm.*		
SUBMERSED NATIVE *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.*		
Elodea canadensis	Canada Waterweed	15%
Chara spp./Nitella spp.	Chara	3%
Potamogeton perfoliatus	Clasping Leaf Pondweed	7%
Ceratophyllum demersum	Coontail	68%
Potamogeton zosteriformis	Flat-stem Pondweed	63%
Potamogeton amplifolius	Large Leaf Pondweed	12%
Myriophyllum sibiricum	Northern Watermilfoil	1%
Potamogeton amplifolius	Large Leaf Pondweed	12%
Stuckenia pectinata	Sago Pondweed	15%
Najas flexilis	Slender Naiad, Bushy Pondweed	27%
Potamogeton praelongus	White-stem Pondweed	17%
Myriophyllum verticillatum	Whorled Watermilfoil	26%
FLOATING-LEAF *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.*		
Potamogeton natuns	Floating-leaf Pondweed	13%
Nuphar lutea	Yellow Pond Lilly	37%
EMERGENT *These plants extend well above the water surface and are usually found in shallow water, near shore.*		
Sparganium eurycarpum	Giant Bur-reed	1%
Schoenoplectus spp.	Bulrush	6%
Typha latifolia & angustifolia	Cattail	8%
EMERGENT NON-NATIVE *These plants spread or have been introduced beyond its native range and are either causing harm or have the potential to cause harm.*		
FREE-FLOATING *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.*		
Sirodela polyrrhiza	Greater Duckweed	3%
Lemna trisulca	Star Duckweed	2%

b Percent frequency for 2023 (PI Survey Method) calculated for 0-15 feet littoral zone.

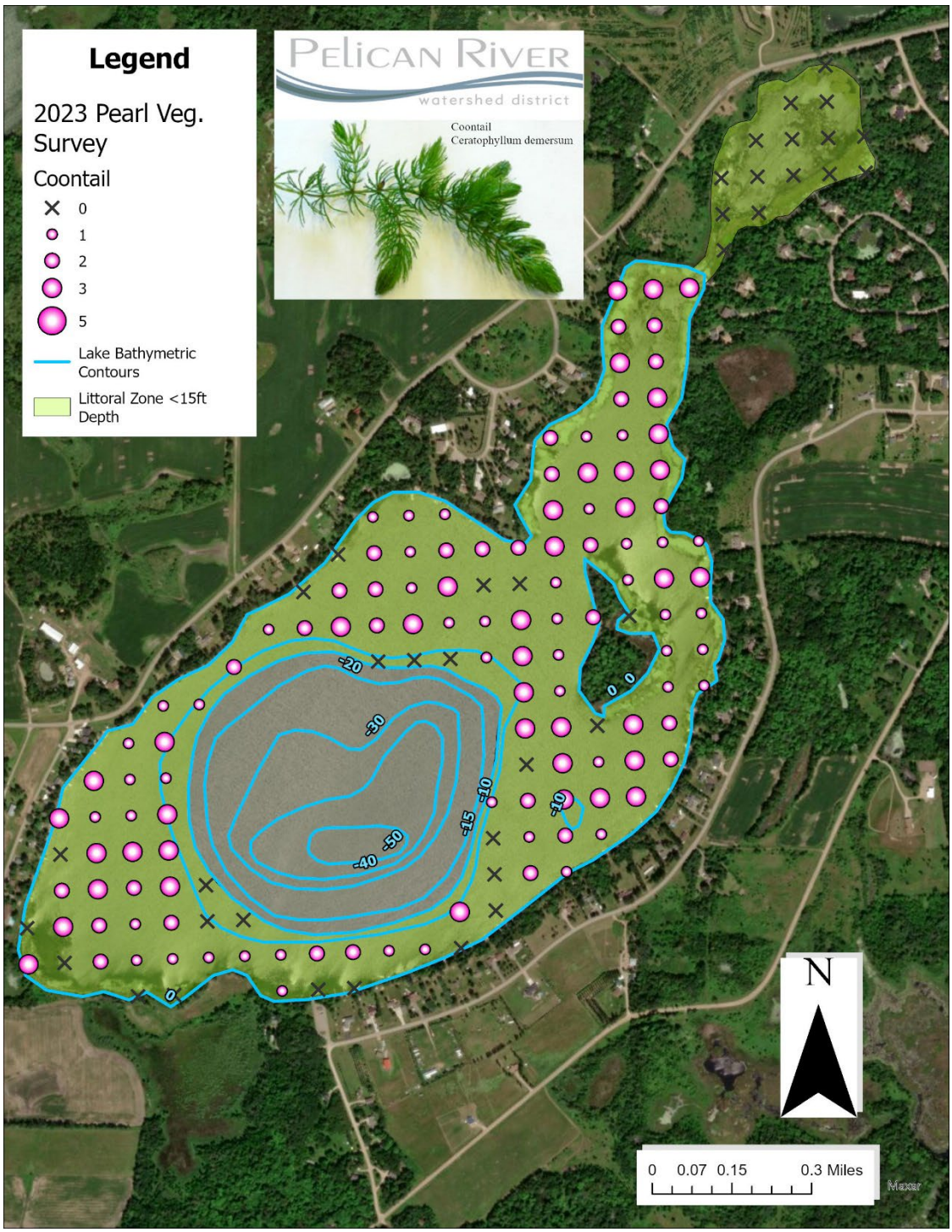

Figure 3 – Coontail Distribution. Plant distribution from the 2023 point-intercept survey for Coontail in intercepts Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating dense plant presence and 0 indicating no plants.

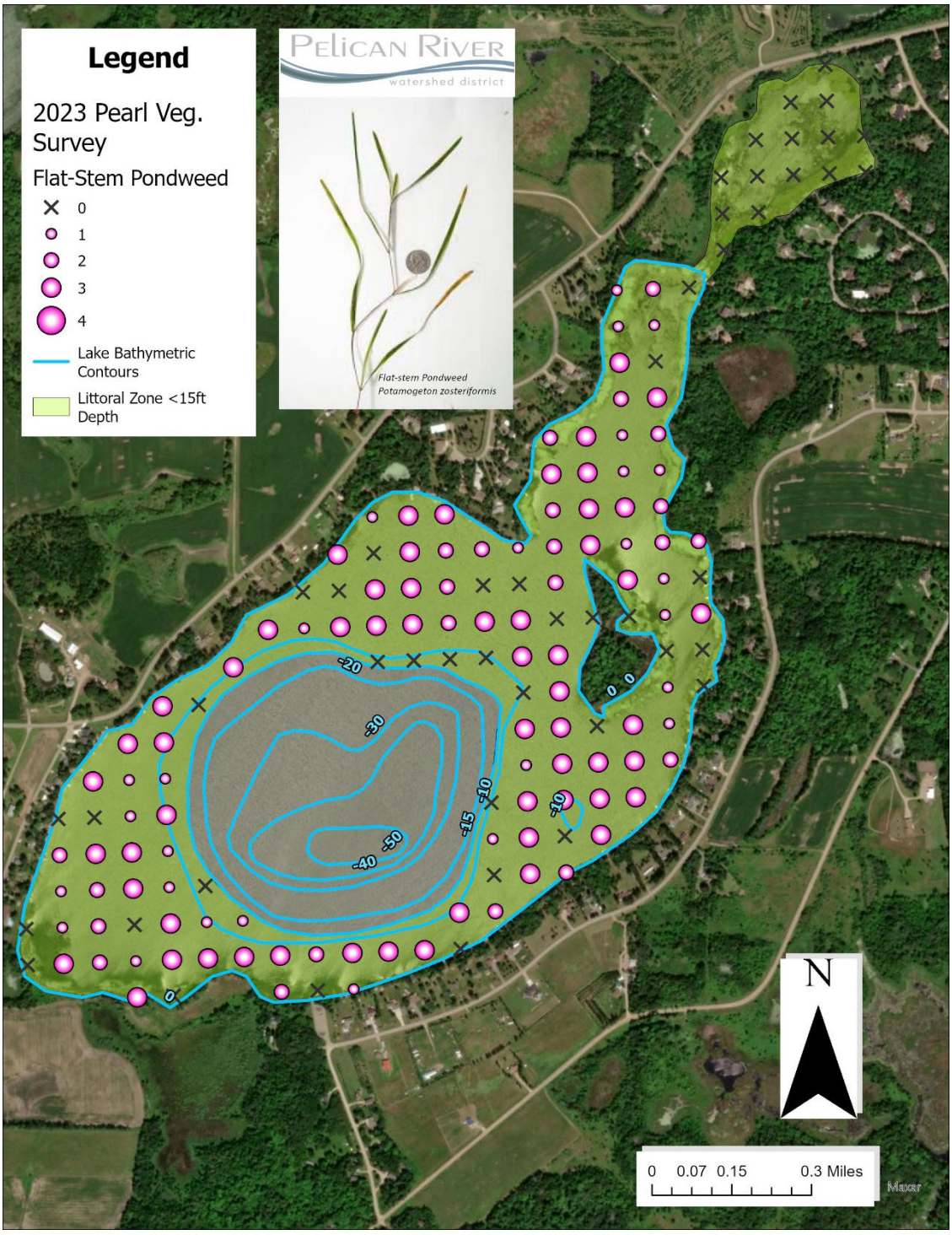

Figure 4 – Flat-stem Pondweed Distribution. Plant distribution from the 2022 point-intercept survey for Flat-stem pondweed in intercepts Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.

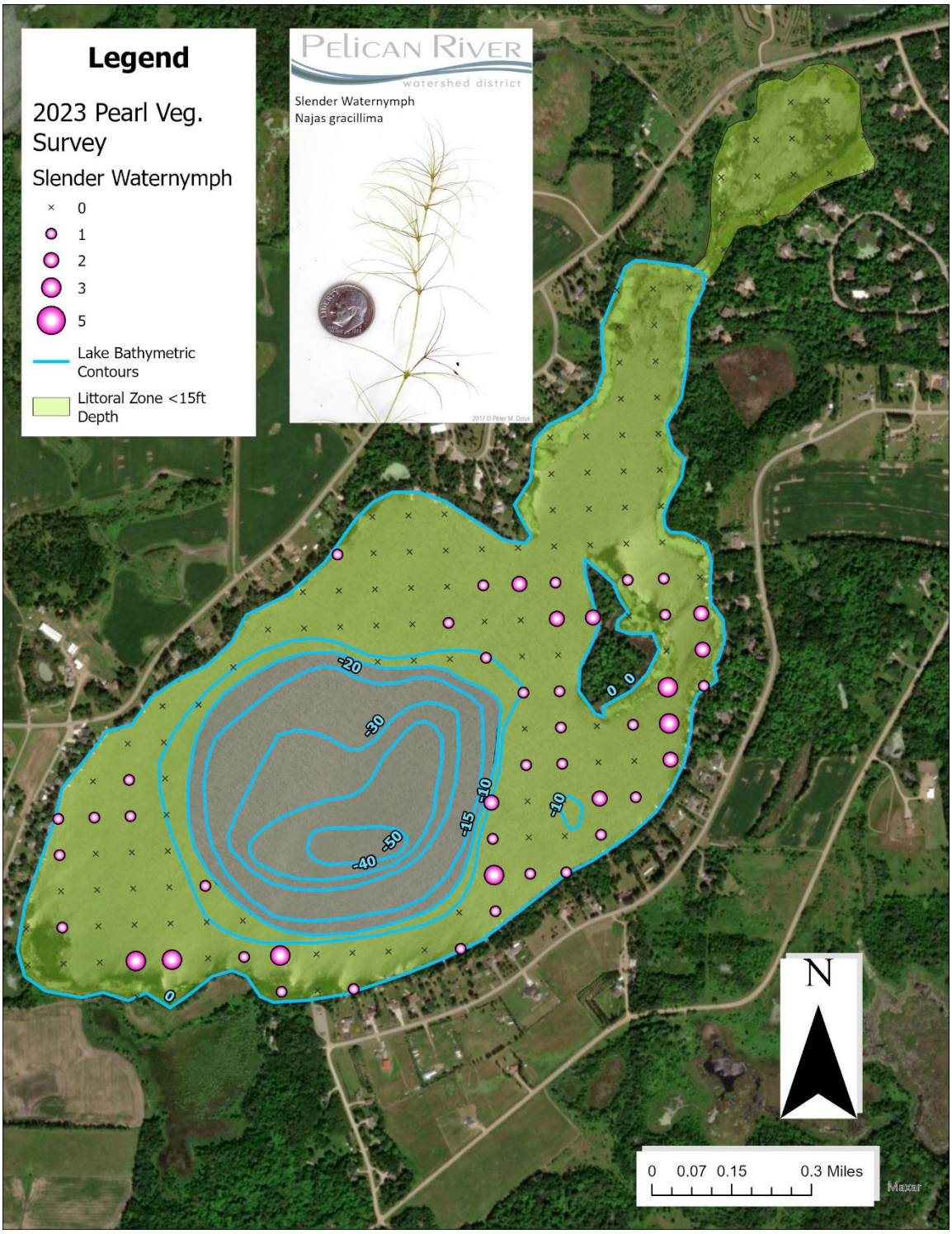

Figure 5 – Slender Waternymph Distribution. Plant distribution from the 2023 point-intercept survey for Slender Waternymph in intercepts Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating dense plant presence and 0 indicating no plants.

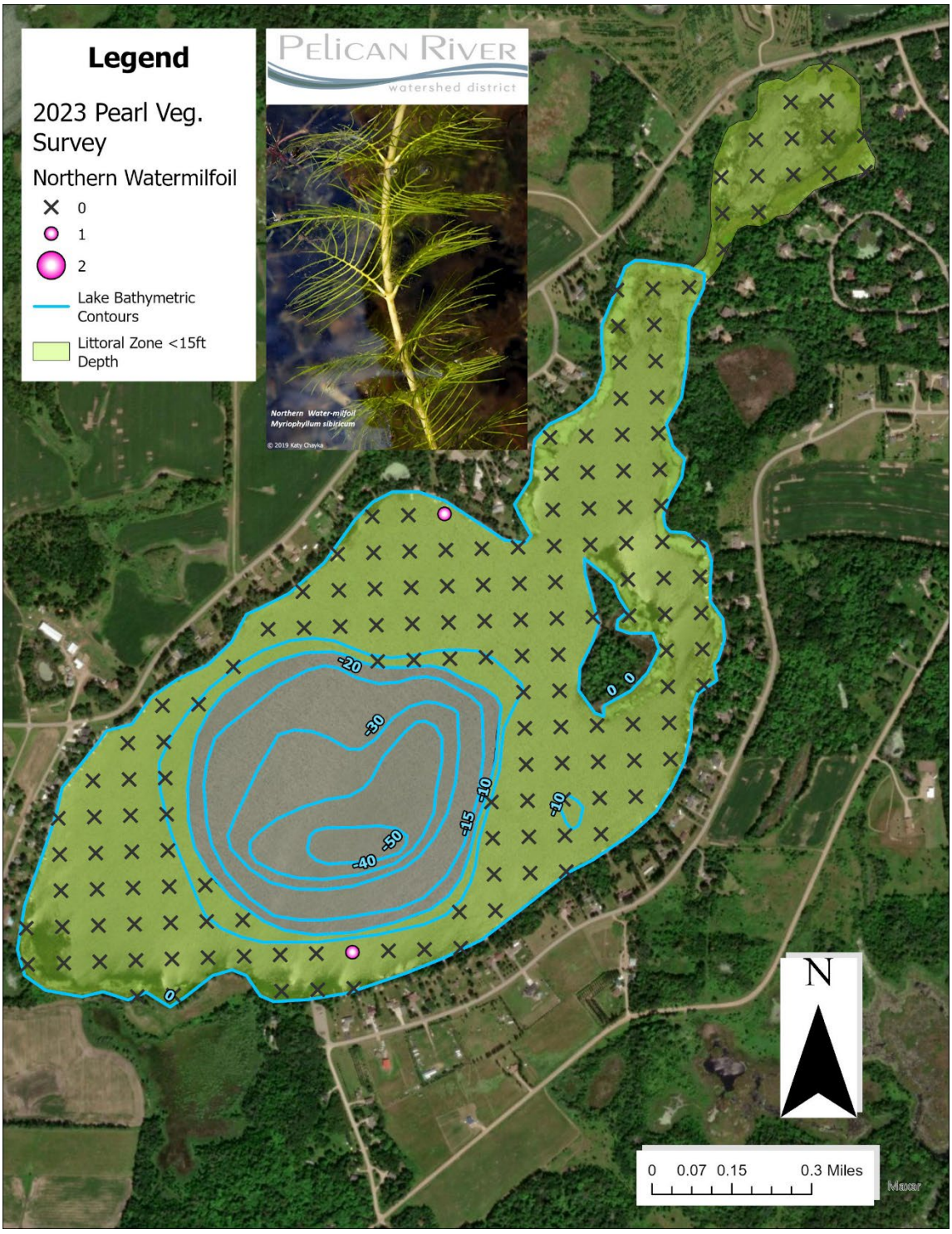

Figure 6 – Northern Water-milfoil Plant distribution from the 2023 point-intercept survey for Northern Water-milfoil in intercepts Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.

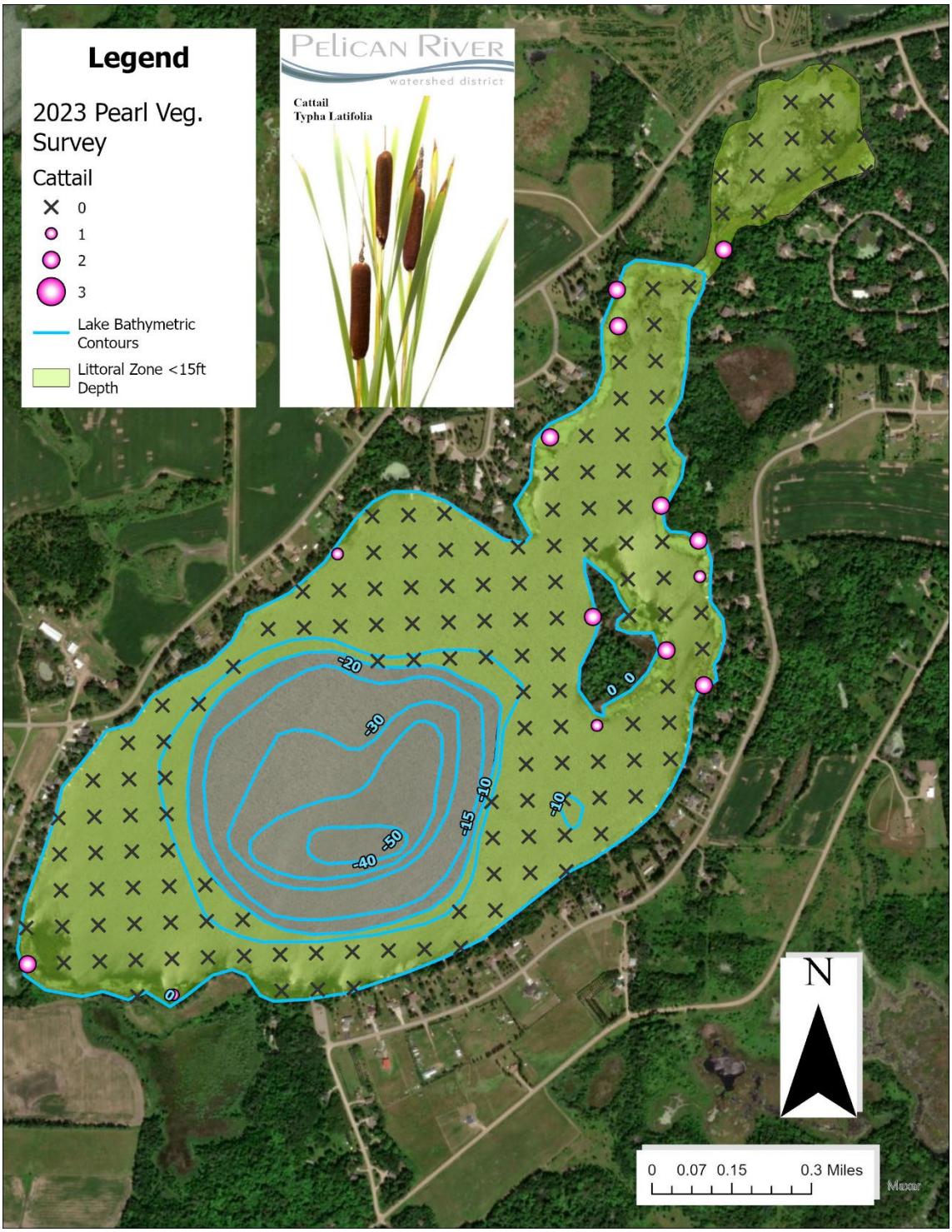

Figure 7 – Cattail Distribution. Plant distribution from the 2023 point-intercept survey for Cattail in intercepts Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.

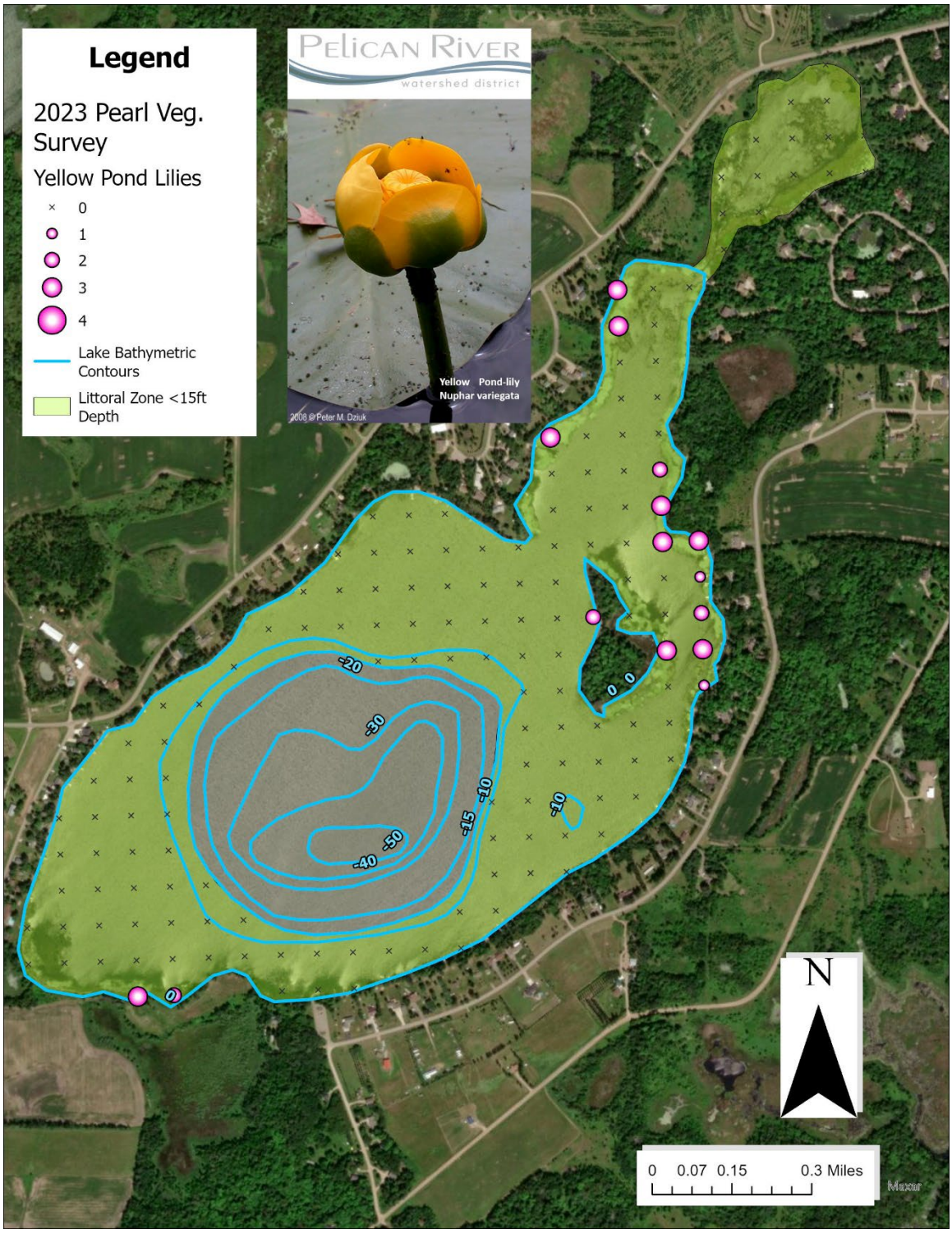

Figure 8 – Yellow Pond-Lily Distribution. Plant distribution from the 2023 point-intercept survey for Yellow Pond-lily in intercepts Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.

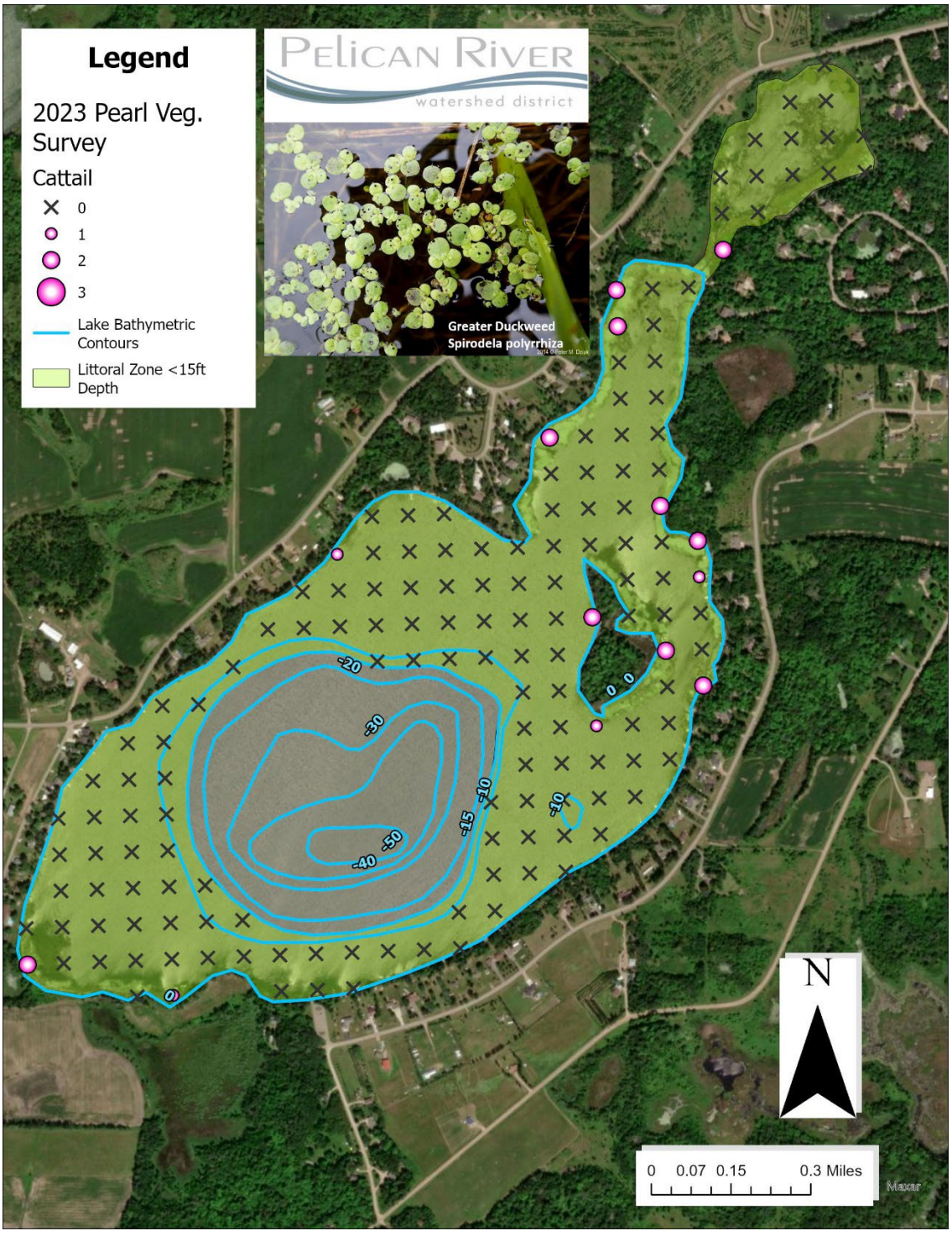

Figure 9 – Greater Duckweed Distribution. Plant distribution from the 2023 point-intercept survey for Small Duckweed in intercepts Pearl Lake, Becker County (EQuIS# 03-0486-00-201). Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.

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.