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

Prepared by:
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Project Details

Lake: Munson (EQuIS# 03-0357-00-201)

Lake Surface Area: 134.45 acres **Littoral Area:** 48 acres **County:** Becker

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

Date of Survey (most recent): July 17, 2023 (PRWD)

Surveyor[s]: Owen Reding & Oliver Kritzberger

Report Updated: December 29, 2023

Author[s]:

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Report Details

G. L. Kemper. 2023. Munson Lake, Becker County: 2023 Aquatic Vegetation Management Report. Water Resource Coordinator Pelican River Watershed District, 211 Holmes Street W., Detroit Lakes, MN 56501. 17 pp.

Summary

The purpose of this report is to provide an overview of aquatic plant distribution and the management of invasive aquatic plants in Munson 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

Munson lake is a recreational development lake with a heavily developed shoreline, located just southeast of the City of Detroit Lakes, between Long Lake and Lake Sallie. Munson Lake has a littoral area of approximately 48 acres (36% of lake surface area). There are no surface water inlets, and the lake receives water primarily from stormwater runoff and groundwater interaction. Water flows from the lake on the southeast corner through a series of historic MN DNR fisheries rearing ponds to Lake Sallie. A MN DNR public access constructed of gravel is located near the outlet.

The shoreline topography is predominantly steep slopes with bluffs draining toward the lake. During the early development of these areas, wood retaining walls were used to alter the slope topography to allow building construction closer to the lake. In many locations, the wood walls have begun to fail and need to be removed and the slope stabilized with vegetation. In some cases, when removal is not feasible, the walls must be properly replaced. The shoreline survey conducted in 2017, revealed 23 parcels containing retaining walls.

Munson is classified as a mesotrophic lake with good water quality that supports a healthy fishery and allows many types of recreational uses. Munson is dimictic, mixing in the spring and in the fall, remaining well mixed in the upper 5-6 meters (16.5-19.5 feet). Water quality on Munson has been stable for the last 10 years with the exception of total phosphorus level, which showed a 20% improvement from the previous ten-year period (1998-2007). Water clarity averages are nearly 11 feet with total phosphorus levels of 18 µg/L.

Because of Munson's elongated shape, it has a higher shoreline length to lake area ratio. This allows more residential development and increases developmental pressure than a lake similar to its size with a round shape. Developmental pressure was apparent during a survey of shoreline alteration where 52% of the parcels were found to be greatly or moderately altered. Only 24% of the parcels were in a natural condition.

Two gravel mining operations are located in the western portion of the drainage area.

Management History

There were 2 sampling sites where Aquatic Invasive Plant Species (AIS), Curly-leaf Pondweed was detected this year (2023) (Figure 10). PRWD will continue to monitor the lake for AIS and will develop a management plan as needed after more assessments.

Survey Objectives

In 2023, a Point-intercept Survey assessed the distribution of aquatic plants in Munson 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 50 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

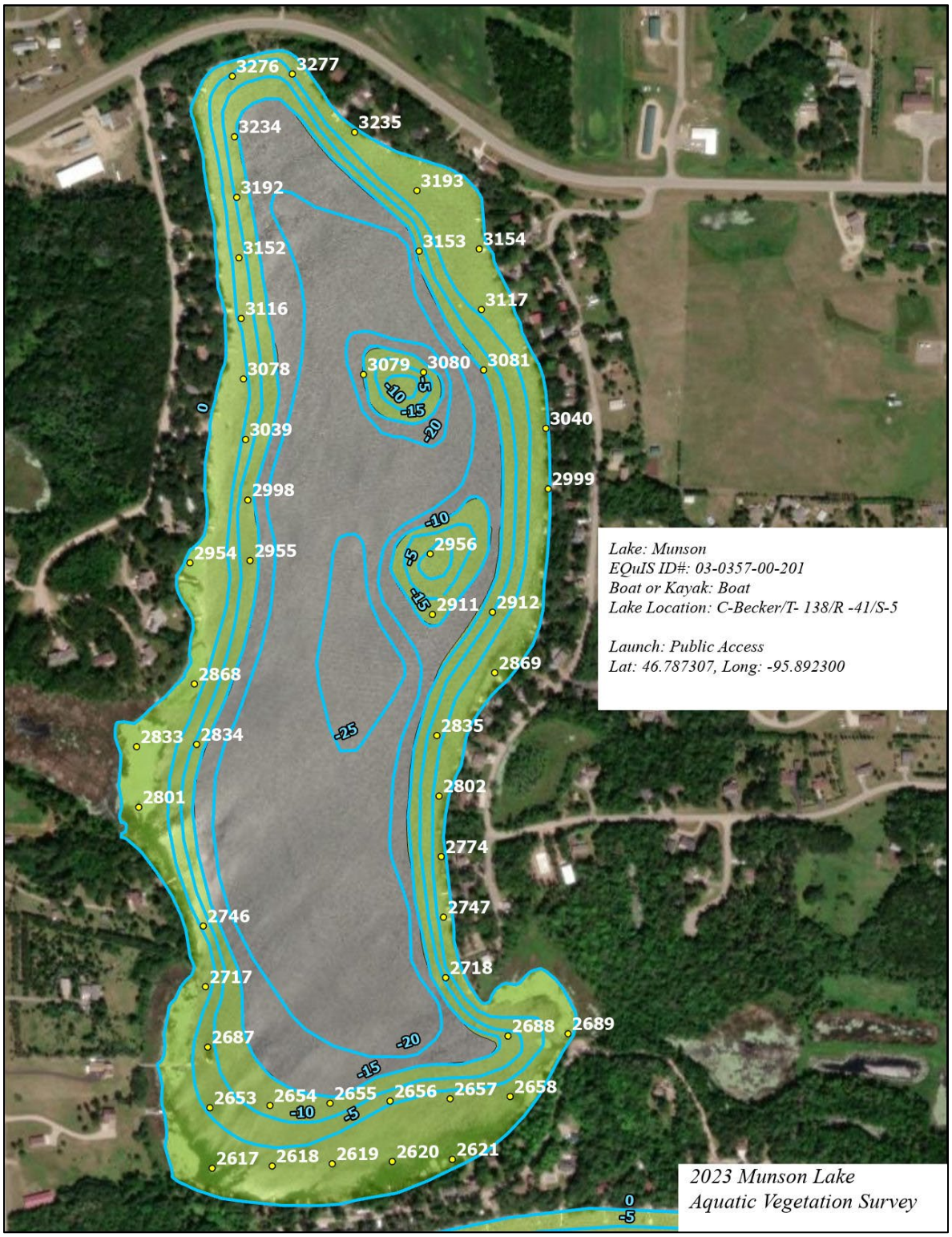

Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Munson Lake, Becker County (EQuIS# 03-0357-00-201). A total of 50 points were surveyed in 2023 at 72 meters apart.

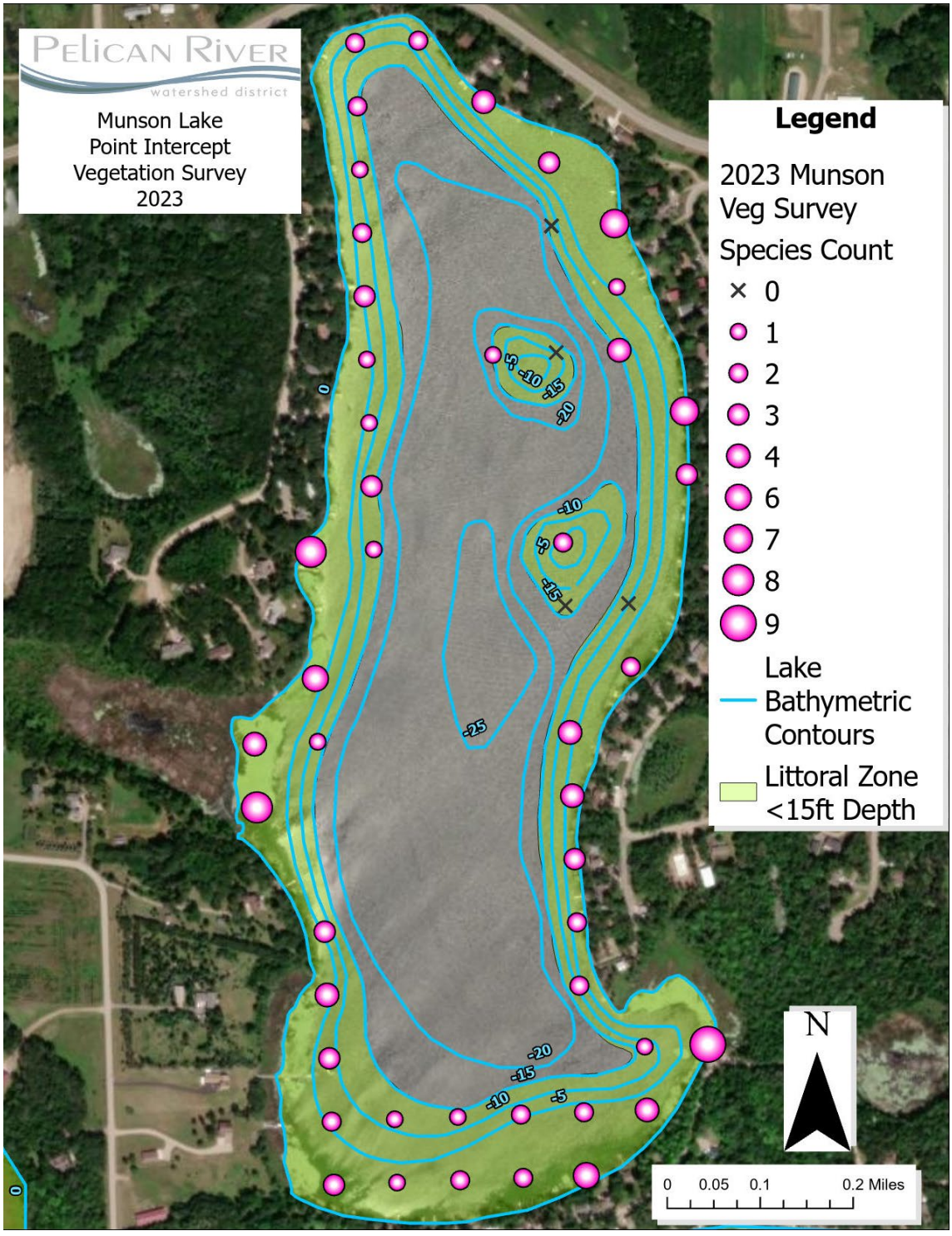

Figure 2 – Species Richness Distribution. Number of species at each site from the 2023 point-intercept survey in Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 9 at each point, with a 9 indicating the richness in species presence and 0 indicating no species.

Survey Observations

The first vegetation point-intercept survey of Munson Lake (EQuIS# 03-0357-00-201 conducted by the PRWD occurred on July 17th, 2023. There are 48 acres of the littoral zone (< 15 feet deep and where aquatic plants are likely to be found) for Munson Lake. Of the 50 points sampled, 92% of the points had submersed native vegetation (Table 2) with a mean of 2.3 submersed native taxa per point (Table 2).

Table 2 - Point-intercept Metrics. Summary of PRWD point-intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	July 2023
Surveyor	PRWD
Total # Points Sampled	50
Max depth of growth	NA
Depth Range of Rooted Veg (ft.)	NA
# Points in Littoral (0-15 feet)	50
# of Vegetated Points in Littoral Zone	46
% Points w/ Submersed Native Taxa	92%
Mean Submersed Native Taxa/ Point	2.3
# Submersed Native Taxa	13
# Submersed Non-Native Taxa	1
% Points w/ Submersed Non- native Taxa	4%

Based on the 2023 point-intercept survey, there are 13 Submergent Native Taxa (Table 3) within the littoral area of Munson Lake. The dominating Submergent species are Coontail (*Ceratophyllum demersum*) 48% (Figure 3), Chara (*Chara sp*.) 30% (Figure 4), Sago Pondweed (*Stuckenia pectinate*) 28% (Figure 5), and Flat-stem Pondweed (*Potamogeton zosteriformis) 22%* (Figure 6). These aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Munson Lake also has the following Emergent Taxa: Giant Bur-reed (Sparganium eurycarpum) 22% (Figure 7), Bulrush (*Schoenoplectus* sp.) 10%, Cattail (*Typha sp.*) 6%, and Needle Spikerush (Eleocharis acicularis) 2%. Floating-leaf Taxa: Yellow Pond Lilly (Nuphar lutea) 16% (Figure 8) and Water Lillies (Nymphaeaceae spp.) 2%. Free-floating Taxa: Small duckweed (Lemna minor) 2% (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.

Munson Lake has an average of 2.5 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 Munson Lake, Becker County (EQuIS# 03-0357-00-201).

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.*		
Potamogeton crispus	Curly-leaf Pondweed	4%
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.*		
Utricularia spp.	Bladderwort	6%
Elodea canadensis	Canada Waterweed	2%
Chara spp./Nitella spp.	Chara	30%
Potamogeton perfoliatus	Clasping Leaf Pondweed	18%
Ceratophyllum demersum	Coontail	48%
Potamogeton zosteriformis	Flat-stem Pondweed	22%
potamogeton illinoensis	Illinois pondweed	12%
Potamogeton amplifolius	Large Leaf Pondweed	12%
Stuckenia pectinata	Sago Pondweed	28%
Najas flexilis	Slender Naiad, Bushy Pondweed	4%
Ruppia cirrhosa	Spiral Ditch Grass	20%
Potamogeton praelongus	White-stem Pondweed	6%
myriophyllum verticillatum	Whorled Watermilfoil	6%
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.*		
Nymphaeaceae spp.	Water Lilies	2%
Nuphar lutea	Yellow Pond Lilly	16%
EMERGENT *These plants extend well above the water surface and are usually found in shallow water, near shore.*		
Sparganium americanum	American bur-reed	22%
Schoenoplectus spp.	Bulrush	10%
Typha latifolia & angustifolia	Cattail	6%
Eleocharis acicularis	Needle Spikerush	2%
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.*		
Lemna minor	Small Duckweed	2%
Lemna trisulca	Star Duckweed	2%

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

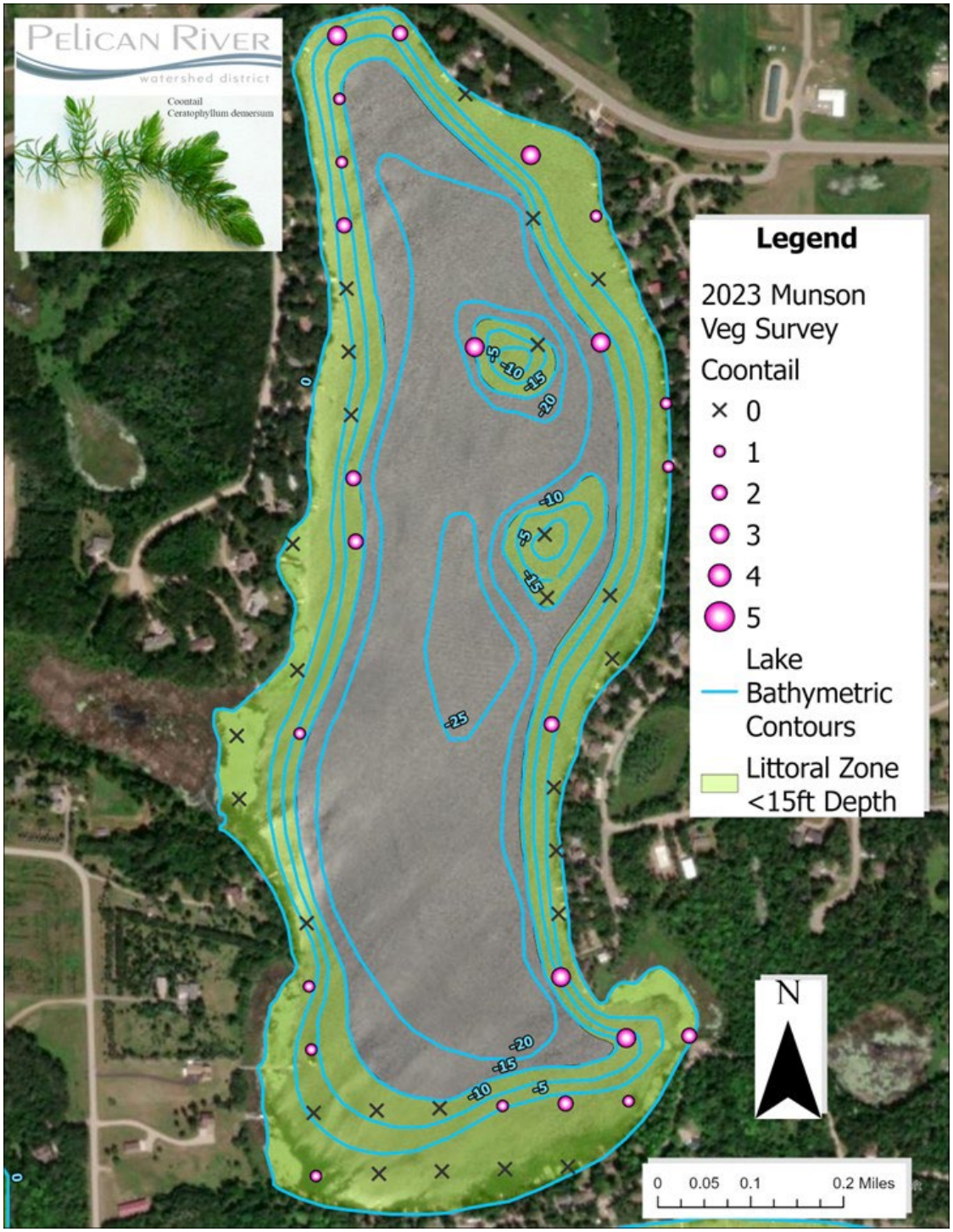

Figure 3 – Coontail Distribution. Plant distribution from the 2023 point-intercept survey for Coontail in intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating dense plant presence and 0 indicating no plants.

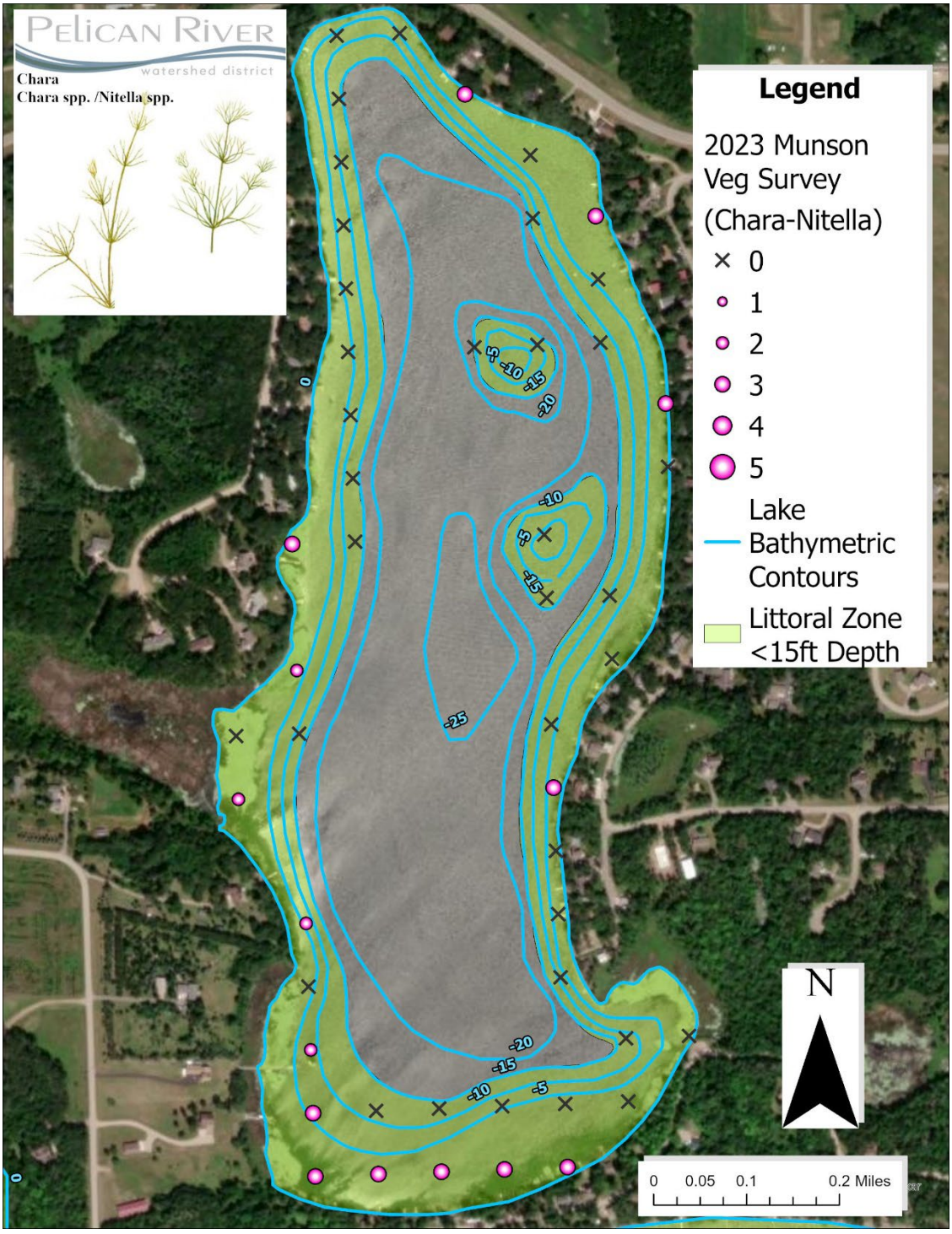

Figure 4 – Chara Distribution. Plant distribution from the 2022 point-intercept survey for Chara in intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating dense plant presence and 0 indicating no plants.

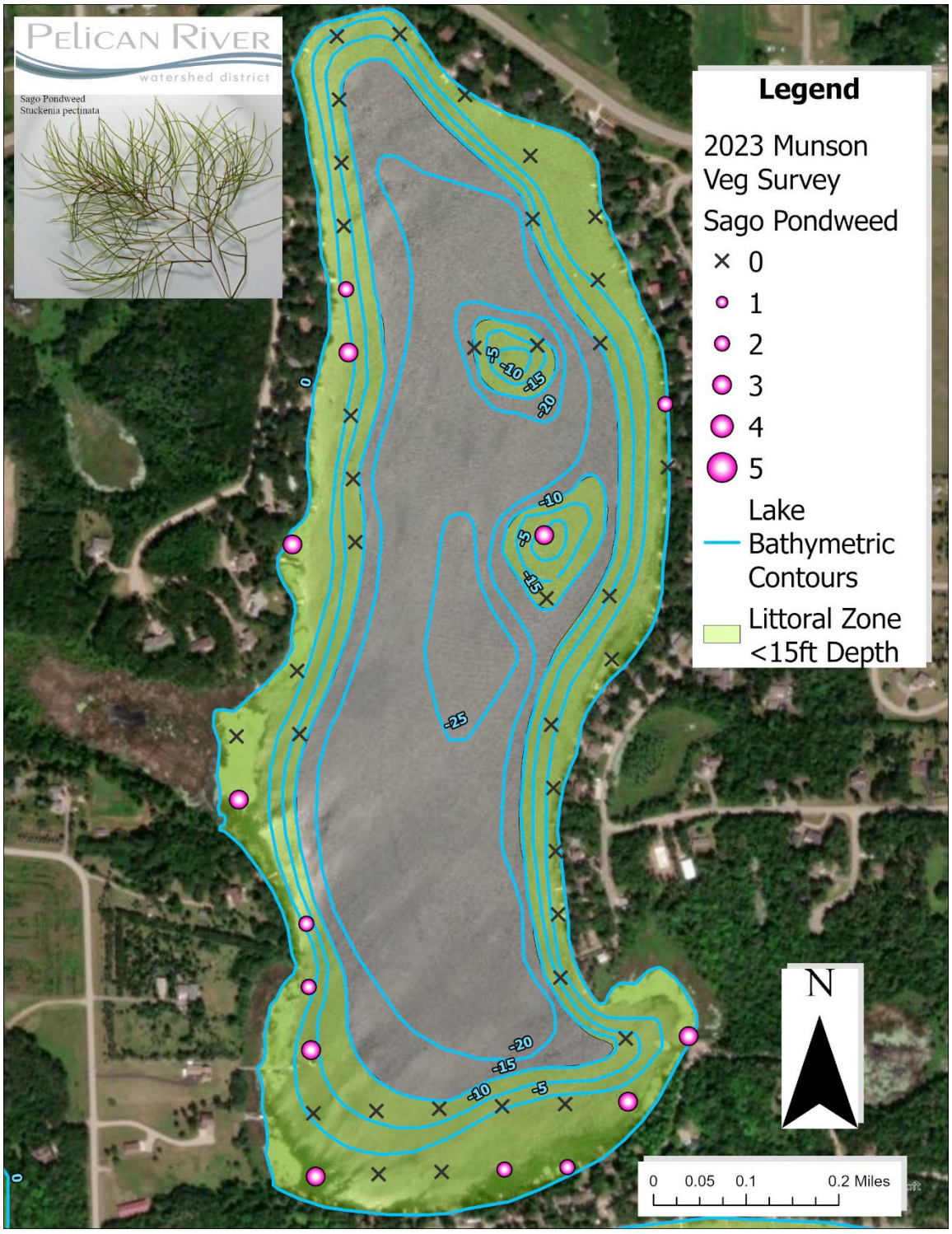

Figure 5 – Sago Pondweed Distribution. Plant distribution from the 2023 point-intercept survey for Sago Pondweed in intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating dense plant presence and 0 indicating no plants.

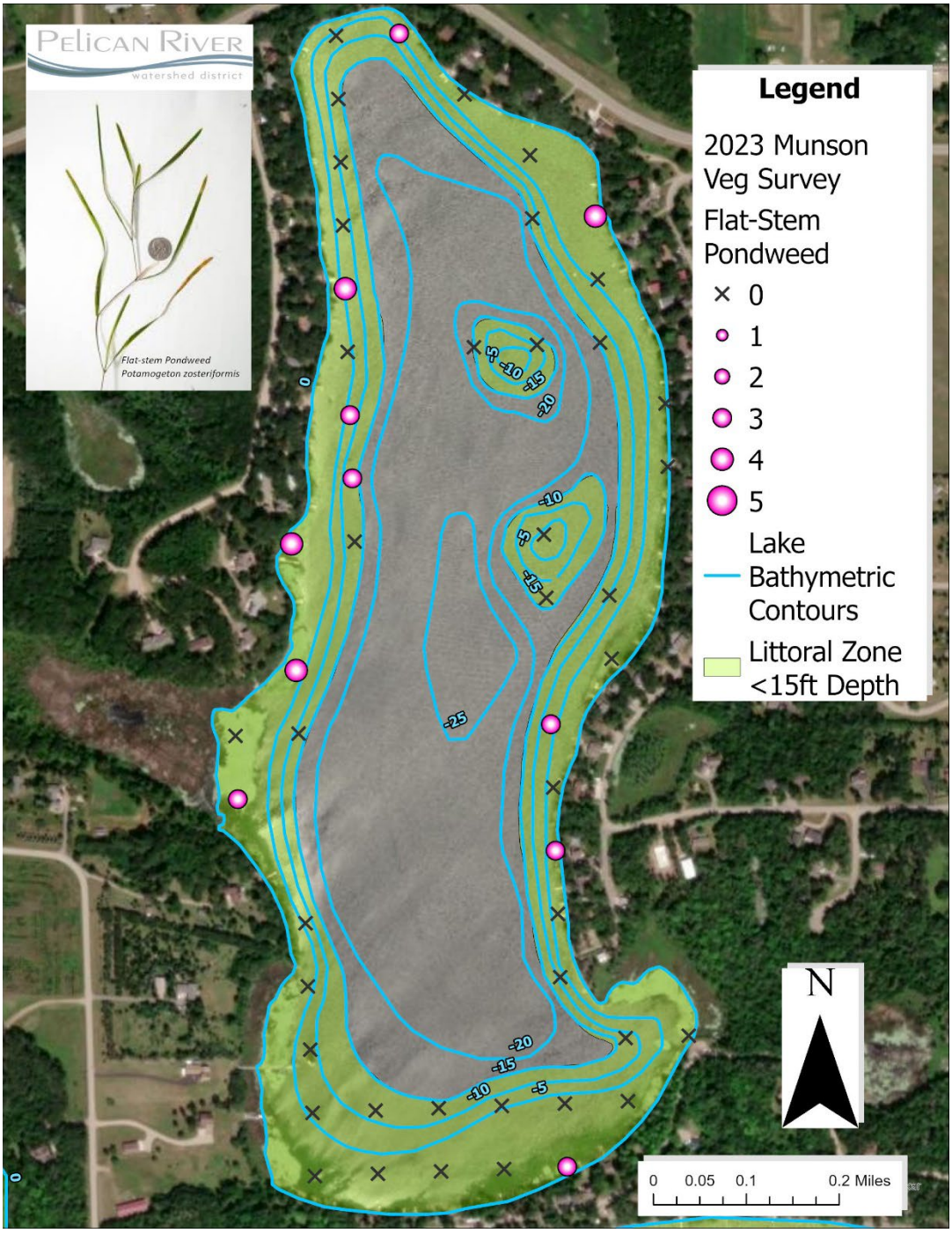

Figure 6 – Flat-stem Pondweed Plant distribution from the 2023 point-intercept survey for Flat-stem Pondweed in intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating dense plant presence and 0 indicating no plants.

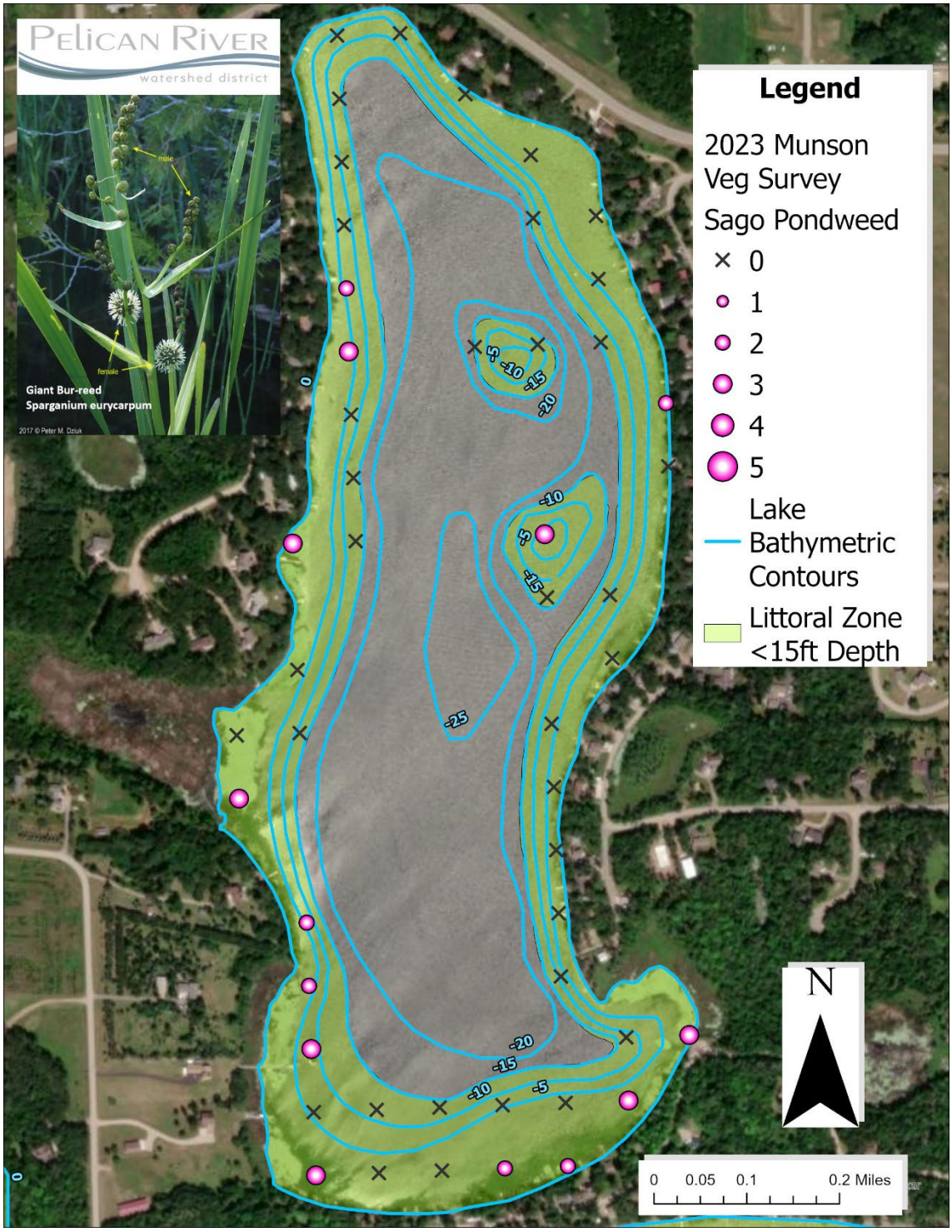

Figure 7 – Giant Bur-reed Distribution. Plant distribution from the 2023 point-intercept survey for Giant Bur-reed in intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating dense plant presence and 0 indicating no plants.

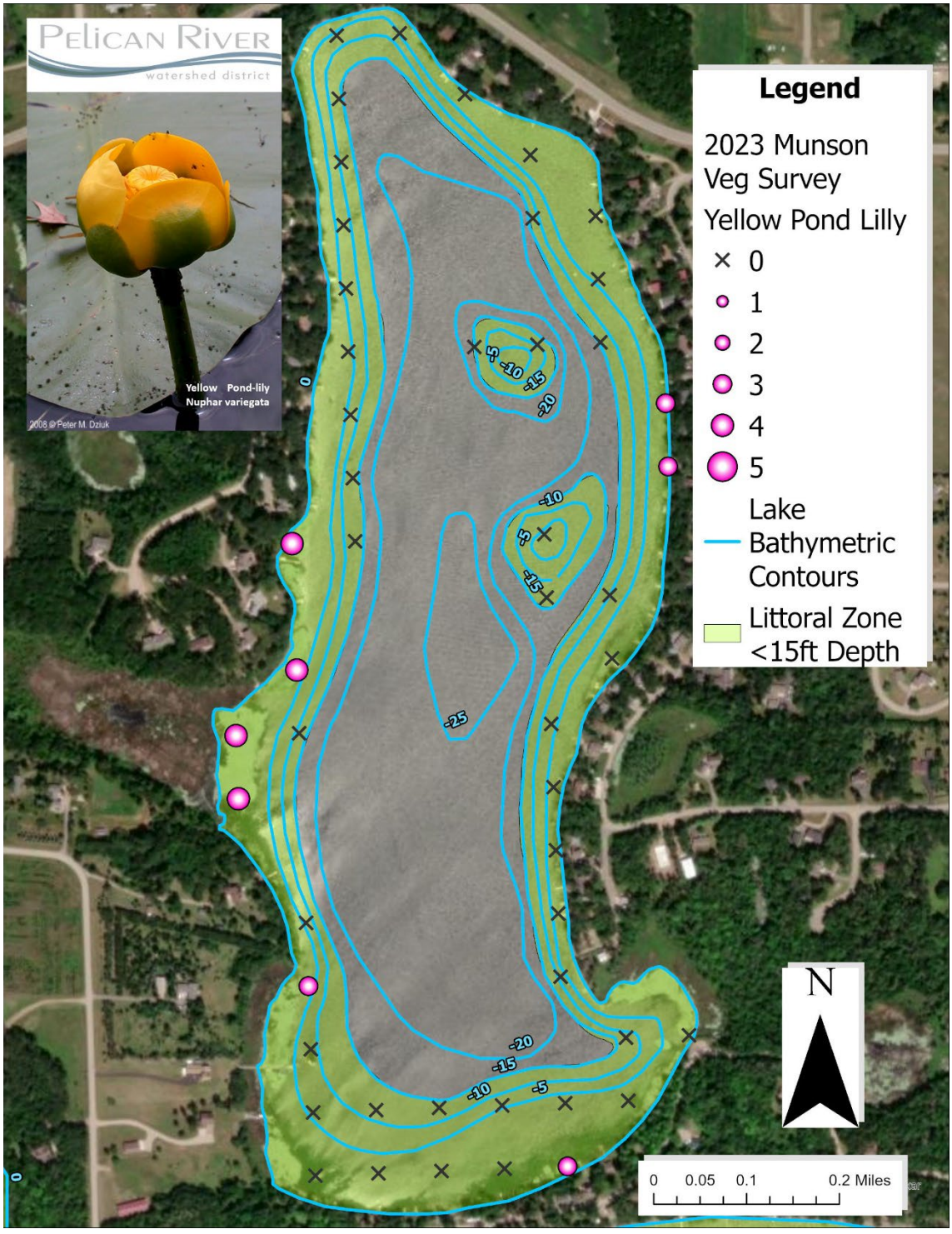

Figure 8 – Yellow Pond-Lily Distribution. Plant distribution from the 2023 point-intercept survey for Yellow Pond-lily in intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating dense plant presence and 0 indicating no plants.

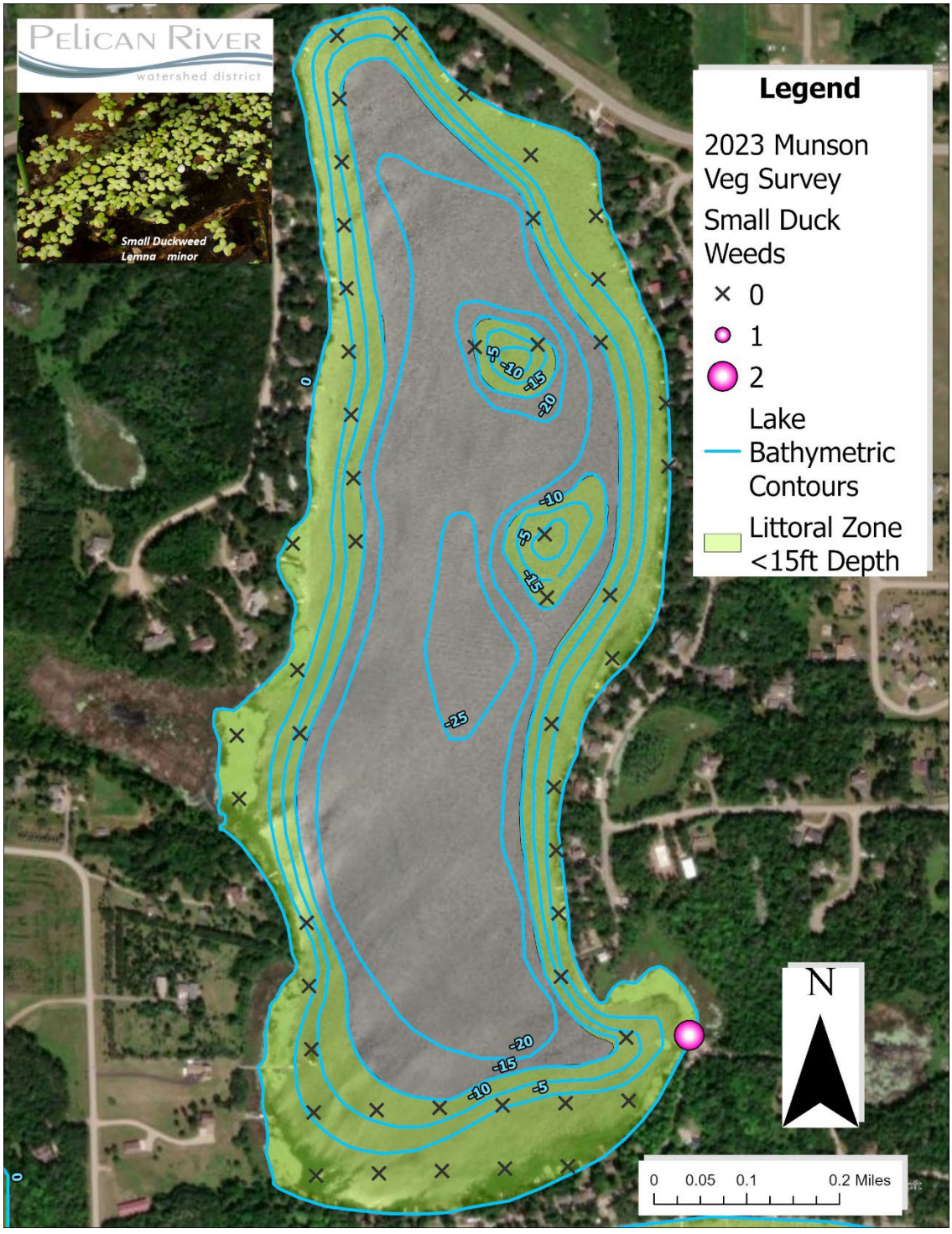

Figure 9 – Small Duckweed Distribution. Plant distribution from the 2023 point-intercept survey for Small Duckweed in intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.

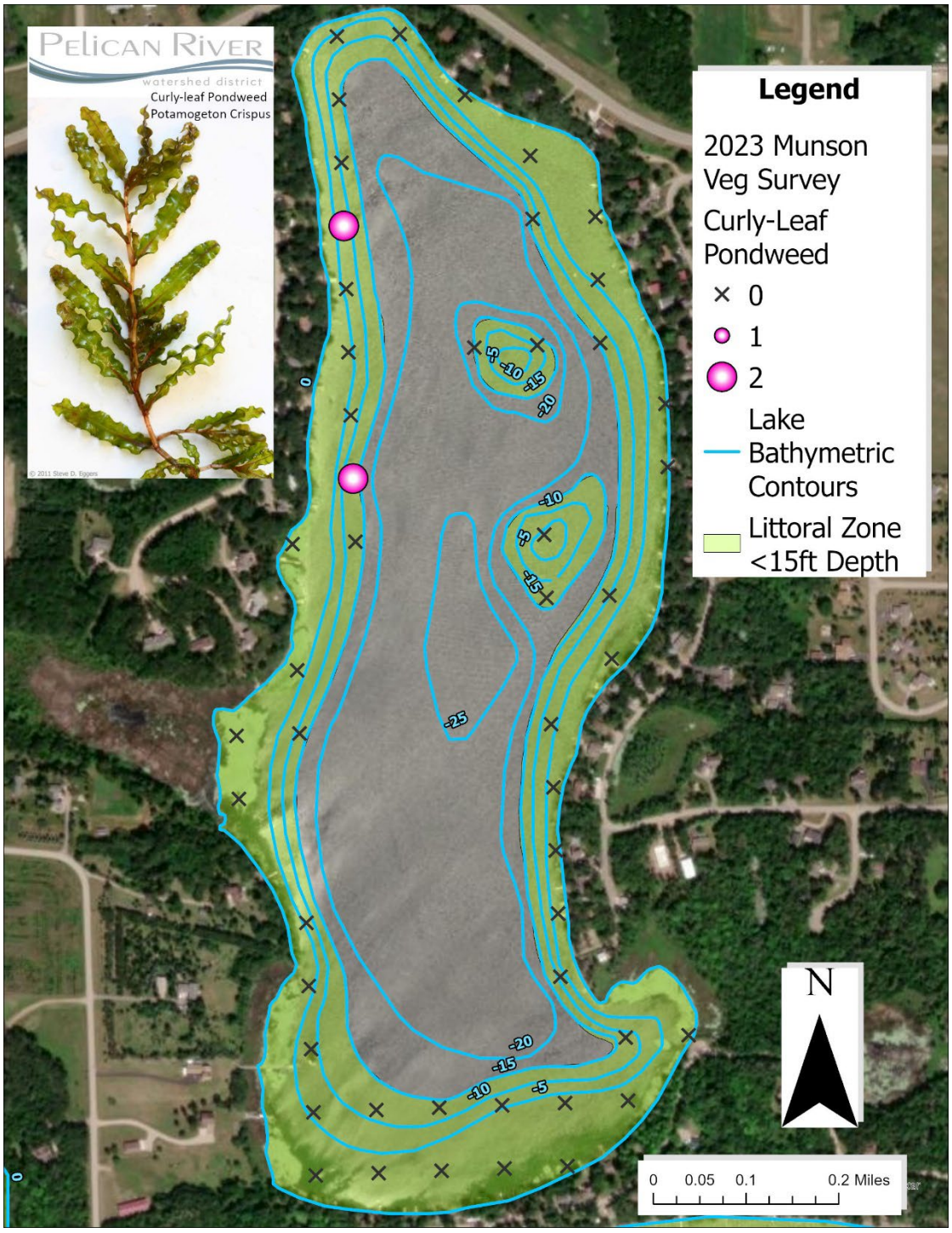

Figure 10 – Curly-leaf Pondweed (AIS). Plant distribution from the 2023 point-intercept survey for Curly-leaf Pondweed in intercepts Munson Lake, Becker County (EQuIS# 03-0357-00-201). Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.

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.