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## Detroit and Curfman, Becker County, MN 2024 Aquatic Vegetation Management Report

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**Prepared by:**

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*Water Resource Coordinator*

*Pelican River Watershed District*

## Project Details

**Lake:** Detroit (Lake ID 03-0381-00); Curfman (Lake ID 03-0363-00)

**Lake Surface Area:** 3,067.13 acres **Littoral Area:** 1,895 acres **County:** Becker

**Survey Type:** Point-intercept aquatic plant surveys (2024)

**Date of Survey (most recent):** July 26, 2024 –August 23, 2024 (PRWD)

**Surveyor[s]:** Jon Fogarty & Sheldon McCoy

**Report Updated:** November 2024

**Author[s]:**

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## Report Details

G. L. Kemper. 2024. Detroit and Curfman Lakes, Becker County: 2024 Aquatic Vegetation Management Report. Water Resource Coordinator Pelican River Watershed District, 211 Holmes Street W., Detroit Lakes, MN 56501. 23 pp.

## Summary

The purpose of this report is to provide an overview of aquatic plant distribution and the management of invasive aquatic plants in Detroit and Curfman Lake, Becker County in 2024. 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

Detroit Lake, locally known as Big Detroit and Little Detroit, has two distinct basins that are separated by a shallow gravel bar. At 3,067 acres, Detroit Lake is the largest lake within the PRWD and lies entirely within the City of Detroit Lakes municipal boundaries. As typical with urban lakes, its shoreline is extensively developed with residential homes, commercial businesses and some industrial buildings. The lakes are heavily used for game fishing, boating, and other summer and winter recreational activities.

There are two public accesses on Big Detroit, located on the north and south sides. The north side access is owned by the City of Detroit Lakes, however, there are short term plans for the MN DNR to construct a new access west of the Holiday Inn. In 2016, the south public water access on Big Detroit, owned by the MN DNR, was expanded and reconstructed to increase the parking area, provide stormwater management enhancements, and a designated area to clean and decontaminate water related equipment. There is one commercial marina on Big Detroit, operated by the Holiday Inn, and is currently permitted for 26 slips.

Little Detroit has a City Park mile long public beach that extends from Washington Avenue to Legion Road. Within the public beach area, the City of Detroit Lakes owns a public water access located at the intersection of Roosevelt Avenue and West Lake Drive. Little Detroit has two commercial marinas – J & K Marina and Long Bridge which have 102 and 36 slips respectively. There are 6 Planned Unit Developments (PUD's) with water access, totaling 82 slips.

The primary inlet and outlet for Detroit Lake is the Pelican River, flowing into the north side of Big Detroit and exiting the southwest side of Little Detroit. In addition to the Pelican River, Sucker Creek drains to the Lake along with two small wetland flowages, located on the southeast side of Big Detroit. There are no water control structures, however, the lake level is controlled further downstream by the rock rapids between Muskrat and Sallie lakes.

Big Detroit is a dimictic lake while Little Detroit is polymictic, however, both exhibit mesotrophic characteristics with moderately clear water and support all recreation/aesthetic uses. Occasionally, after large rain events or during hot summer months, the lake becomes borderline eutrophic with visible algal blooms. This is due, in part, to Rice Lake, an upstream degraded wetland complex which releases phosphorous following large rain events. Urban and residential stormwater runoff are also contributors of nutrients to the lake.

The two water bodies typically have different water clarity and nutrient levels. Little Detroit generally has better water quality than the larger and deeper Big Detroit. Little Detroit is showing a slight improvement in

both clarity and total phosphorus. Big Detroit has exhibited stable water clarity with a slight increase in total phosphorous levels.

With the continued development of Detroit Lake, there has been an increase in lakeshore alteration activities, including the removal of natural shoreline vegetation and installation of rock rip rap. There has also been a noticeable increase in the removal of aquatic vegetation by both manual and mechanical means.

The MN DNR is very active in the fisheries management of Detroit Lake and the lake supports a healthy game fish population.

**Management History**

Aquatic invasive species have a large effect on lake health and in turn, lakeshore property value. Because of the high level of recreational use of Detroit Lake, this makes it very susceptible to invasive species introduction. The aquatic invasive plants Flowering Rush (*Butomus umbellatus*) (FR) and Curly-leaf pondweed (*Potamogeton crispus*) (CLP) and both have been present in the lake since the 1970s, along with invasive invertebrates Zebra Mussels and Chinese Mystery snails. Mechanical harvesting was the primary method used to control CLP and FR, however in the mid-2000s it became clear that harvesting was not an effective control method. After conducting several years of research, the District used herbicides as its primary control method for CLP and FR. Both Flowering Rush and Curly-leaf Pondweed are assessed and managed annually via herbicide applications. The City of Detroit Lakes recognizes the economic value of the lake and assists the District in managing invasive plants.

While Curly-leaf Pondweed and Flowering Rush can be delineated in large areas, MN DNR only allows up to 15% of the Littoral area to be treated with herbicide without a variance. 2024 treatments for Curly- leaf Pondweed was for 45.4 acres in Detroit and 8.7 acres in Curfman. For the first time flowering Rush was not treated on Detroit and Curfman due to very few, if any plant found during delineations. Management of invasive aquatic plants is summarized in Table 1. Over time, the invasive aquatic plant community has fluctuated based on annual field delineations.

**Table 1 - Curly-leaf Pondweed Management Summary.** Characteristics and history of partial lake invasive plant treatments for Detroit and Curfman, Becker County, MN, total acres: 3,067, Littoral acres: 1,895, (15% of Littoral acres: 284.25). CLP is an abbreviation for curly-leaf pondweed. Total acres permitted does not reflect areas actually treated or delineated. The total acres were rounded to the nearest whole number.

Date (year)	Target Species	Total Acres Permitted	Herbicide Total Treatment Cost	Licensed Commercial Applicator
5/20/2024 Detroit	CLP	45	Flumioxazin \$11,210.00	PLM & Land Management Corp.
5/20/2024 Curfman	CLP	9	Flumioxazin \$2,010.00	PLM & Land Management Corp.




## Survey Objectives

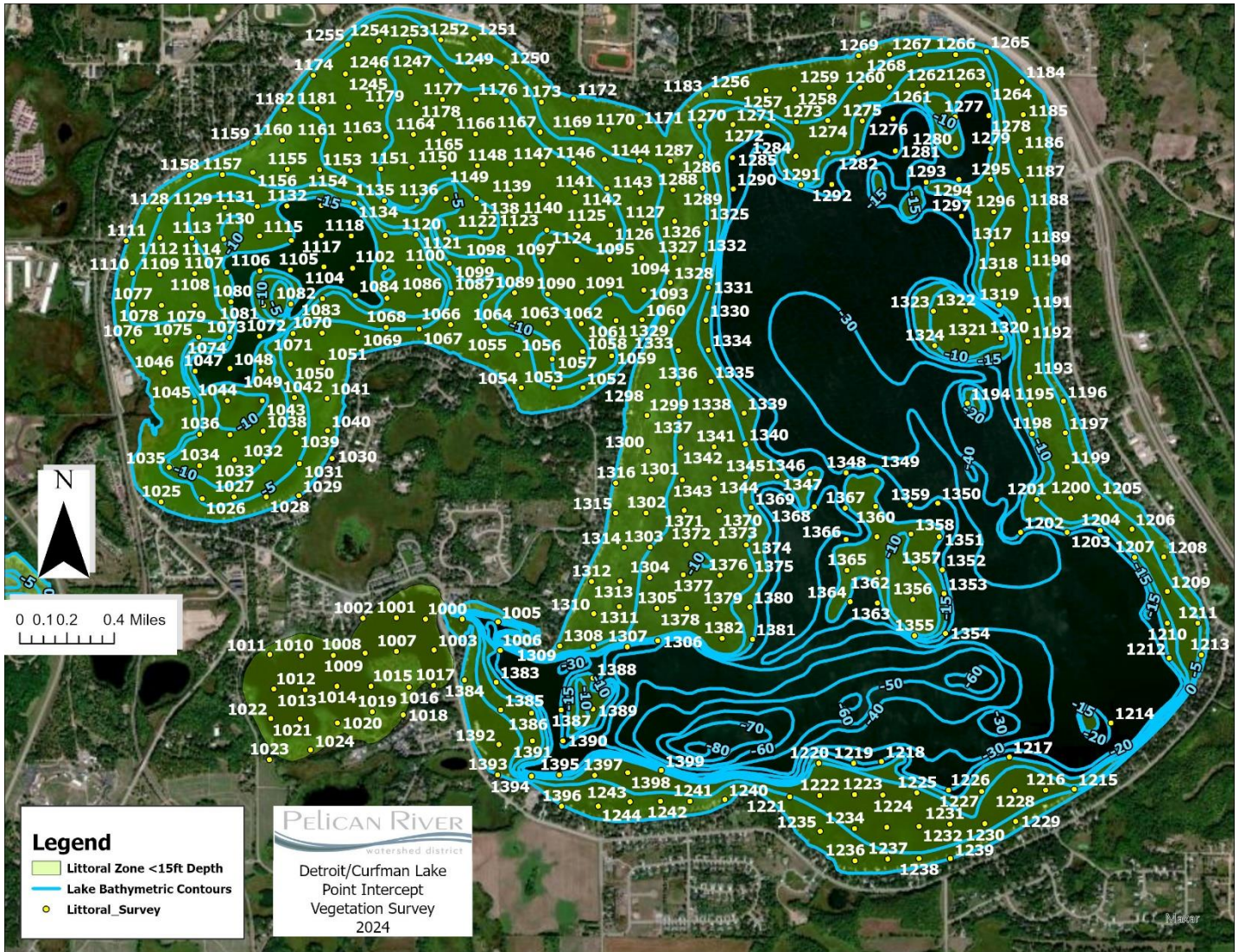
In 2024, a Point-intercept Survey assessed the distribution of aquatic plants in Detroit and Curfman Lakes. The primary purpose for this type of survey is to 1) develop baseline knowledge of the current plant community in a lake, and over time, 2) compare year-to-year plant variation (in plant presence 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

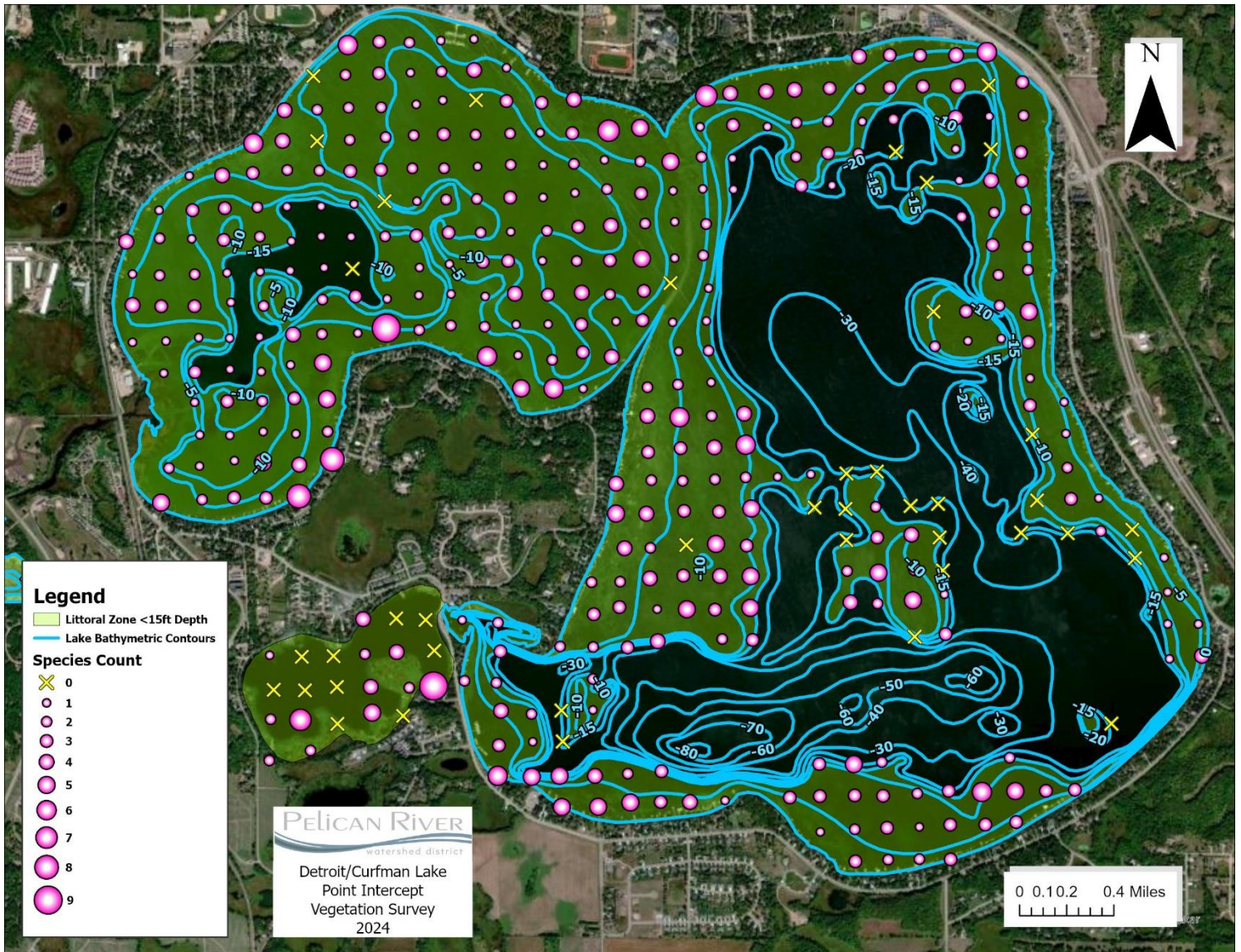
PRWD surveyors used a point-intercept survey method developed by John Madsen in “Aquatic Plant Control Technical Note MI-02, 1999” during the 2024 Survey. Points were placed 72 meters apart using a Geographic Information System (GIS), comprising of 400 points on a grid (Figure 1). Plant samples were 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 2. 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 Detroit and Curfman Lakes, Becker County, MN. A total of 400 points were surveyed in 2024 at 72 meters apart.



**Figure 2 – Species Richness Distribution.** Number of species at each site from the 2024 point-intercept survey in Detroit and Curfman Lakes, Becker County. 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 vegetation point-intercept survey of Detroit and Curfman Lakes conducted by the PRWD occurred between July 22<sup>nd</sup> and August 8<sup>th</sup>, 2024. Plants were rooted to a maximum depth (95%) of 26 feet, with depths ranging from 0 – 26 feet. However, since 1,895 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. 95% of the points had submersed native vegetation (Table 3) with a mean submersed native taxa per point of 3.6. Detroit and Curfman Lakes have up to 13 submersed native taxa (Table 4) and one non-native submersed taxa (Curly-leaf Pondweed) and one non-native emergent taxa (Flowering Rush).

**Table 3 - Point-intercept Metrics.** Summary of PRWD point-intercepts metrics Detroit and Curfman Lakes, Becker County. Shaded values were calculated from littoral depth range (0-15 feet).

Metric	JULY – AUGUST 2024
Surveyor	PRWD
Total # Points Sampled	400
Max depth of growth	26
Depth Range of Rooted Veg (ft.)	0.0 – 15.0
Max Depth of Growth (95%) (ft.)	15
# of Vegetated Points in Max Depth Range	359
# Points in Littoral (0-15 feet)	362
% Points w/ Submersed Native Taxa	95%
Mean Submersed Native Taxa/ Point	3.6
# Submersed Native Taxa	13
# Submersed Non-Native Taxa	1
% Points w/ Submersed Non- native Taxa	2%

Based on the 2024 point-intercept survey, the submersed native plant community within the littoral area in Detroit and Curfman Lakes were primarily dominated by Chara (Chara spp./ Nitella spp.) 62%, Bladderwort (*Utricularia spp.*) 29%, Water Celery (*Vallisneria americana*) 27%, White-stem Pondweed (*Potamogeton praelongus*) 22%, Slender Naiad (*Najas flexilis*) 17%, Coontail (*Ceratophyllum demersum*) 15% and Flat-stem Pondweed (*Potamogeton zosteriformis*) 15% (3, 4, 5, 6, 7, 8 & 9). These aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Detroit and Curfman Lakes also have the following free-floating leaf, and emergent: Star Duckweed (*Lemna trisulca*) 3%, Aquatic Mosses (*Drepanocladus*) 14%, Narrowleaf Cattails (*Typha angustifolia*) 6% and Bulrush (*Schoenoplectus spp.*) 2%, (Figures 10, 11, 12 and 13) 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.

Detroit and Curfman Lakes have an average of two species per sampling site. Figure 2 displays the spatial distribution and species richness (# of species per sample point) of all native submersed species from the 2024 point-intercept survey.



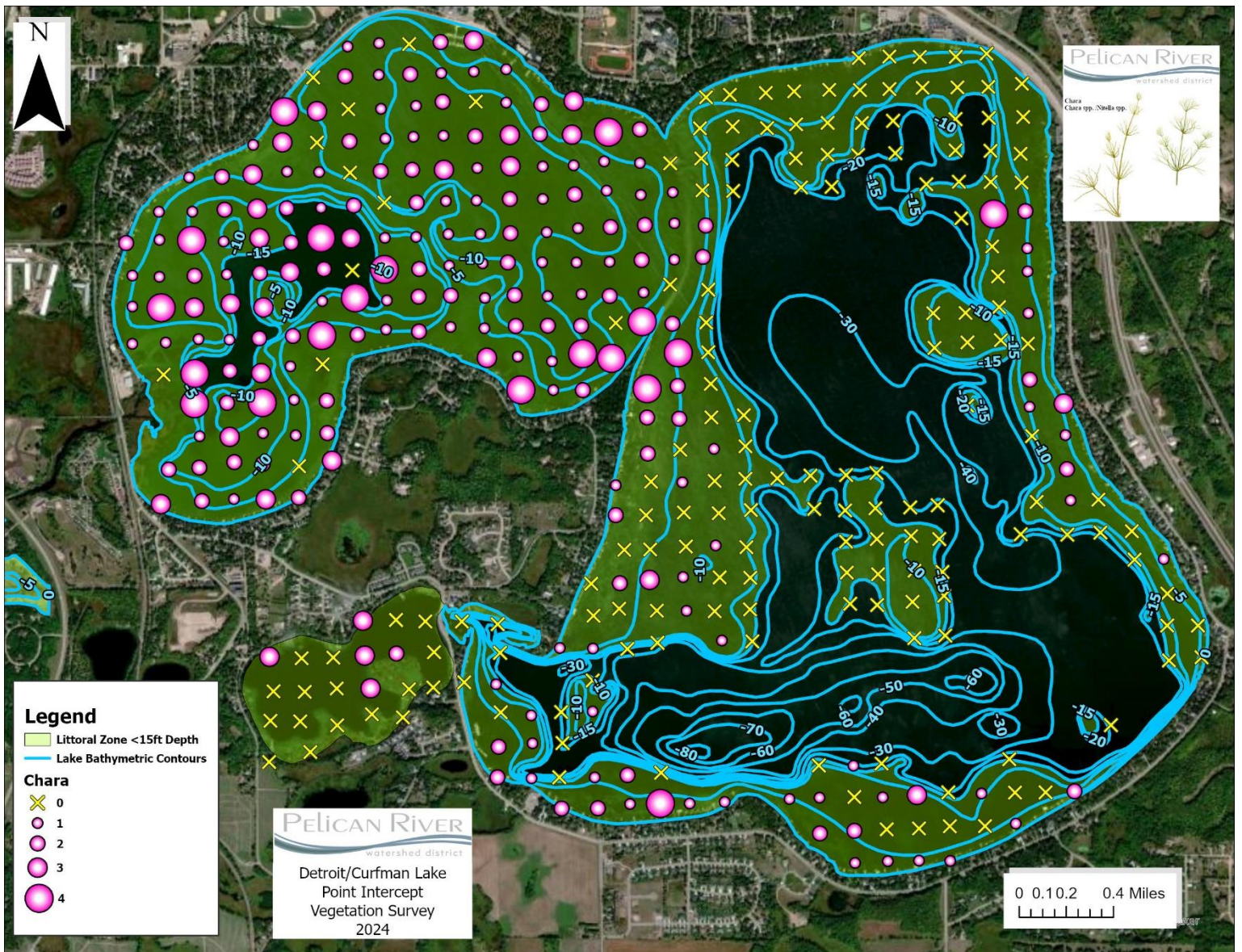
**Table 4 - Plant Frequency Occurrence.** Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Detroit and Curfman Lakes, Becker County, MN.

July 24 b

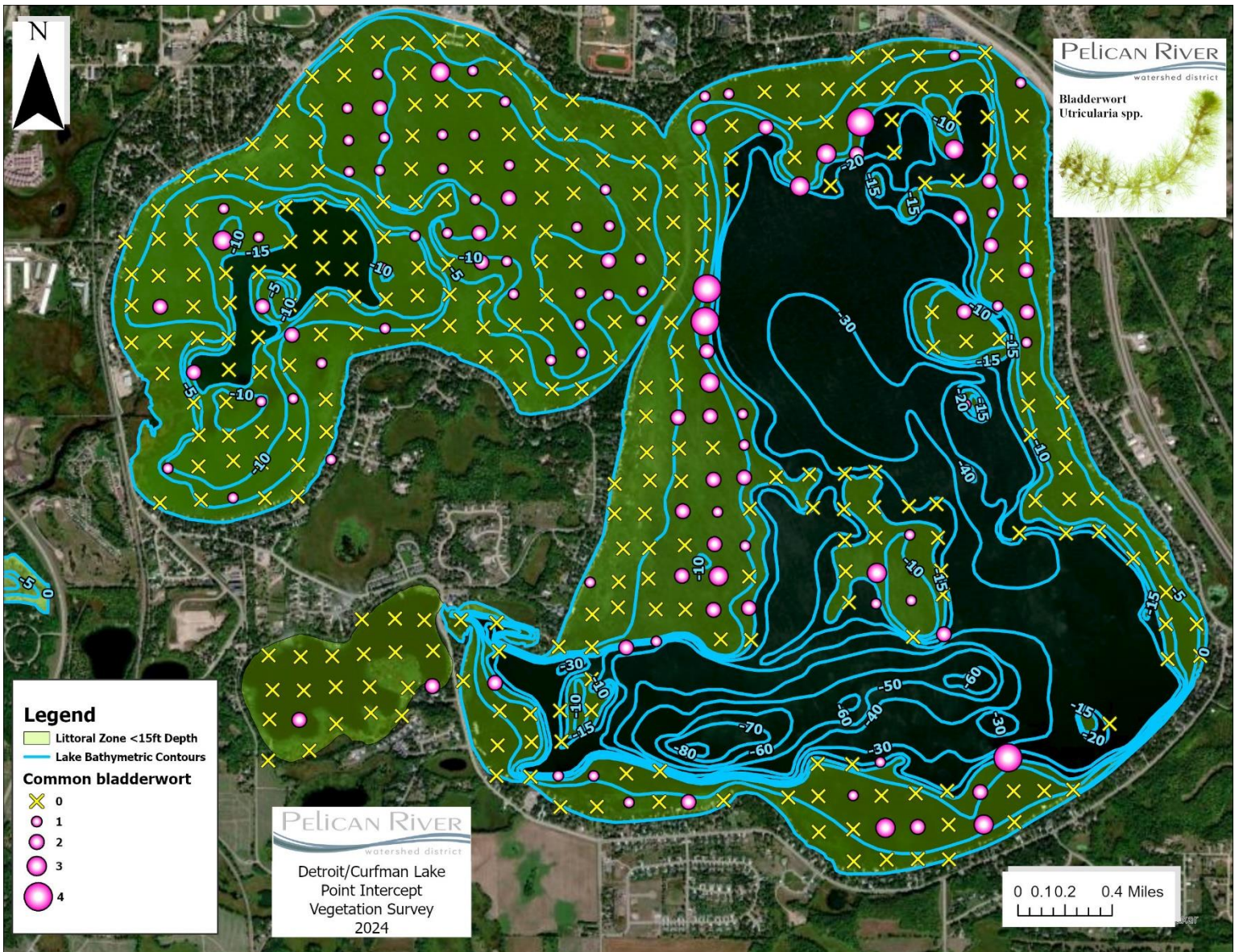
Taxonomic Name	Common Name	Frequency (%)
<b>SUBMERSED NON-NATIVE</b>		
<i>These plants spread or have been introduced beyond their native range and are either causing harm or have the potential to cause harm.</i>		
<i>Potamogeton crispus</i>	Curly-leaf Pondweed	2%
<b>SUBMERSED NATIVE</b>		
<i>These plants 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>Elodea canadensis</i>	Canada Waterweed	1%
<i>Chara spp./Nitella spp.</i>	Chara	62%
<i>Potamogeton perfoliatus</i>	Clasping Leaf Pondweed	12%
<i>Ceratophyllum demersum</i>	Coontail	15%
<i>Potamogeton zosteriformis</i>	Flat-stem Pondweed	15%
<i>Potamogeton illinoensis</i>	Illinois pondweed	7%
<i>Potamogeton floiosus</i>	Leafy Pondweed	1%
<i>Stuckenia pectinata</i>	Sago Pondweed	7%
<i>Najas flexilis</i>	Bushy Pondweed	17%
<i>Vallisneria americana</i>	Water Celery	27%
<i>Potamogeton praelongus</i>	White-stem Pondweed	22%
<i>Myriophyllum sibiricum</i>	Northern Watermilfoil	7%
<b>FLOATING LEAF</b>		
<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>		
<i>Utricularia spp.</i>	Bladderwort	29%
<i>Nuphar lutea</i>	Yellow Pond Lilly	2%
<b>EMERGENT</b>		
<i>These plants extend well above the water surface and are usually found in shallow water, near shore.</i>		
<i>Schoenoplectus spp.</i>	Bulrush	2%
<i>Typha angustifolia</i>	Narrowleaf Cattail	6%
<i>Drepanocladus spp.</i>	Aquatic Mosses	14%
<b>EMERGENT NON-NATIVE</b>		
<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>		
<i>Butomus umbellatus</i>	Flowering Rush	0.00%
<b>FREE FLOATING</b>		
<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>		
<i>Lemna trisulca</i>	Star Duckweed	3%

b Percent frequency for 2024 (PI Survey Method) calculated for 0-15 feet zone.

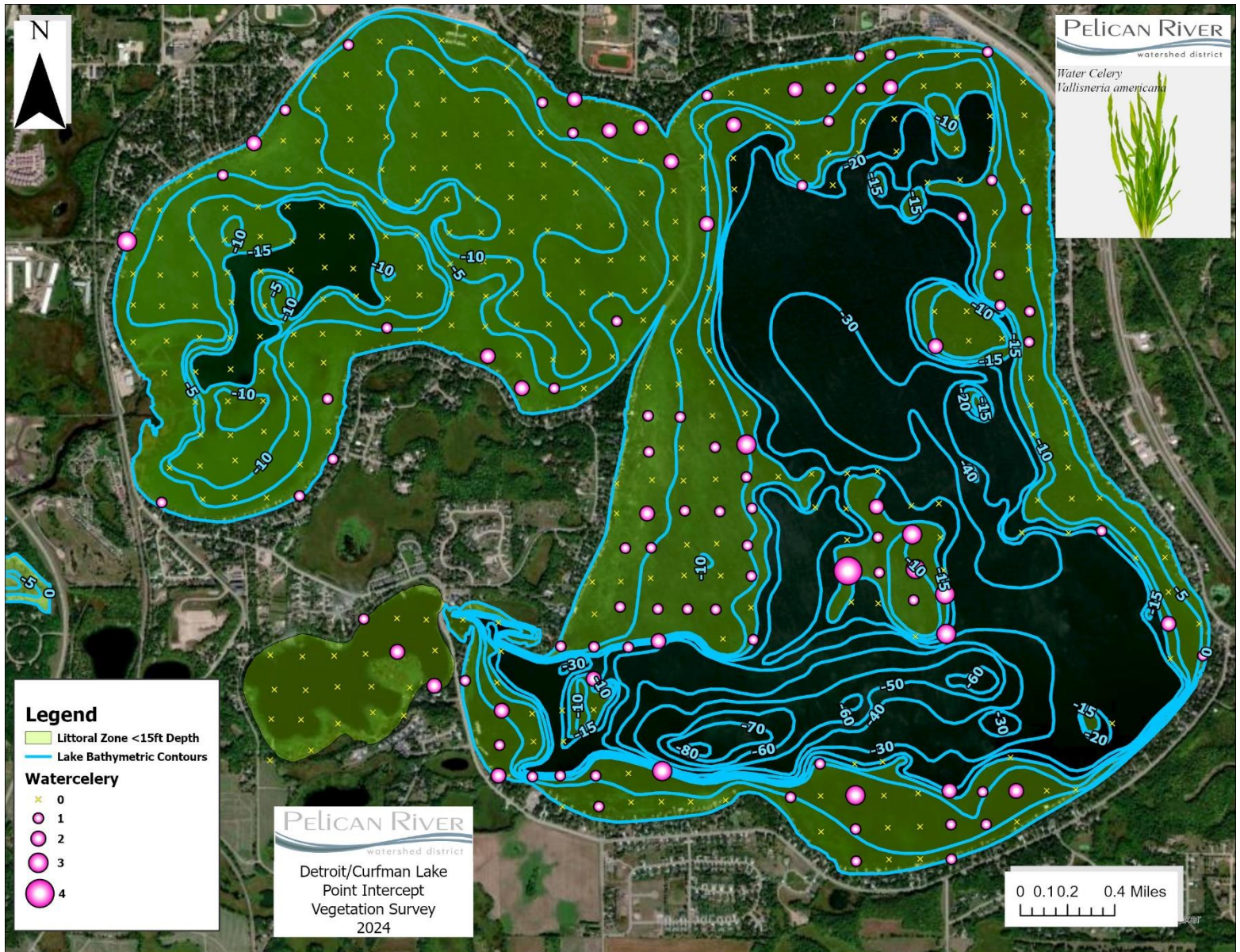
\*\* This species is present on the lake but detected through the lake delineation process and is not recorded in the Point intercept process data.



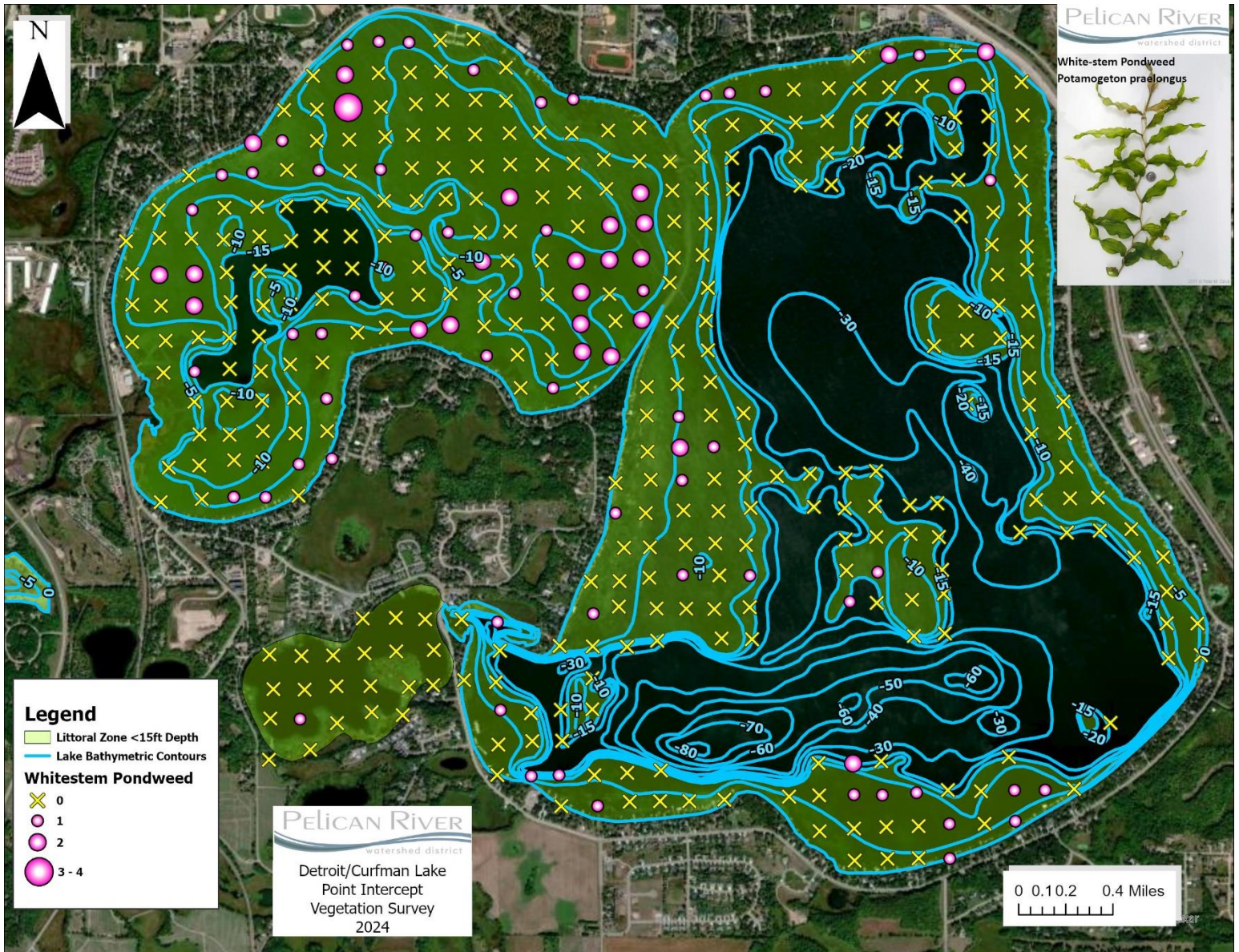
**Figure 3 – Chara Distribution.** Plant distribution from the 2024 point-intercept survey for Chara in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.



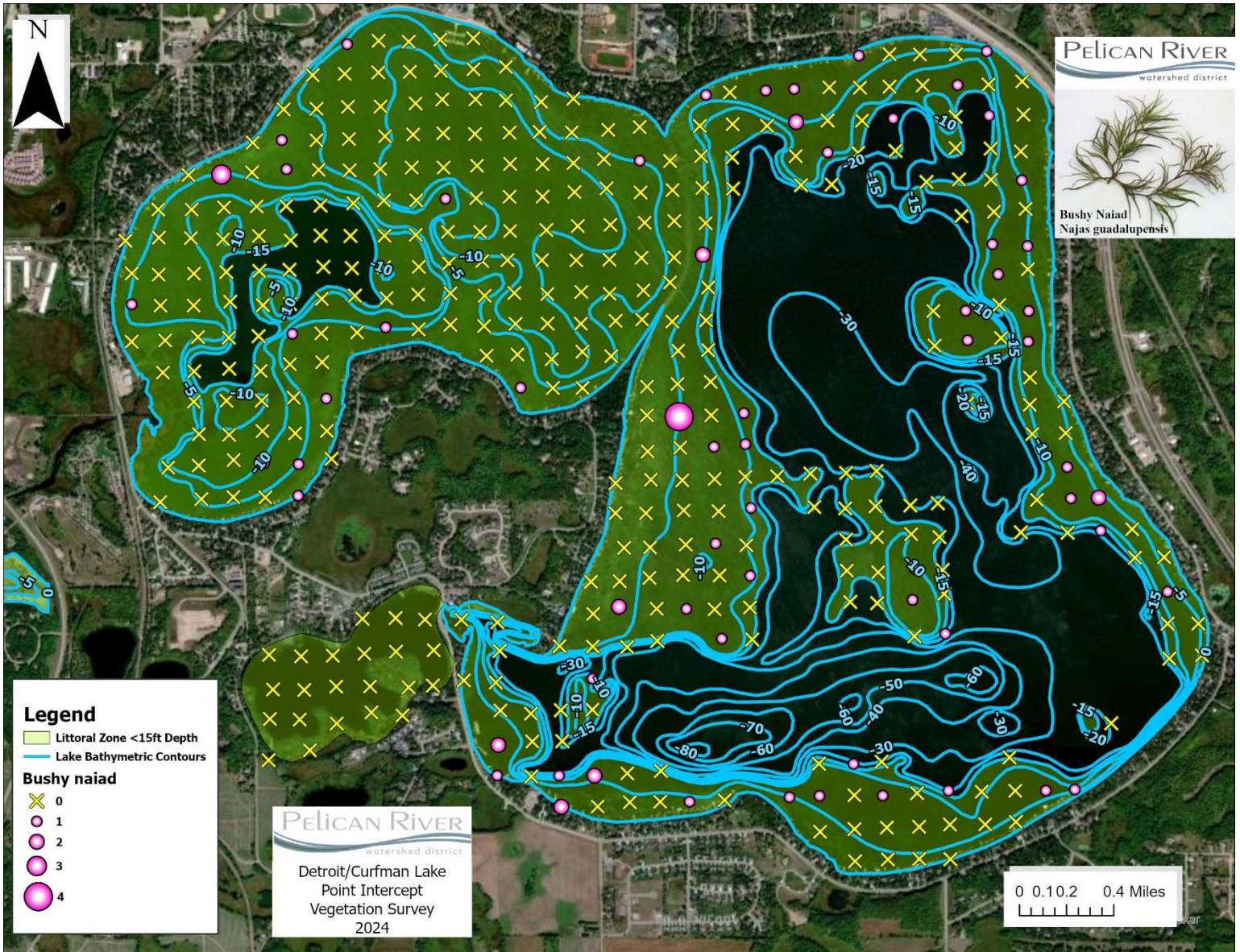
**Figure 4 – Bladderwort Distribution.** Plant distribution from the 2024 point-intercept survey for Bladderwort in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.



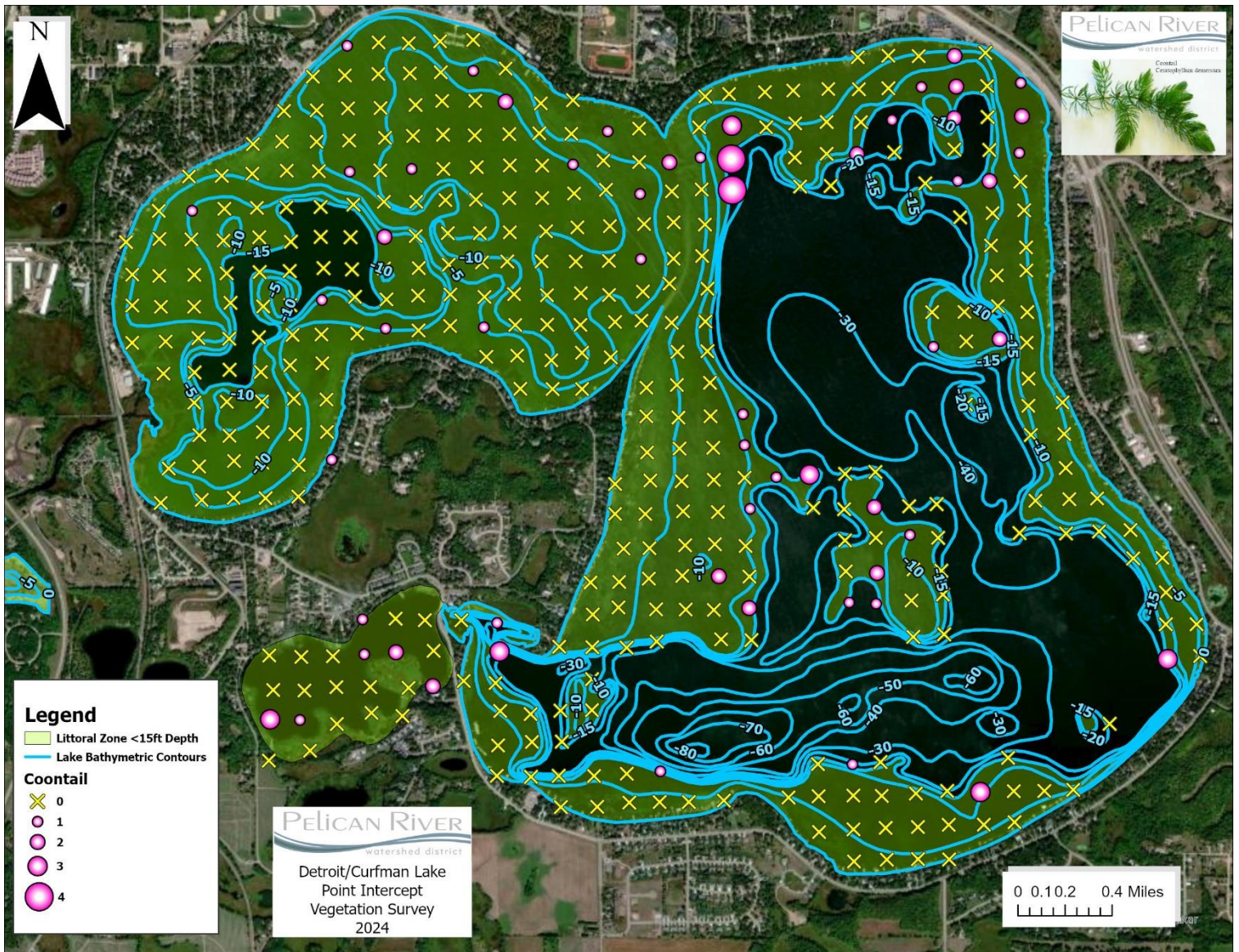
**Figure 5 – Water Celery Distribution.** Plant distribution from the 2024 point-intercept survey for Water Celery in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.



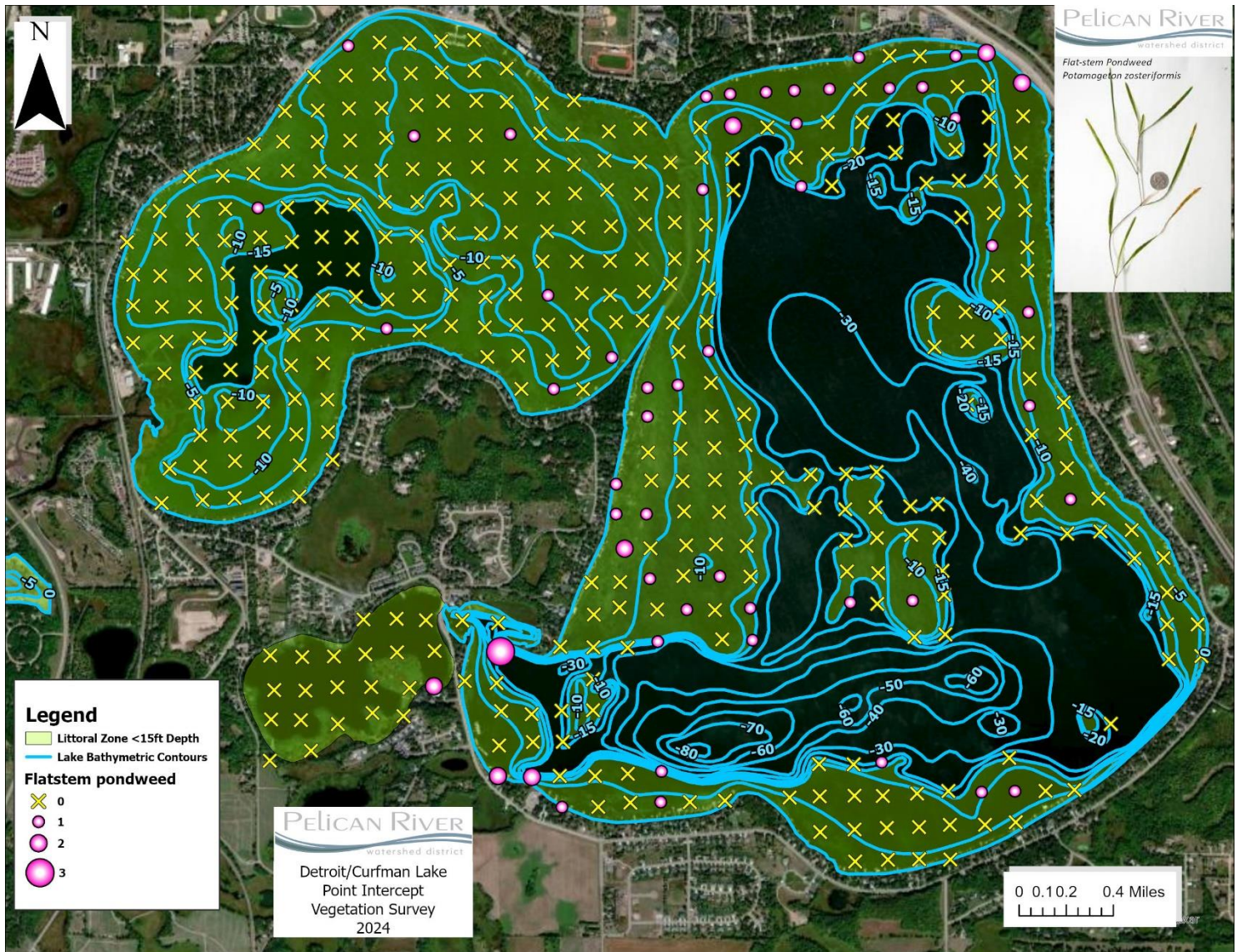
**Figure 6 – White-stem Pondweed Distribution.** Plant distribution from the 2024 point-intercept survey for White-stem Pondweed in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.



**Figure 7 – Bushy Naiad Distribution.** Plant distribution from the 2024 point-intercept survey for Bushy Naiad in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.

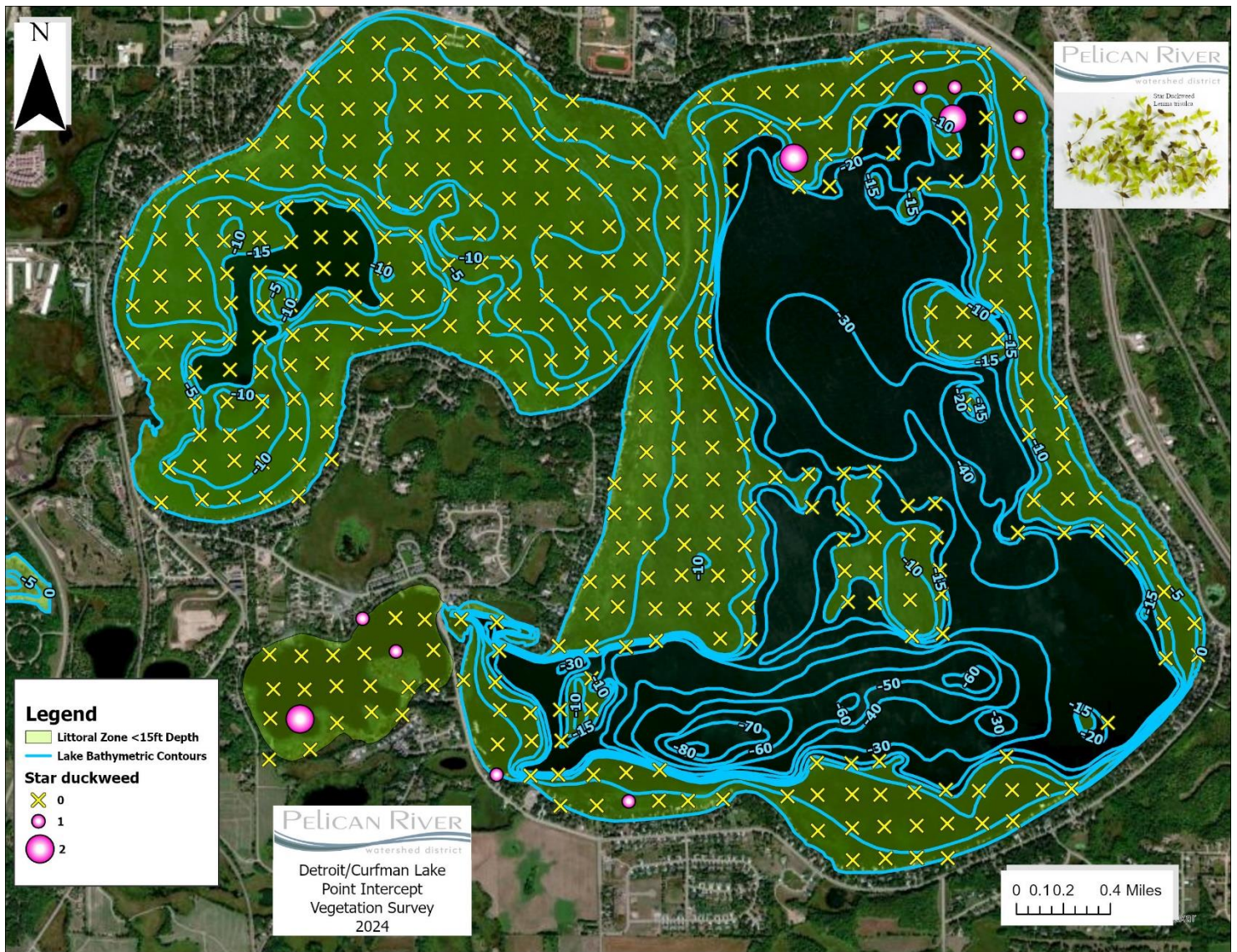


**Figure 8 – Coontail Distribution.** Plant distribution from the 2024 point-intercept survey for Coontail in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.

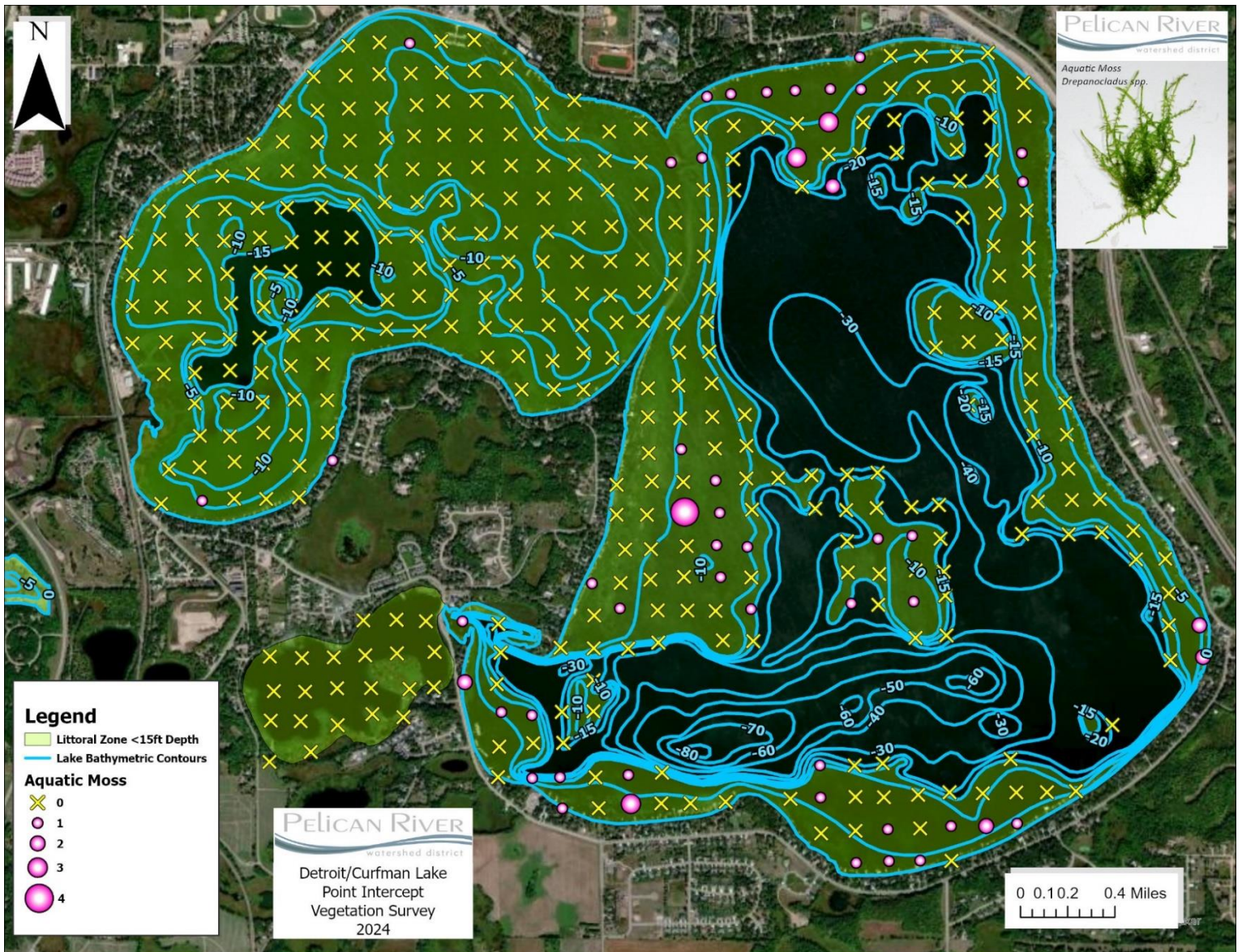


**Figure 9 – Flat-stem Pondweed Distribution.** Plant distribution from the 2024 point-intercept survey for Flat-stem Pondweed in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.

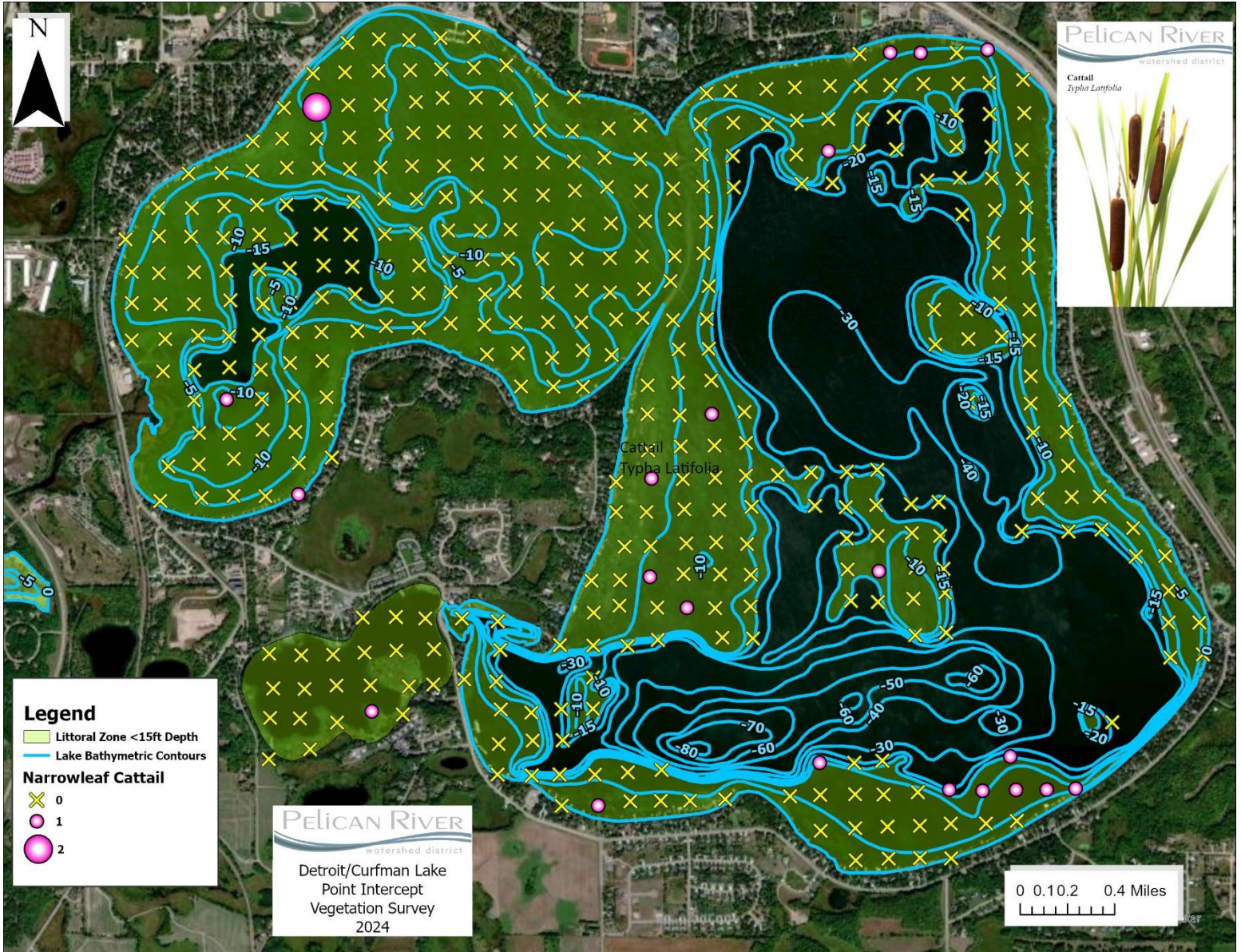




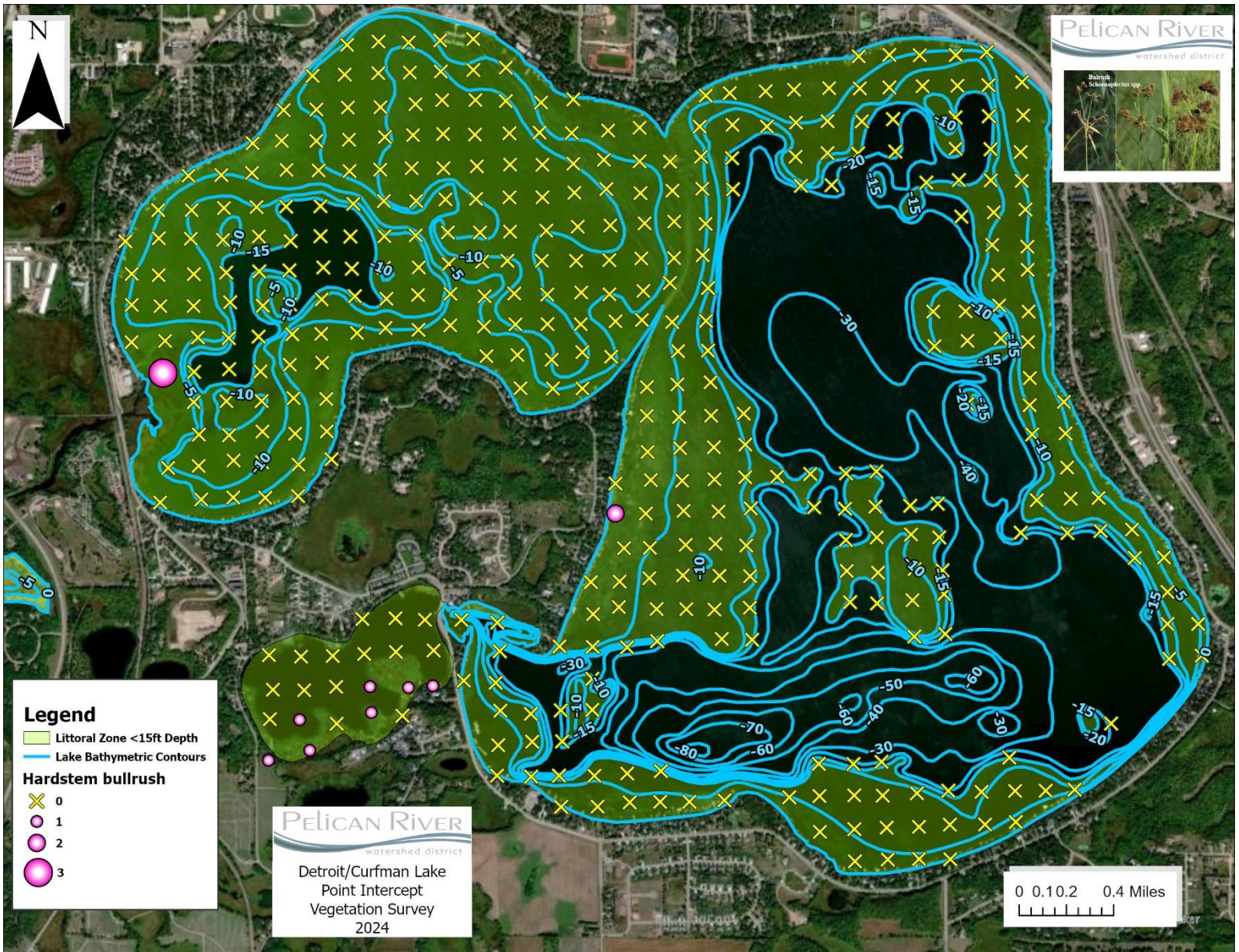
**Figure 10 – Star Duckweed Distribution.** Plant distribution from the 2024 point-intercept survey for Star Duckweed in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.



**Figure 11 – Aquatic Moss Distribution.** Plant distribution from the 2024 point-intercept survey for Aquatic Moss in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 4 at each point, with a 4 indicating dense plant presence and 0 indicating no plants.



**Figure 12 – Narrowleaf Cattail Distribution.** Plant distribution from the 2024 point-intercept survey for Narrowleaf Cattail in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.



**Figure 13 – Hardstem Bullrush Distribution.** Plant distribution from the 2024 point-intercept survey for Hardstem Bullrush in Detroit and Curfman Lakes, Becker County, MN. Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.



<b>Project Name:</b> Detroit, CLP 2024	<b>Resource:</b> Detroit (03038100)
<b>County:</b> Becker	<b>Watershed:</b> Otter Tail River

Metro:  
1511 Maras Street  
Shakopee, MN 55379

Phone: (866) 687-5253  
servicemw@plmcorp.net

Brainerd:  
2509 Business Highway 371  
Brainerd, MN 56401

**Figure 14 - Curly-leaf Pondweed Distribution.** Red polygons indicate the presents of Curly-leaf Pondweed on Detroit and Curfman Lakes, Becker County, MN based on delineation surveys in 2024.



<b>Project Name:</b> Curfman, Proposed CLP 2024	<b>Resource:</b> Curfman (03036300)
<b>County:</b> Becker	<b>Watershed:</b> Otter Tail River

Metro:  
1511 Maras Street  
Shakopee, MN 55379

Phone:(866) 687-5253  
servicemw@plmcorp.net

Brainerd:  
2509 Business Highway 371  
Brainerd, MN 56401

**Figure 15 - Curly-leaf Pondweed Distribution.** Red polygons indicate the presents of Curly-leaf Pondweed on Detroit and Curfman Lakes, Becker County, MN based on delineation surveys in 2024.

## 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.