Whole Lake Point-Intercept Survey on Lake Victoria and Heiden Pond, Jefferson County,



Picture 1: View of Lake Victoria

Wisconsin

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Summary

Within lake and pond ecosystems, the aquatic plant community serves as critical habitat and nursery for fish and other animals, a source of oxygen for all organisms, a refuge for prey as well as a foraging area for predators, a buffer against erosion and sediment resuspension from both waves and shoreline inputs and can significantly contribute to overall lake primary productivity.

This is the first true aquatic plant survey on both Heiden Pond and Lake Victoria. The two most common invasive species in Wisconsin, Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP), invaded both waterbodies likely many years ago. Management of EWM and CLP has been done with chemical treatments on a yearly basis since 2018 based on Wisconsin Department of Natural Resources (WDNR) ePermitting.

A full-lake aquatic plant survey using the point-intercept (PI) method developed by the Wisconsin DNR was conducted on both Lake Victoria and Heiden Pond, Jefferson County, Wisconsin on July 13, 2026. This survey and report will help guide the City of Watertown and the lake residents on understanding the current status of the aquatic plant community and efforts that can be taken in the future.

Introduction

Aquatic plants are vital for maintaining ideal water quality and habitat conditions. In fact, 90% of a lake's ecosystem depends on what happens in the vegetated shallow areas. Some valuable characteristics of aquatic plants are the following:

- Aquatic plants create a thriving habitat supplying food, shade, and shelter for a large variety of aquatic and terrestrial animals.
- Fruits and tubers of aquatic plants provide food for mammals, waterfowl, insects and fish.
- Aquatic plants are essential to the spawning success of many fish species.
- Aquatic plants photosynthesize, creating oxygen for the animals that live in shallow areas.
- Aquatic plants filter runoff from uplands to protect lake water quality.
- Plant roots create networks that stabilize sediments at the water's edge where waves might otherwise erode the lakeshore.
- Submersed plants absorb phosphorus and nitrogen over their leaf surface and through their roots.
- Plant use nutrients, making it less available for nuisance algae blooms.
- Native aquatic plants limit the growth of exotic plants.

The relative abundance, distribution and types of rooted aquatic plants can be used as an indicator of lake quality. Ideally, healthy lakes will have at least moderate levels of native plant growth that are characterized by high species diversity.

An absence of vegetation and associated habitat can lead to declines in native fish and wildlife, while favoring more tolerant “rough fish” like carp. It can also lead to increased algal blooms and higher turbidity, resulting in a loss of water clarity that is likely to further suppress plant growth. A different set of problems occurs when invasive aquatic plants gain dominance and become overly abundant. This situation can create single-species monocultures of low habitat value, impede recreational use of the water, stunt fish growth, and contribute to dramatic fluctuations in dissolved oxygen levels that can stress aquatic life.

Methods

The point-intercept method as described in the “Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: Sampling Design, Field and Laboratory Procedures, Data Entry, and Analysis, and Applications” (WDNR PUB-SS-1068 2010) has been used to complete hundreds of thousands of PI surveys across the state of Wisconsin. This monitoring protocol was designed to quantitatively assess the distribution and abundance of aquatic plants in lake ecosystems. This protocol employs a point-intercept sampling design, with sites located on a geo-referenced sampling grid placed over the entire lake (Hauxwell, et. al., 2010).

Colton Hutchinson from Jefferson County Land and Water Conservation Department (LWCD) was the lead on these surveys with assistance from Addison Schuch from the City of Watertown. On July 13, 2026 the surveyors employed the point-intercept sampling method in accordance with protocols approved by the WDNR. Based on parameters specific to Lake Victoria and Heiden Pond, the DNR mapped a 105-point sampling grid for Lake Victoria and a 100-point sampling grid for Heiden Pond. Of the 105 points for Victoria, 104 were sampled and of the 100 points for Heiden, 98 were sampled during the 2026 survey. Not all the points were able to be surveyed because some points landed on land. Using GPS, the field crew navigated to each of the predetermined grid points. The biologists locate the sample points using a hand-held GPS. This continuity of sampling leads to statistically significant data as well as an increased correlation when surveys are done in the future.

A metal rake is used to sample a site where the water is shallower than 15 feet. In order to record depth with this rake, the rake’s handle is marked in one-foot increments with electrical tape. When researchers arrive at a sampling point by kayak, the metal rake is lowered straight through the water column to rest slightly on the bottom. The rake is then twisted around twice and pulled straight out of the water. This sampling technique allows the biologists to collect a plant sample, measure the water depth (to the nearest half foot) and determine the sediment composition of the lake’s bottom.



ey covered in plants, a common occurance on both lakes.

After pulling the rake from the water at each site, the overall rake fullness is recorded with a rating that best estimates the total coverage of plants on the rake. Each species is then identified and assigned a density rating based on the amount of that specific plant found on the rake (Table 1). Plants that are in close proximity (2-3 feet) to the sample point but not collected on the rake are recorded as “visual” sightings.

The data collected are later analyzed and used for statistical analysis. The analyses are used for determining trends within the lake’s aquatic plant community, and can provide insight into recommendations for monitoring and managing any invasive species found.

Table 1: Plant abundance rating criteria used in submergent aquatic plant point-intercept surveys developed by the Wisconsin Department of Natural Resources.

Rake Fullness Rating	Coverage	Description
1		Only few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered, and tines are not visible.

Results and Discussion



Picture 3: Curly Leaf Pondweed

The 2026 survey’s completed on July 13, 2026 provides a snapshot of plant conditions. As curly-leaf pondweed peaks before July and treatment occurred about two weeks prior, we expect to see this species at lower abundance or not present at all. The results from the surveys coincide with this expectation as only a few visuals were noted in Heiden Pond and only a few turions were found in Lake Victoria. Turions are small buds formed as water temperatures rise in the late spring that can survive many years and reproduce later on.

For Lake Victoria, the total number of plant species found using both the point-intercept survey was 3. Lake Victoria maximum depth is 11.5 feet with max depth of plant material found at 10.5 feet. The three species present were:

Coontail (*Ceratophyllum demersum*), Eurasian watermilfoil (Myriophyllum spicatum), and Slender naiad (Najas flexillis).

For Heiden Pond, the total number of plant species found using both the point-intercept survey was 4 with Curly Leaf Pondweed recorded as a visual. Heiden Pond maximum depth is 4.5 feet with max depth of plant material found at 4.5 feet. The three species present in Heiden Pond were: Coontail (*Ceratophyllum demersum*), Eurasian watermilfoil (Myriophyllum spicatum), and Sago Pondweed (Stuckenia pectinata).

See table 2 for the plant species found between both Lake Victoria and Heiden Pond for ecological significance.

Table 2. Ecological Significance for Aquatic Plants Identified in

Aquatic Plant *Species name* Common name	**Ecological Significance**
Ceratophyllum demersum Coontail	Provides good shelter for young fish, supports insects valuable as food for fish and ducklings, and fruits are eaten by waterfowl.
Myriophyllum spicatum Eurasian water milfoil - Exotic species -	Waterfowl graze on fruit and foliage to a limited extent. Habitat for insects but not as good as other plants.
Najas flexilis Slender naiad/Bushy pondweed	One of the most important plants for waterfowl. Ducks eat the stems, leaves and seeds. Important to marsh birds and fish.
Stuckenia pectinata Sago pondweed	Fruits and tubers are a very important food source for a variety of waterfowl. Supports insects that are eaten by game fish and also provides cover for young game fish.

Overview of 2026 Results

The floristic quality index (FQI) helps us assess the overall ecosystem's health. Changes in the FQI between aquatic plant surveys can help inform decisions for management. The FQI is 6.36 for Lake Victoria and 4.24 for Heiden Pond. In general, a higher FQI indicates higher floristic quality and biological integrity and a lower level of disturbance impacts (Bernthal, 2003). The scale is from zero to 42. In the case of both Lake Victoria and Heiden Pond, the low FQI indicates highly disturbed waterbodies with low overall aquatic plant diversity.

The coefficient of conservatism is a number on a scale from 0 to 10 that represents an estimated probability that a plant species is likely to occur in a lake unaltered from what is believed to be pre-settlement conditions. A coefficient of 10 indicates the plant is almost certain to be found only in an undegraded natural community, and a coefficient of 0 indicates that probability is almost 0. The mean coefficient of conservatism (Mean C) is the average C-value (conservation value) for all plants found in the survey. This is

used in Floristic Quality Assessments to measure habitat health. The 'Mean C' is calculated by adding all individual species' C-values and dividing by the number of species, indicating a lake's quality. A higher 'Mean C' suggests higher integrity in the plant community. The Mean C for Lake Victoria is 4.5 and for Heiden Pond is 3.0.

Table 3. Summary of Point Intercept Survey Plant Data

Summary of the Plant Inventory Survey Results 2026	Lake Victoria	Heiden Pond
[a]Total Number of Points Sampled	104	98
[b]Number of Points Sampled within Depth Range of Potential Plant Growth	100	98
[c]Number of Points with Vegetation	89	75
[d]Maximum Depth of Plant Growth (Feet)	10.5	4.5
[f]Frequency of Occurrence of Vegetation within Range of Plant Growth	89	76.53
[g]Simpson Diversity Index	0.36	0.18
[h]Species Richness	3	3
[i]Species Richness + Visuals	3	4
[j]Floristic Quality Index (FQI)	6.36	4.24
[k]Mean Coefficient of Conservatism (C)	4.5	3
Average Number of Species Sampled Per Site	1.22	1.11

[f]Percentage of occurrence that vegetation would be sampled
[g]Simpson Diversity Index: The closer the SDI value is to one, the greater the diversity is between communities being compared. The greater the index value, the higher the diversity in a given location. Plant communities with high diversity are usually representative of healthier lakes, and also tend to be more resistant to invasion by exotic species.
[h]Indicates the number of different plant species found in and directly adjacent to the lake (on the waterline).
[i]Indicates the number of different plant species found in and directly adjacent to the lake (on the waterline).

Figure 1: Chart depicting plant depth colonization on Lake Victoria during the 2026 plant inventory

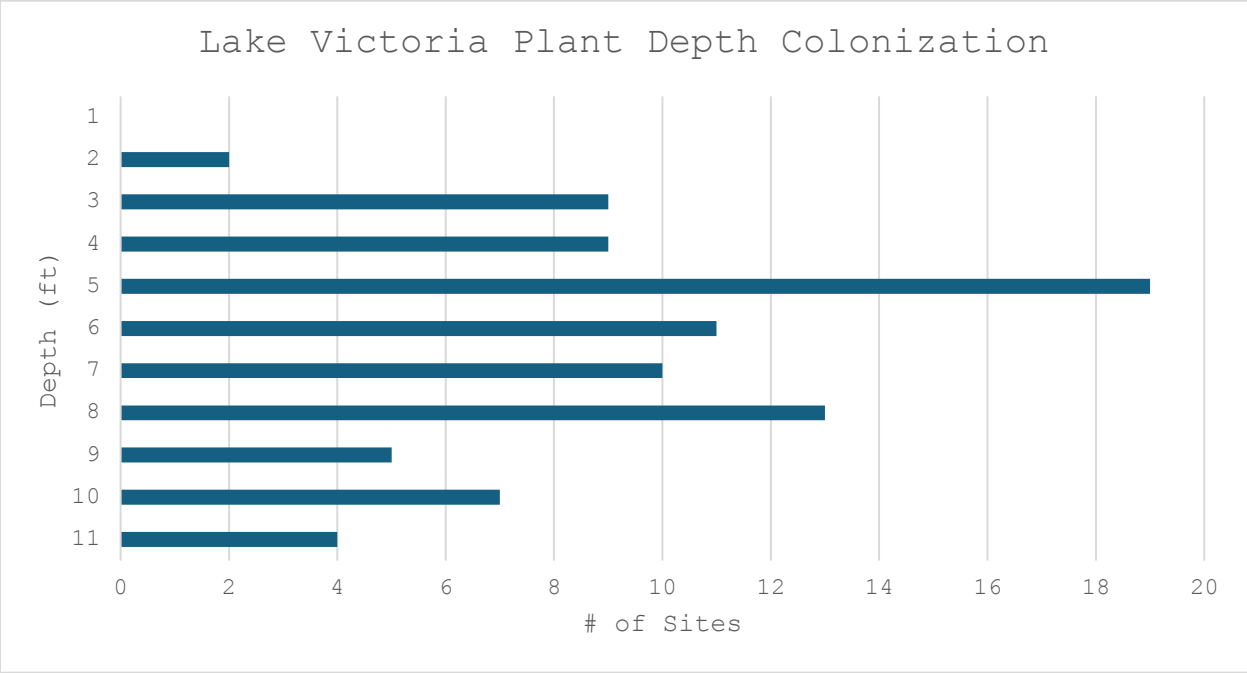
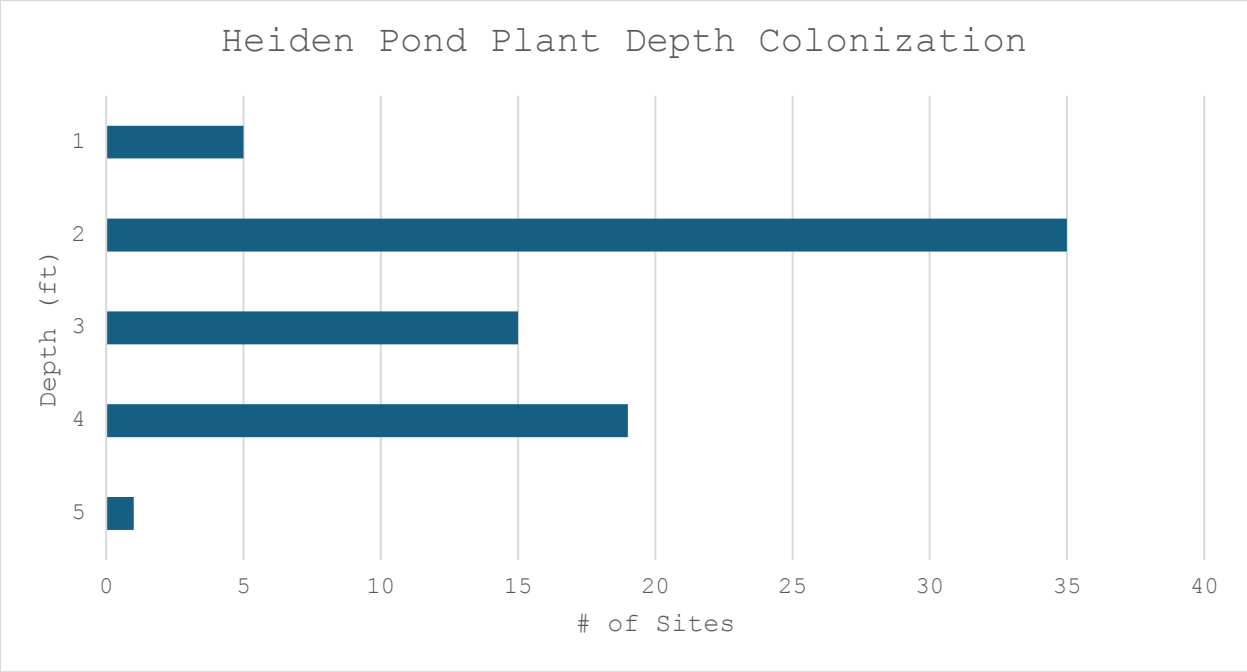


Figure 2: Chart depicting plant depth colonization on Heiden Pond during the 2026 plant inventory



Map 1 shows rake fullness of all plant species at every site in Lake Victoria and Heiden Pond. Note a few spots were void of plants either because the point was on land or there were no plants present. Much of the void areas in Heiden Pond may be from carp activity, decreased water clarity and/or shallowness. In Lake Victoria, the void areas were in locations too deep for plant growth, and shallow sites where plants may have been physically removed. See Appendix B for all individual plant species maps.

Table 4 shows the frequency of occurrence (*percent occurrence of a plant species*), average density, relative frequency (*value that reflects degree to which an individual species contributes to the sum total of all species observations, the sum of the relative frequencies of all species is 100*%) and number of sites found for the 2026 survey. This table does not include visually observed plant species. The most dominant plant for both Lake Victoria and Heiden Pond was Coontail (a native species). The second most dominant plant was Eurasian Water Milfoil (an invasive species). The third and final plant for each waterbody was different. For Lake Victoria, Slender Naiad (a native species) was found at one site. For Heiden Pond, Sago Pondweed (a native species) was found at 3 sites.

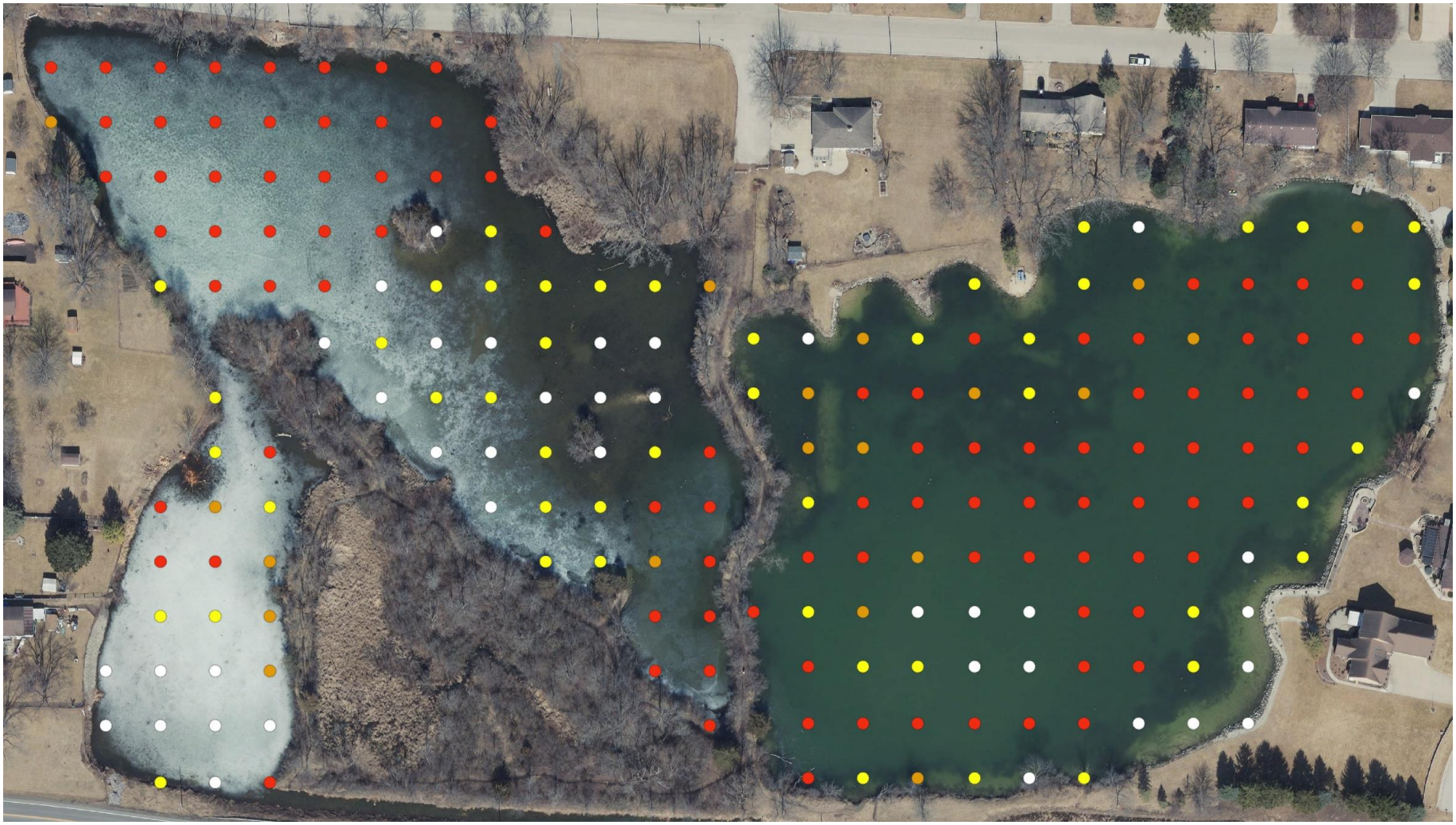
Table 4. Lake Victoria and Heiden Pond Plant Inventory Data Summary

Lake Victoria Plant Inventory Survey Data				
Aquatic Plant Species	**Frequency of Occurrence (%)**	**Average Density (1-3 scale)**	**Relative Frequency**	**# Sites Found**
Coontail *(Ceratophyllum demersum*)	94.38	2.4	77.1	84
*Eurasian Water Milfoil *(Myriophyllum spicatum)*	26.97	1.0	22.0	24
Slender Naiad (*Najas flexillis*)	1.12	1.0	0.9	1
Heiden Pond Plant Inventory Survey Data				
Aquatic Plant Species	**Frequency of Occurrence (%)**	**Average Density (1-3 scale)**	**Relative Frequency**	**# Sites Found**
Coontail (*Ceratophyllum demersum*)	100.00	2.32	90.4	75
*Eurasian Water Milfoil (*Myriophyllum spicatum*)	6.67	1.0	6.0	5
Sago Pondweed (*Stuckenia filformis*)	4.00	1.0	3.6	3

Map 1. Lake Victoria and Heiden Pond Total Rake Fullness All Species

Aquatic Plant Survey, Heiden Pond and Lake Victoria – July 2026

Rake Fullness Rating for All Species



N
W E
S

Total Rake Fullness Ratings

1 2 3

Visual No Plants

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Date: 9/24/2026
2025 Aerial

Illustration of Rake Fullness Ratings



Appendix A

References:

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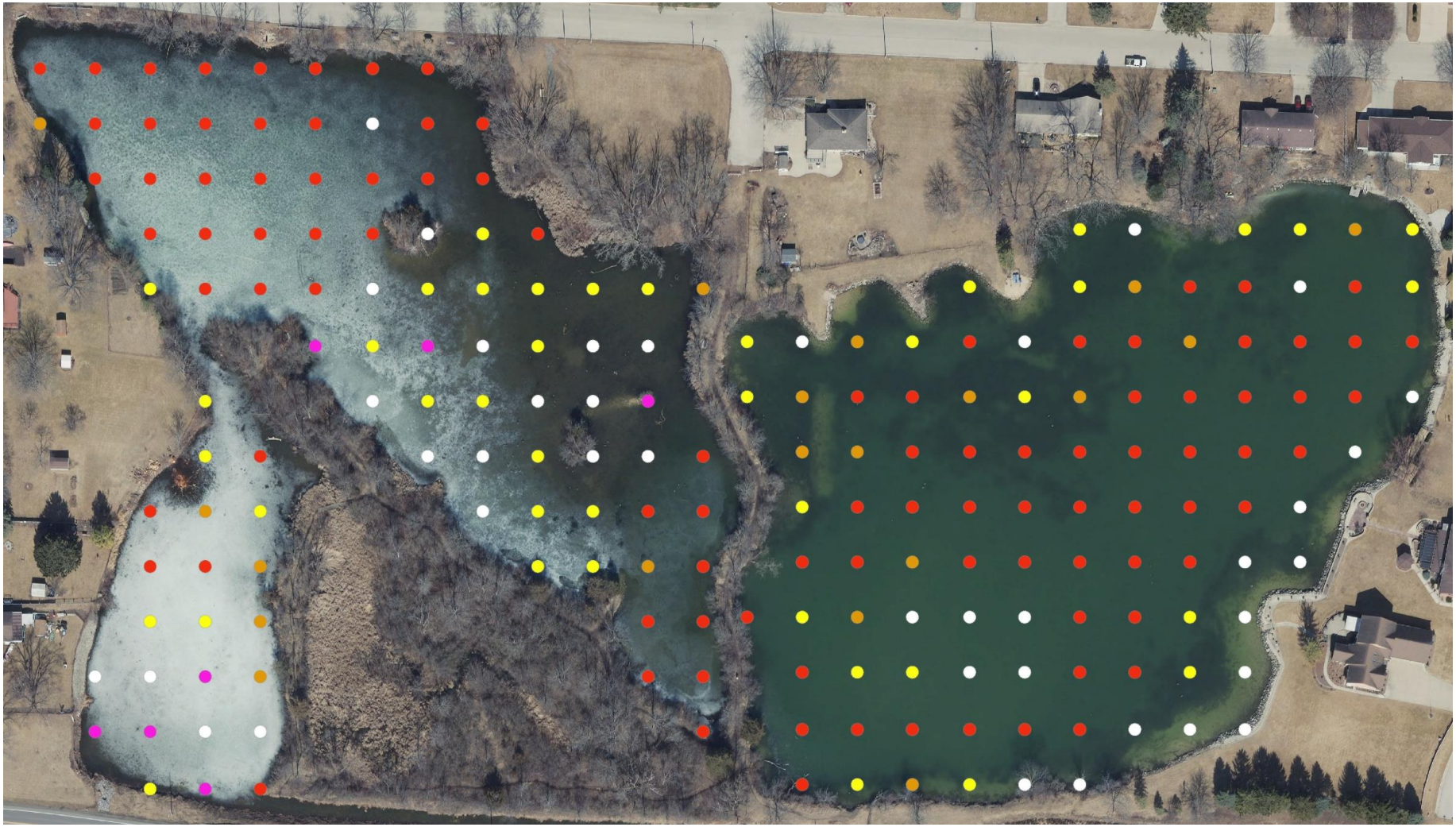
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Appendix B (next page)

Aquatic Plant Survey, Heiden Pond and Lake Victoria – July 2026

Rake Fullness Rating for Coontail



N
W E
S

Total Rake Fullness Ratings

1 2 3

Visual No Coontail

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Illustration of Rake Fullness Ratings



Aquatic Plant Survey, Heiden Pond and Lake Victoria – July 2026

Rake Fullness Rating for Eurasian Watermilfoil



N
W E
S

Total Rake Fullness Ratings

- 1
- 2
- 3
- Visual
- No EWM

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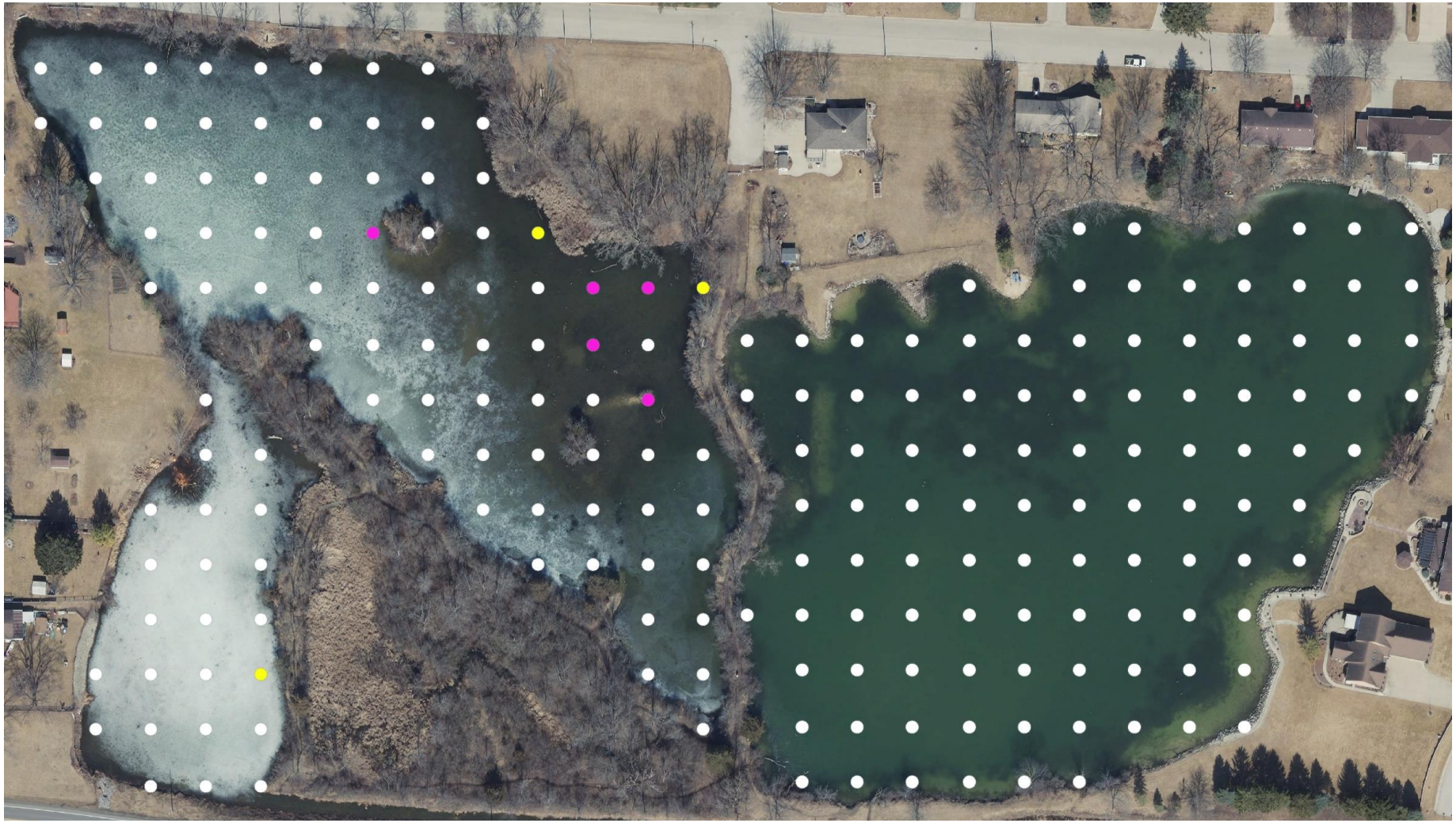
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2025 Aerial

Illustration of Rake Fullness Ratings



Aquatic Plant Survey, Heiden Pond and Lake Victoria – July 2026

Rake Fullness Rating for Sago Pondweed



N
W E
S

Total Rake Fullness Ratings

- 1
- 2
- 3
- Visual
- No Plants

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Illustration of Rake Fullness Ratings



Aquatic Plant Survey, Heiden Pond and Lake Victoria – July 2026

Rake Fullness Rating for Slender Naiad



N
W E
S

Total Rake Fullness Ratings

- 1
- 2
- 3
- Visual
- No Plants

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Illustration of Rake Fullness Ratings

