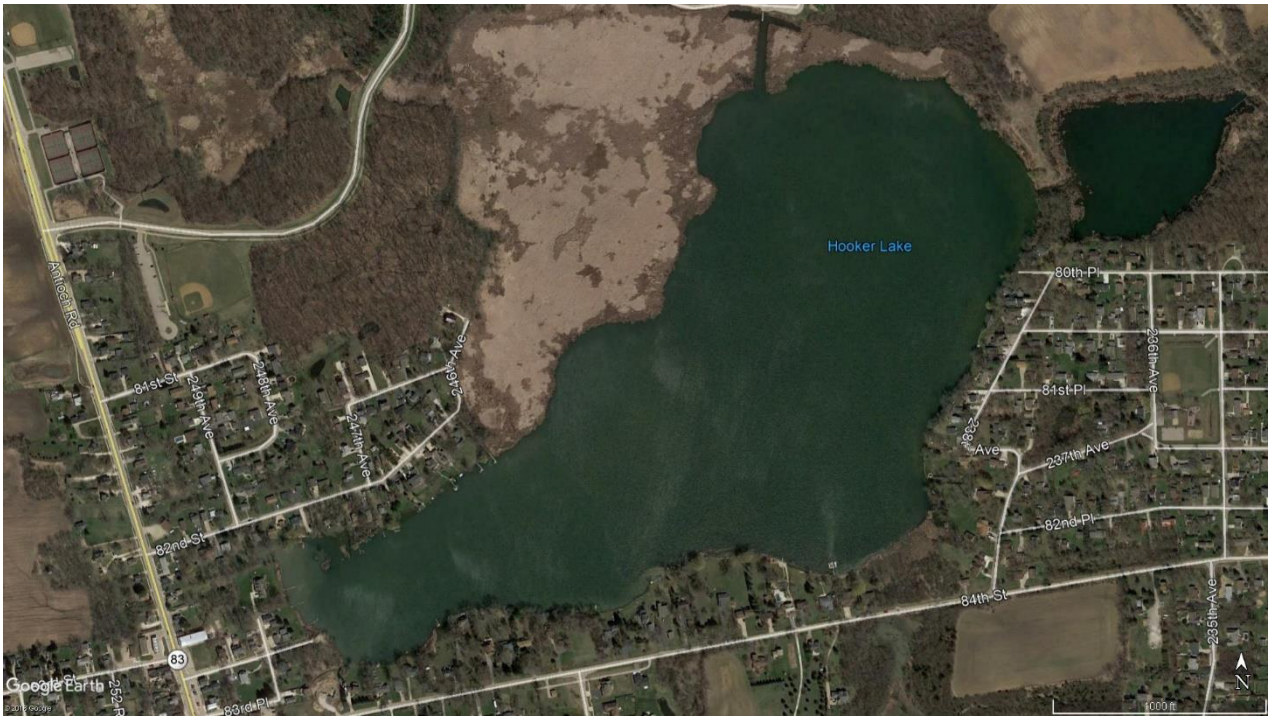
2024 Point-Intercept Survey Results

Hooker Lake



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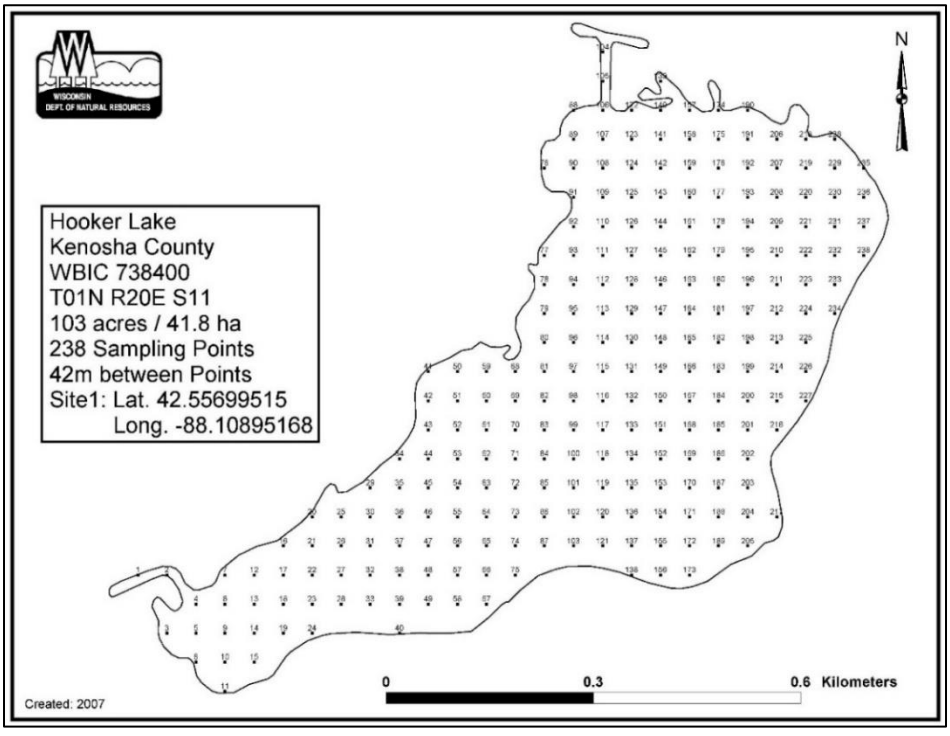
2024 Hooker Lake Plant Survey Results

The 2024 aquatic plant survey was requested by the Hooker Lake Management District as a tool to quantify ongoing longevity of the 2022 fluridone treatment, along with the 2024 Aquathol K and ProcellaCOR EC treatment and track changes in the plant community. It was conducted using some guidelines adopted by the WDNR for point-intercept survey methods. This method utilizes a grid system that considers the size and morphology of the lake. For the survey, the 238 WDNR established points (Figure 1) were transferred to a Garmin GPSMAP64 GPS unit before field sampling. At each established point, depth and substrate data at sites less than 15' deep were taken with a 15' graduated pole while sites over 15' deep were measured with a Humminbird sonar unit. Plant data was collected with a double headed rake on a 15' pole or a double headed rake on a rope. Data collection included depth, substrate type, species present, species density, overall rake density and any visuals of species located within a 6-foot radius of the boat. For emergent species, a visual was recorded for each point closest to shore. Ultimately, data was used to calculate frequency of occurrence, relative frequency of occurrence, average rake density, total sites with vegetation, maximum depth of plants, average native species per site, average of all species per site, species richness and floristic quality (FQI). It should be noted that our data is entered into a spreadsheet which takes visual observations into account.

Background

Plants were surveyed on July 30th, 2024 using 234 of the 238 pre-determined WDNR points (Figure 1). Four of these points were located on land. Eighteen different species of plants were found covering approximately 38% of the Lake. On average, there were 2.27 native plant species found at each vegetated site.

Figure 1: Overview of 2024 Plant Sampling Points on Hooker Lake



SOURCE: WDNR (2007)

Plant Species

There were eighteen different species of plants sampled during the 2024 Point-Intercept (PI) survey (Table 1). Species are listed from most to least frequent, including visual sightings. Data shown includes the overall frequency (percentage plant was found compared to all sites), relative frequency (percentage plant was found compared to vegetated sites), the average relative density rating (based on a scale of 1 for "least dense" and 3 for "most dense" at vegetated sites) and the C-Value (a numerical rating of 0-10 demonstrating a species' ability to tolerate disturbance).

The five most common aquatic species within Hooker Lake based on relative frequency are Filamentous Algae (53.93%), Cattails (43.82%), Coontail (38.20%), Muskgrass (37.08%) and Purple Loosestrife (32.58%). There is a fair distribution of native plants, which includes three species listed as "high value" by the WDNR.

Table 1: Hooker Lake 2024 Plant Sampling Species Summary

Common Name	Scientific Name	Total Number of sites found (includes Visuals)	% Overall Frequency of Occurance (Includes Visuals)	% Relative Frequency of Occurance (Includes Visuals)	Average Density Rating	C-value
Filamentous Algae	n/a	48	20.51	53.93	1.02	n/a
Cattail	Typha sp.	39	16.67	43.82	V	1
Coontail	Ceratophyllum demersum	34	14.53	38.20	1.23	3
Muskgrasses	Chara sp.	33	14.10	37.08	1.33	7
Purple loosestrife**	Lythrum salicaria	29	12.39	32.58	V	Invasive
Swamp loosestrife	Decodon verticillatus	27	11.54	30.34	1.00	n/a
Water star-grass	Heteranthera dubia	24	10.26	26.97	1.05	6
Sago pondweed*	Stuckenia pectinata	12	5.13	13.48	1.10	3
White water lily	Nymphaea odorata	12	5.13	13.48	1.00	6
Spatterdock	Nuphar variegata	10	4.27	11.24	1.00	6
Common watermeal	Wolffia columbiana	5	2.14	5.62	V	5
Curly-leaf pondweed**	Potamogeton crispus	3	1.28	3.37	1.00	Invasive
Common bladderwort	Utricularia vulgaris	2	0.85	2.25	1.00	7
Small duckweed	Lemna minor	2	0.85	2.25	V	4
Common reed**	Phragmites australis	1	0.43	1.12	V	Invasive
Slender naiad	Najas flexilis	1	0.43	1.12	1.00	6
Spiny naiad**	Najas marina	1	0.43	1.12	1.00	Invasive
Wild celery*	Vallisneria americana	1	0.43	1.12	2.00	6

SOURCE: Lake and Pond Solutions LLC (2024)

* Species are considered "high value" plant species under Wisconsin Administrative Code NR 107
**** Denotes non-native (exotic) species**

% Overall Frequency	The percentage a plant species was found compared to all sites sampled. It is calculated by taking the number of sites a species was found and dividing by the total number of *sampled points* on the lake.
% Relative Frequency	The percentage a plant species was found compared to all sites with vegetation. It is calculated by taking the number of sites a species was found and dividing by the total number of *vegetated sites* on the lake.
Relative Average Density	The average density of each plant species comparative to the number of sites where it was found. It is calculated by dividing the sum of the site densities (for that specific plant species) by the total number of sites where it was found

Table 2: Five Most Common Species Found in Hooker Lake 2024

2024 Survey		
Species	**% Relative Frequency**	**C-Value**
Filamentous Algae	53.93	n/a
Cattail	43.82	1
Coontail	38.20	3
Muskgrasses	37.08	7
Purple Loosestrife**	32.58	-
Avg. C-Value of Top 5 Species = 3.67		
Floristic Quality of Top 5 Species = 6.35		

SOURCE: Lake and Pond Solutions LLC (2024)

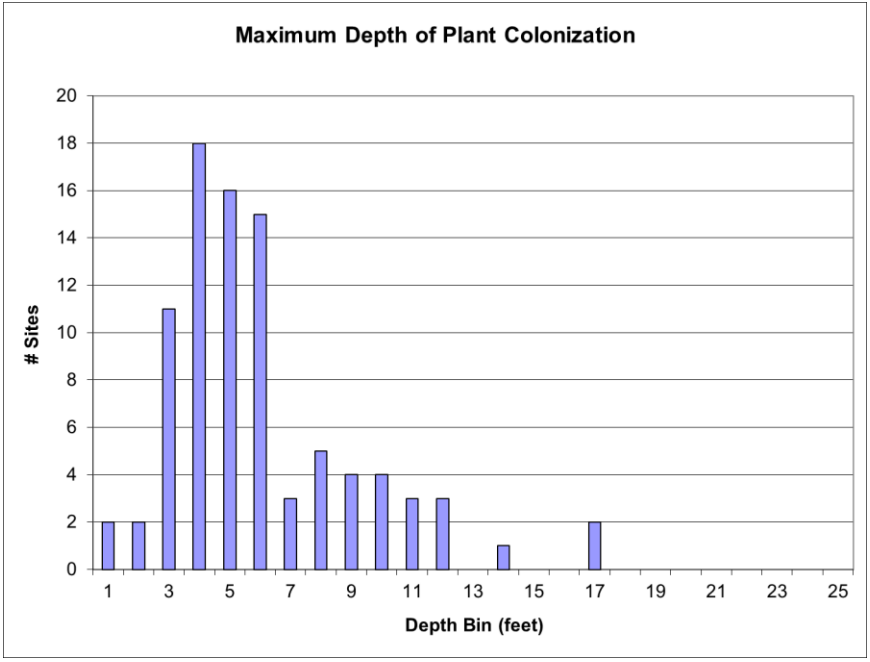
Table 3: 2018 - 2024 Hooker Lake PI Survey Statistics

Summary Statistics (Including Visuals)	2018 Survey (8-15-18)	2019 Survey (8-1-19)	2020 Survey (7-23-20)	2021 Survey (7-22-21)	2023 Survey (7-27-23)	2024 Survey (7-30-24)
Total Number of Sites with Vegetation/All Sites Sampled	90/235 (38.3%)	87/233 (37.3%)	101/231 (43.7%)	133/234 (56.8%)	89/226 (39.4%)	89/234 (38.0%)
Maximum Depth of Plants	11.0'	10.5'	21.0'	18.0'	20.0'	17.0'
Species Richness	16	20	22	21	20	17
Average Number of All Species per Vegetated Site	3.69	4.07	2.93	3.18	2.48	2.65
Average Number of Native Species per Vegetated Site	3.08	3.53	2.59	2.34	2.34	2.27
Simpson Diversity Index	0.91	0.92	0.85	0.85	0.88	0.89
Average C-Value	5.08	5.19	5.26	5.00	5.47	5.00
Floristic Quality	17.61	20.75	22.94	20.00	21.17	17.32

SOURCE: Lake and Pond Solutions LLC (2024)

Depth of plant colonization was recorded (Table 4). The deepest sampled plant was in 17.0 feet of water. The clear majority however was in the three to six-foot depth range, accounting for more than 65% of the vegetated sample sites.

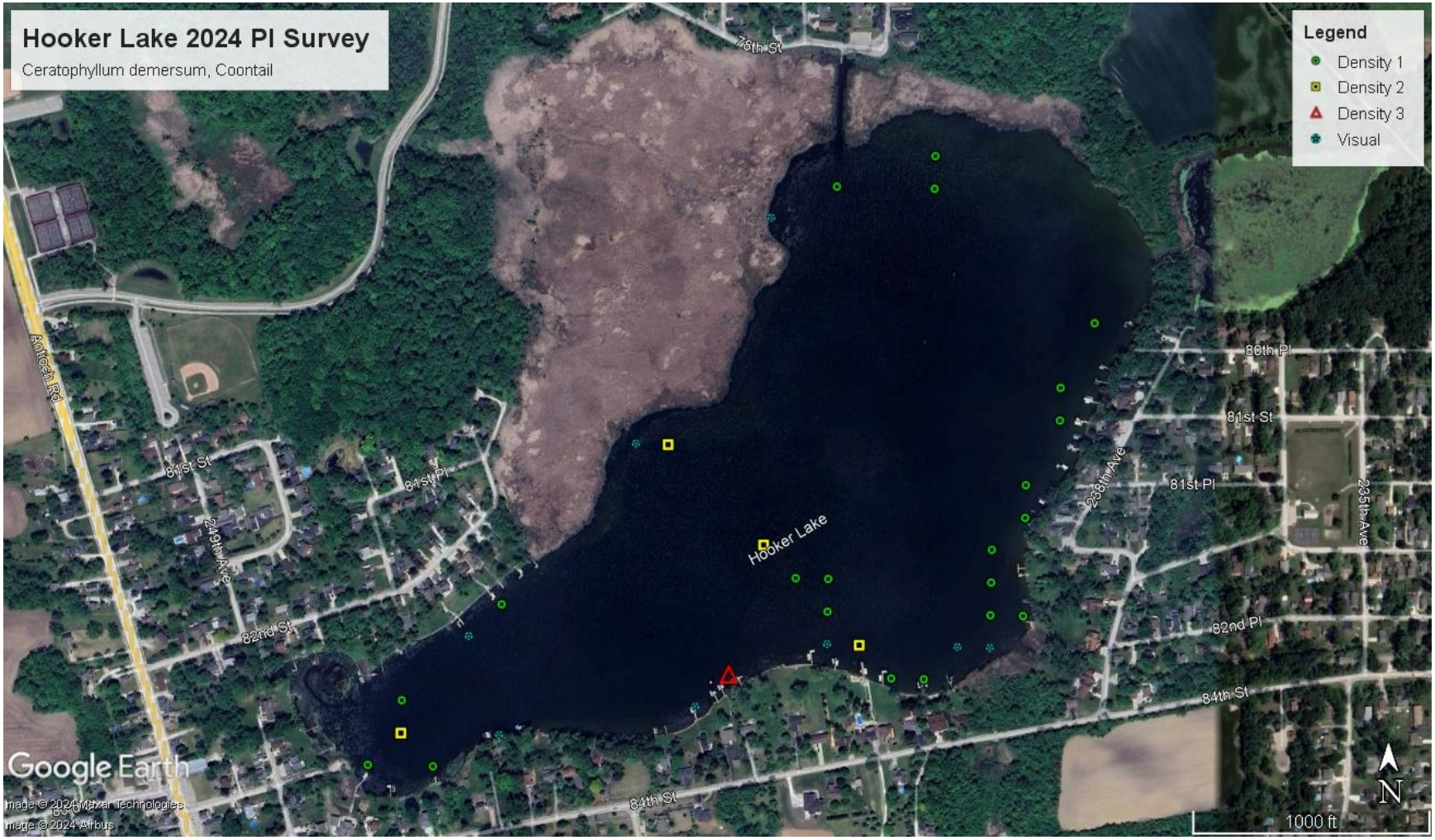
Table 4: Hooker Lake 2024 Depth of Plant Colonization



SOURCE: Lake and Pond Solutions LLC (2024)

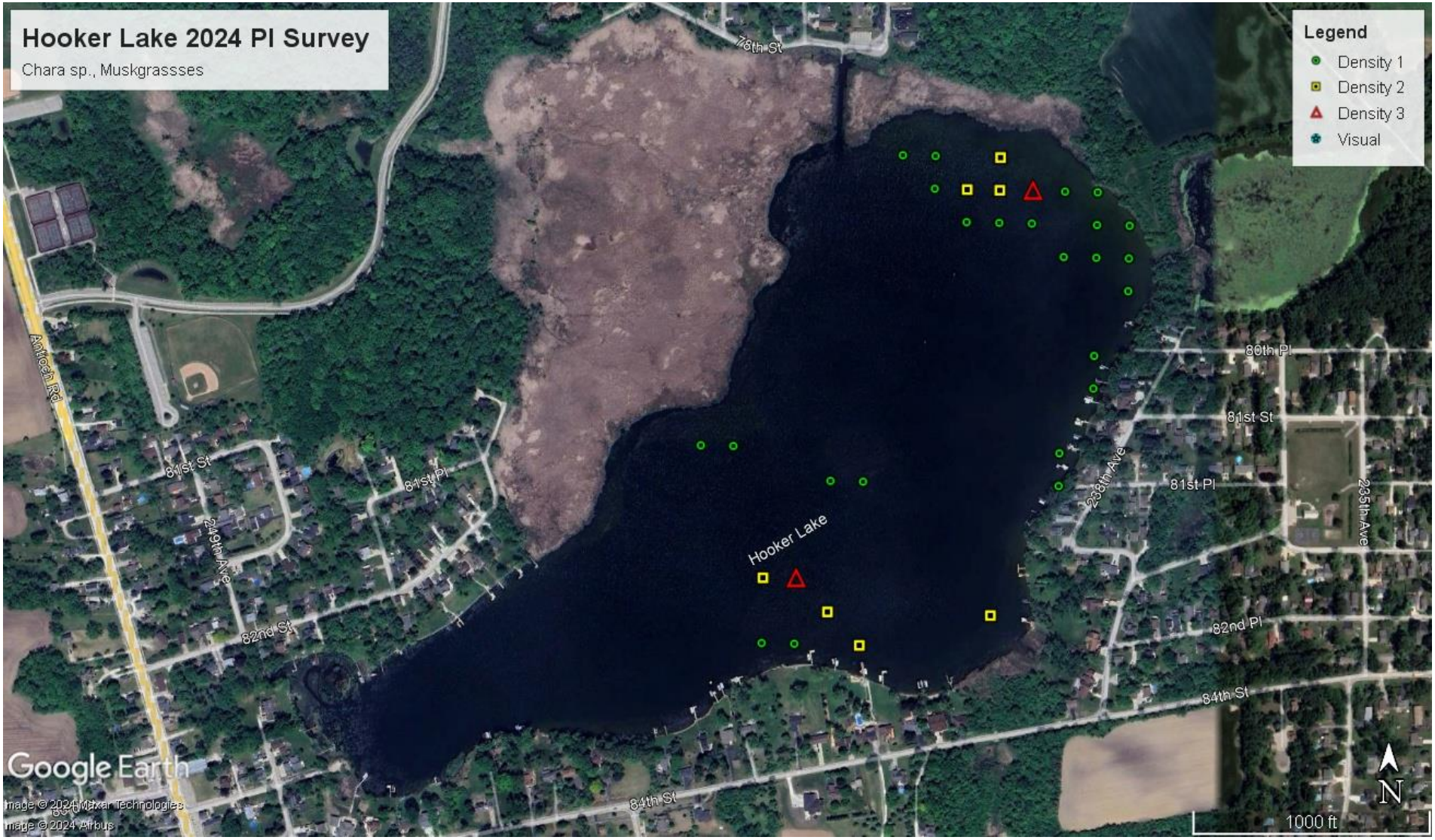
Figure 2 – **Error! Reference source not found.** show the distribution and densities of the top seven native species along with the four non-native species found in Hooker Lake in 2024 (arranged from most to least frequent distribution). We intentionally omitted maps for algae (1st), cattails (2nd), swamp loosestrife (6th), common watermeal 11th) and small duckweed (13th) since they are emergent or floating species.

Figure 2: Hooker Lake Coontail Distribution



SOURCE: Lake and Pond Solutions LLC (2024)

Figure 3: Hooker Lake Muskgrass (*Chara spp.*) Distribution

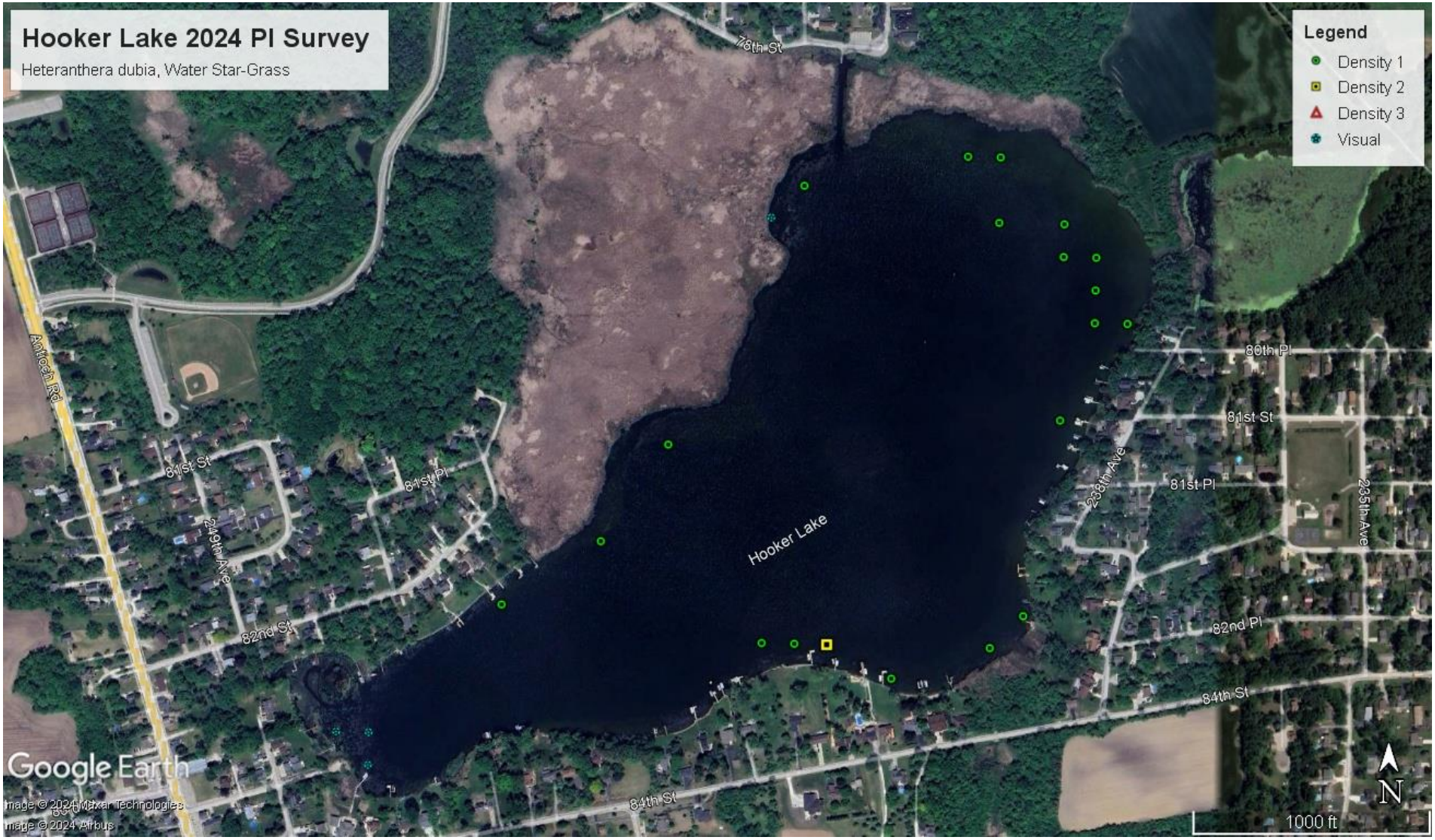


SOURCE: Lake and Pond Solutions LLC (2024)

Figure 4: Hooker Lake Purple Loosestrife (INVASIVE) Distribution

SOURCE: Lake and Pond Solutions LLC (2024)

Figure 5: Hooker Lake Water Star-grass Distribution



SOURCE: Lake and Pond Solutions LLC (2024)

Figure 6: Hooker Lake White Water Lily Distribution

SOURCE: Lake and Pond Solutions LLC (2024)

Figure 7: Hooker Lake Sago Pondweed Distribution

SOURCE: Lake and Pond Solutions LLC (2024)

Figure 8: Hooker Lake Spatterdock Distribution

SOURCE: Lake and Pond Solutions LLC (2024)

Figure 9: Hooker Lake Curly-leaf Pondweed (INVASIVE) Distribution

SOURCE: Lake and Pond Solutions LLC (2024)

Figure 10: Hooker Lake Common Bladderwort Distribution

SOURCE: Lake and Pond Solutions LLC (2024)

Figure 11: Hooker Lake Spiny Naiad (INVASIVE) Distribution

SOURCE: Lake and Pond Solutions LLC (2024)

Figure 12: Hooker Lake Phragmites (INVASIVE) Distribution

SOURCE: Lake and Pond Solutions LLC (2024)

Floristic Quality Assessment

Floristic Quality is a rapid assessment metric designed to evaluate the closeness that the flora of an area is to that of undisturbed conditions.[1] It can be used to:

- Identify natural areas
- Compare the quality of different sites or different locations within a single site
- Monitor long-term floristic trends and/or habitat restoration efforts

For any area (lake in this case), floristic quality (I) equals the average coefficient of conservatism (C-value) times the square root of the number of native species (√N). A C-value was assigned to 128 aquatic plants, compared to regional studies and reviewed by a number of biologists familiar with Wisconsin lake plants[2]. They range from 0 to 10 with 10 being assigned to species most sensitive to disturbance. These final C-values were used in calculating the Floristic Quality for Hooker Lake. Table 5 summarizes the C-values compared to the Southeast Till Plain (STP) average, Wisconsin average and 75th percentile numbers. The STP average categorizes the lakes in the southeast corner of the state.

Table 6 shows each individual plant species found in the lake along with the associated C-value, average C-value throughout the lake, and overall Floristic Quality.

The floristic quality within Hooker Lake has decreased since the last survey and is the lowest in the last 6 years. This year the lake water level was higher than previous years, the water clarity was slightly turbid and had a significant amount of planktonic algae. All these factors can lead to less sunlight penetration into the water column, leading to less growth than in years past.

Table 5: Floristic Quality Comparison

	2018	2019	2020	2021	2023	2024	STP AVERAGE	WI AVERAGE	WI 75th PERCENTILE
Avg. C-Value	5.08	5.19	5.26	5.00	5.47	5.00	5.60	6.00	6.90
# of natives (N)	12	16	19	16	15	12	14	13	20
Floristic Quality	17.61	20.75	22.94	20.00	21.17	17.32	20.9	22.2	27.5

SOURCE: Lake and Pond Solutions LLC (2024)

[1] Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region*. 4th Edition. The Morton Arboretum. Lisle, IL. 921 pp.

[2] Nichols, SA. 1999. Floristic Quality Assessment of Wisconsin Lake Plant Communities with Example Applications. Journal of Lake and Reservoir Management, 15(2):133-141.

Table 6: Hooker Lake Overall Floristic Quality

Common Name	Scientific Name	Total Number of Sites Found (Includes Visuals)	C-Value
Filamentous Algae	n/a	48	n/a
Cattail	Typha sp.	39	1
Coontail	Ceratophyllum demersum	34	3
Muskgrasses	Chara sp.	33	7
Purple loosestrife	Lythrum salicaria	29	Invasive
Swamp loosestrife	Decodon verticillatus	27	n/a
Water star-grass	Heteranthera dubia	24	6
White water lily	Nymphaea odorata	12	6
Sago pondweed	Stuckenia pectinata	12	3
Spatterdock	Nuphar variegata	10	6
Common watermeal	Wolffia columbiana	5	5
Curly-leaf pondweed	Potamogeton crispus	3	Invasive
Small duckweed	Lemna minor	2	4
Common bladderwort	Utricularia vulgaris	2	7
Slender naiad	Najas flexilis	1	6
Spiny naiad	Najas marina	1	Invasive
Common reed	Phragmites australis	1	Invasive
Wild celery	Vallisneria americana	1	6
AVG C-VALUE = 5.00			
FLORISTIC QUALITY = 17.32			

SOURCE: Lake and Pond Solutions LLC (2024)

Summary

While it was not found in the 2023 PI survey due to a whole lake fluridone treatment in 2022, Eurasian water-milfoil (EWM) had popped back up this year during the Spring meander survey leading to a small treatment using ProcellaCOR EC. Our recent PI Survey did not reveal any locations of EWM although it was found at four locations during an informal inspection of the lake last week. CLP was only found at one site during the PI Survey. It should be noted that late summer is not the ideal time for recording CLP as it dies back in July.

The native plant community decreased slightly with 14 native species present and an average of 2.27 native species per site. There was also a very small decline in the percentage of vegetation in the lake (38.0% versus 39.4% in 2023). The largest changes were muskgrass (dropping from 57.30% in 2023 to 37.08% in 2024) and sago pondweed (dropping from 30.34% in 2023 to 13.48% in 2024). In response, coontail saw a significant increase (4.49% in 2023 to 38.20% in 2024). We're confident that the decline in the plant community this year is not a function of the 2022 treatment but likely due to the unusual weather conditions including an abnormally warm winter, high lake levels, excessive runoff, and near record heat. It will be important to monitor the plant community next year to document further changes.

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