
Comfort Lake, Chisago County

2022 Aquatic Vegetation Management Report

Report by the Invasive Species Program - Division of Ecological and Water Resources
Minnesota Department of Natural Resources



Prepared by:

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Project Details

Lake: Comfort (DOW# 13005300)

Lake Surface Area: 217.8 acres

Littoral Area: 90 acres

County: Chisago County

Survey Type: Point-intercept

Date of Survey (most recent): July 20, 2022

Observer[s]: MN DNR, Invasive Species Program (ISP): Chris Jurek, Emelia Hauck Jacobs (2022)

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Report Details

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Summary

The purpose of this report is to provide an overview of aquatic plant distribution and the management of invasive aquatic plants in Comfort Lake, Chisago County between 2015 and 2022, with an emphasis on evaluating impacts from a 2022 whole-lake fluridone treatment. Historical data on water quality, invasive aquatic plant management permits and point-intercept surveys are all summarized in this report. These summaries will guide future invasive aquatic plant control projects and can evaluate changes in native plant communities.

Lake Description

Comfort Lake is a 218 acre lake located near the City of Wyoming, Chisago County, MN. The maximum depth of water in Comfort Lake is 47 feet, and 41% of the lake is classified as littoral (areas of water depth between 0 to 15 feet, where aquatic plants are most likely to grow). Water clarity during the summer averaged 6.8 feet in 2022. According to surveys from the Minnesota Pollution Control Agency (MPCA, 2022), Comfort Lake is classified as mesotrophic lake, based on its Trophic State Index (TSI) of approximately 53. Mesotrophic lakes are lakes with an intermediate level of productivity and are typically clear water lakes with some summer algal blooms. The three parameters that are factored into the trophic state index are total phosphorus (nutrients in the water), chlorophyll-a (measure of the amount of algae growing in the water) and Secchi depths (water transparency). For more information on water quality, go to [Comfort Lake's water quality data](https://webapp.pca.state.mn.us/wqd/surface-water/waterunit-details?wid=13-0053-00) on the MPCA website: (<https://webapp.pca.state.mn.us/wqd/surface-water/waterunit-details?wid=13-0053-00>)

Management History

Invasive aquatic plant management in Comfort Lake has focused on Eurasian watermilfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogeton crispus*). The most recent treatment for Eurasian watermilfoil was for a whole lake treatment in 2022, organized by the Association of Comfort Lakes (Table 1). Past treatments have ranged from 1 to 15 acres. The most recent treatment for curly-leaf pondweed was in 2016 for 1 acre. Pre-treatment survey

data (i.e. point-intercept surveys or lake-wide delineations that can be repeatable), collected over time, would be a recommended course of action for analyzing plant abundance and distribution trends into the future.

Table 1- Invasive Plant Management Summary. Characteristics and history of partial lake invasive plant treatments for Comfort Lake, Chisago County (DOW#13005300), total acres: 218, Littoral acres: 88, 15% of Littoral acres: 13). Abbreviations are as followed: curly-leaf pondweed (CLP) and Eurasian watermilfoil (EWM). Note: Total acres permitted does not reflect the actual treatment or known acreage of the taxa in the lake. Acreage is rounded to the nearest whole number.

Date	Target Species	Total Acres Permitted	Herbicide
2014	EWM	0.6	Auxin-mimic
2015	EWM	4.6	Auxin-mimic
2016	EWM	10	Auxin-mimic
2017	EWM	3.2	-
2019	EWM	7.5	Aquathol K, 2, 4-D
2020	EWM	10.5	2, 4-D
2021	EWM	15	Procellacor, Aquathol K
2022	EWM	218	Fluridone
2015	CLP	2.5	Endothall
2016	CLP	1	Endothall




Survey Objectives

A point-intercept survey was used to assess the distribution of aquatic plants in Comfort 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. This particular survey was used to monitor the aquatic plants in Comfort Lake after a whole lake fluridone treatment that was conducted in 2022. 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

Surveyors used a point-intercept survey method developed by John Madsen in “Aquatic Plant Control Technical Note MI-02, 1999”. In 2022, sampling points were placed 50 meters apart using a Geographic Information System, although sampling points varied by year, depth of rooted vegetation and surveyor. The most recent DNR survey was comprised of 158 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 Crow and Hellquist (2000). 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 2). Frequencies of occurrence percentages (i.e., how often a plant species was sampled in the lake) were calculated based on the littoral zone. Maximum depths were calculated at the 95th percentile for all vegetated sampling points.

Table 2- Quantitative rake abundance ranking (0-3) used to estimate plant abundance for each species based on rake coverage and/or visual observation (MN DNR). 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

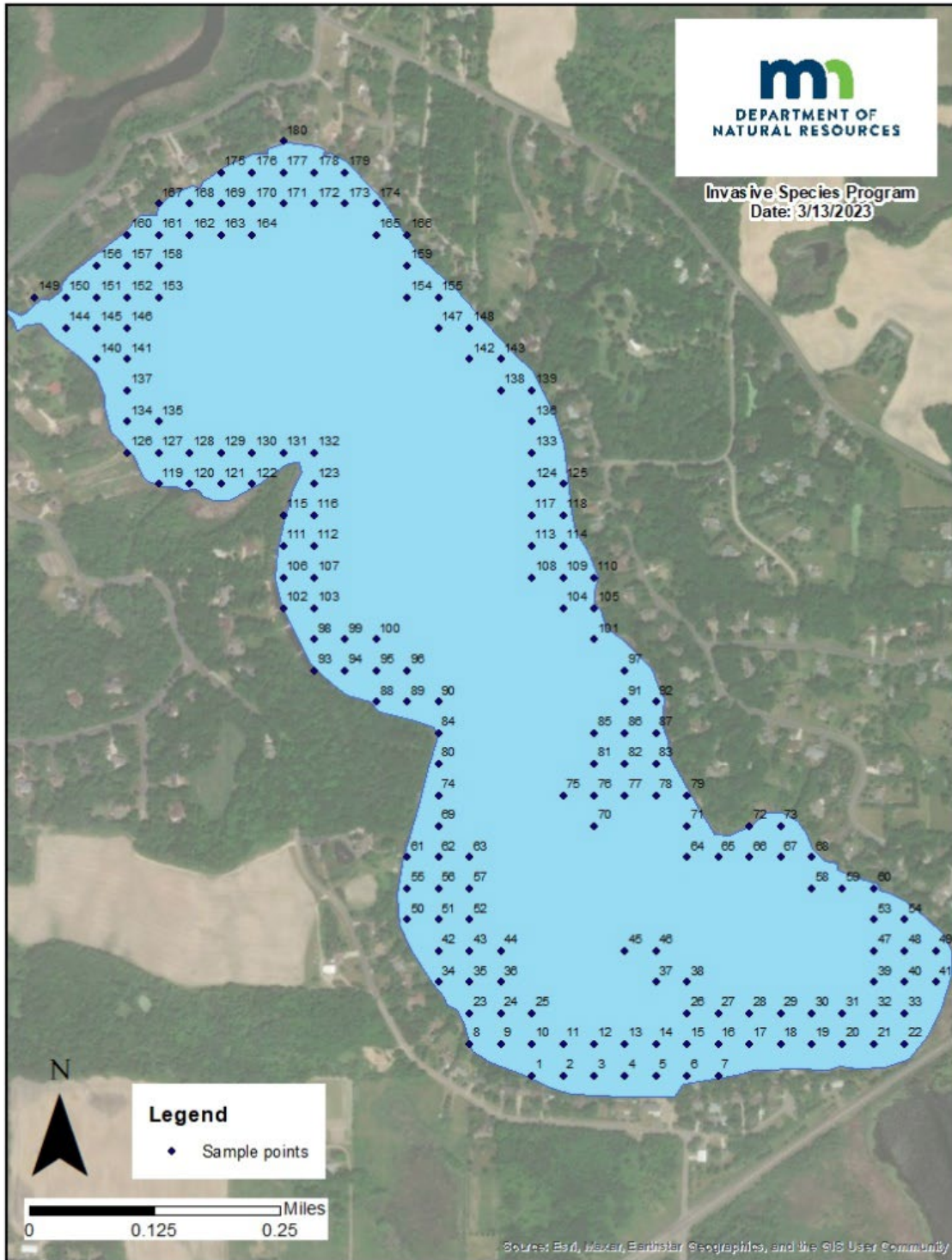


Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Comfort Lake, Chisago County (DOW#13005300). Point-intercept survey included 158 points, 50 meters apart.

Survey Observations

The most recent aquatic vegetation point-intercept surveys of Comfort Lake (DOW #13005300) occurred in June, July and September of 2022 as part of the monitoring efforts to evaluate lake-wide fluridone treatments. In the littoral zone (water depth from 0 to 15 feet, where aquatic plants are likely to be found), 42% of the points had submersed native vegetation during the June survey (prior to treatment), then later declined to 7% post-treatment (Table 3). During this same period, the mean submersed native taxa per point of declined from 0.7 to 0.1 (Figure 2) and the number of submersed native taxa declined from 11 to 4 (Table 4). Based on the MnDNR July 2022 point-intercept survey, the native plant community within the littoral area in Comfort Lake was primarily dominated by yellow waterlily (45%, *Nuphar variegata*.; Figure 3), followed by white waterlily (28% *Nymphaea odorata*.; Figure 4), and coontail (28%, *Ceratophyllum demersum*; Figure 5). The survey was performed approximately one week after a whole lake fluridone treatment. Overall, the emergent and floating-leaf native aquatic plant community is most dominant in Comfort Lake and did not appear to be impacted by the fluridone treatment. Submerged plant growth post treatment showed signs of either dying plants and or plants with new growth. All living fragments of plants were counted in the survey. The fluridone treatment reduced the Eurasian watermilfoil in the lake from 19% to 3% (Figure 6) during the growing season of 2022, although there was a negative response from the native aquatic plant community. In general, aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Future surveys are warranted to evaluate how the native aquatic plants rebound from the fluridone treatment. Native aquatic plants will hopefully increase in the years following the whole lake treatment. Plants are important to absorb nutrients and reduce algae, thereby improving water quality.

Table 3 - Point-intercept Metrics. Summary of point-intercept metrics for Comfort Lake, Chisago County (DOW#13005300). Shaded values were calculated from littoral depth range (0-15 feet). Abbreviations include Department of Fisheries (FSH), Blue Water Science (BWS), and Invasive Species Program (ISP).

Metric	JULY 2015	AUG 2019	JUNE 2022	JULY 2022	SEP 2022
Surveyor	FSH	BWS	BWS	MN DNR (ISP)	BWS
Total # Points Sampled	160	180	155	158	116
Depth Range of Rooted Veg (ft.)	1-10	2 - 6	1 – 9	1 - 12	1 – 5
Max Depth of Growth (95%)	8	5	7	8	5
# of Points in Max Depth Range	NA	87	99	112	92
# Points in Littoral (0-15 feet)	160	180	135	145	114
% Points w/ Submersed Native Taxa	NA	33	42	41	7
Mean Submersed Native Taxa/ Point	1.6	1.1	0.7	0.7	0.1
# Submersed Native Taxa	9	8	11	11	4
# Submersed Non-Native Taxa	2	1	2	2	0
% Points w/ Submersed Non- native Taxa	40	20	24	3	0

Table 4 - Plant Frequency of Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Comfort Lake, Chisago County (DOW#13005300). Abbreviations are as follows; FSH (MN DNR Department of Fisheries), BWS (Bluewater Science), ISP (MN DNR Invasive Species Program).

Taxonomic Name	Common Name	2015	2019	2022	2022	2022
Surveyors		(FSH)	(BWS)	(BWS)	(ISP)	(BWS)
SUBMERSED NON-NATIVE						
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	40	20	19	3	-
<i>Potamogeton crispus</i>	curly-leaf pondweed	8	-	14	1	-
SUBMERSED NATIVE						
<i>Chara</i> sp.	muskgrass	-	-	10	7	-
<i>Ceratophyllum demersum</i>	coontail	18	18	14	19	2
<i>Elodea canadensis</i>	Canadian waterweed	3	-	9	5	-
<i>Heteranthera dubia</i>	water star-grass	-	1	-	-	-
<i>Myriophyllum sibiricum</i>	northern watermilfoil	4	-	1	9	-
<i>Najas</i> sp.	naiad species	-	1	4	3	-
<i>Potamogeton gramineus</i>	variable pondweed	-	-	-	1	-
<i>Potamogeton illinoensis</i>	Illinois pondweed	2	6	1	3	-
<i>Potamogeton</i> spp.	narrow-leaf pondweed	2	1	6	3	-
<i>Stuckenia pectinata</i>	sago pondweed	13	1	-	-	1
<i>Potamogeton zosteriformis</i>	flat-stemmed pondweed	2	4	5	7	1
<i>Vallisneria americana</i>	water celery	-	-	1	1	-
<i>Potamogeton pusillus</i>	Small Pondweed	6	-	-	-	-
<i>Potamogeton amplifolius</i>	Largeleaf pondweed	14	2	2	-	1
Floatingleaf						
<i>Nuphar variegatum</i>	Yellow Waterlily	30	21	14	32	28
<i>Nymphaea odorata</i>	White Waterlily	6	12	19	19	11
<i>Nuphar microphyllum</i>	Little Yellow Waterlily	1	-	-	-	-

Taxonomic Name	Common Name	2015	2019	2022	2022	2022
Surveyors		(FSH)	(BWS)	(BWS)	(ISP)	(BWS)
EMERGENT						
<i>Persicaria sp.</i>	Water smartweed	-	-	-	1	-
<i>Scirpus sp.</i>	Bulrush species	2	-	1	2	1
<i>Elocharis sp.</i>	Needlerush	1	-	-	-	-
<i>Typha sp.</i>	Cattail species	1	-	-	-	-
<i>Asclepias incarnata</i>	Swamp milkweed	**	-	-	-	-
<i>Sagittaria latifolia</i>	Broadleaf arrowhead	**	-	-	-	-
<i>Schoenoplectus pungens</i>	Three-square bulrush	**	-	-	-	-
<i>Lythrum salicaria</i>	Purple Loosestrife	**	-	-	-	-

* Narrow-leaf pondweeds may include several species of *Potamogeton*, including *P. foliosus* and *P. strictifolius*. Surveyors used this group to record narrow-leaf pondweed (*Potamogeton* sp.) that were not identified to the species level.

**Species not sampled at points but observed on shore

-Species not present

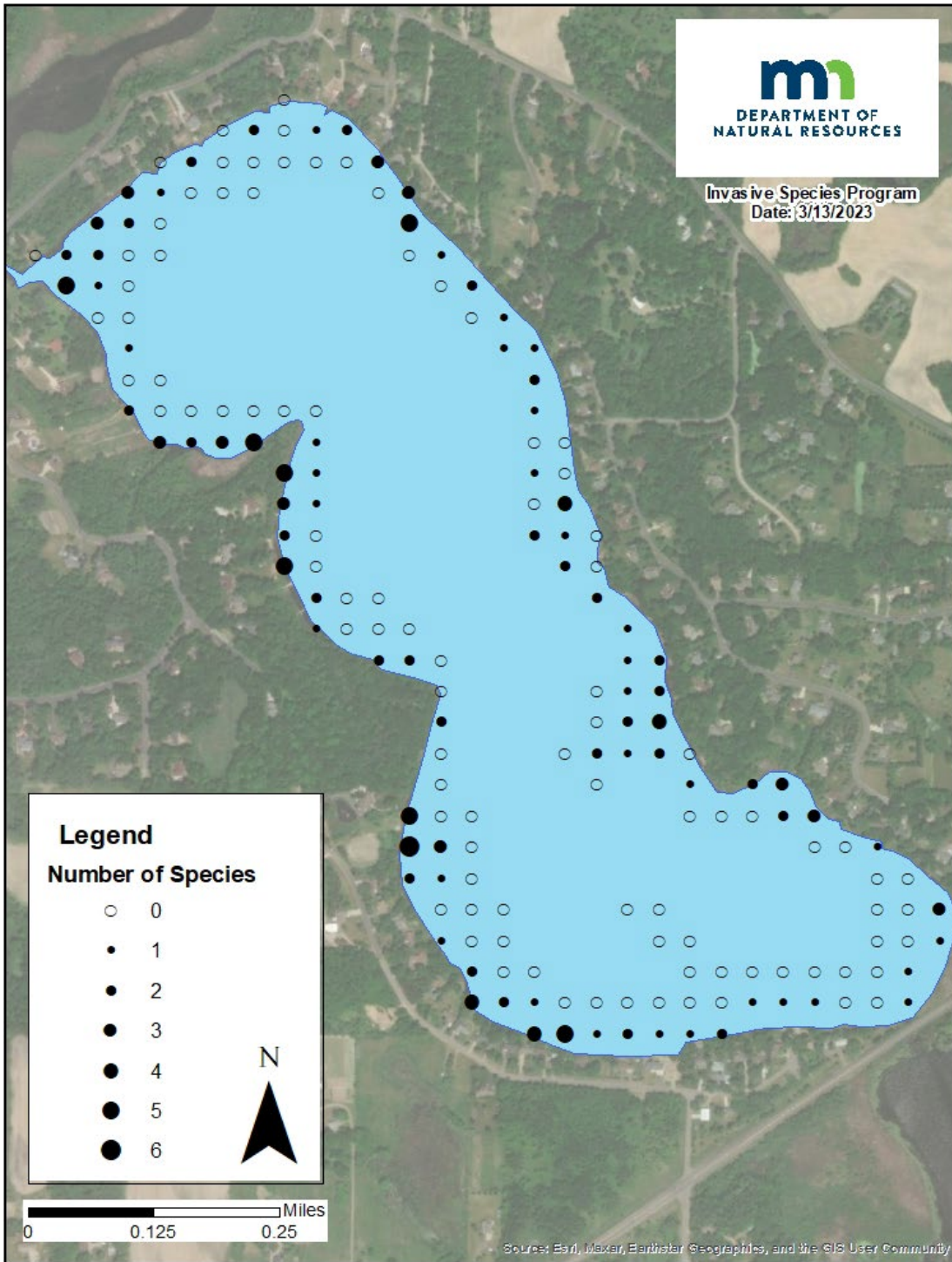


Figure 2 – Species Richness Distribution. Number of species per a sampling point from the 2022 MN DNR point-intercept survey in Comfort Lake, Chisago County (DOW#13005300).

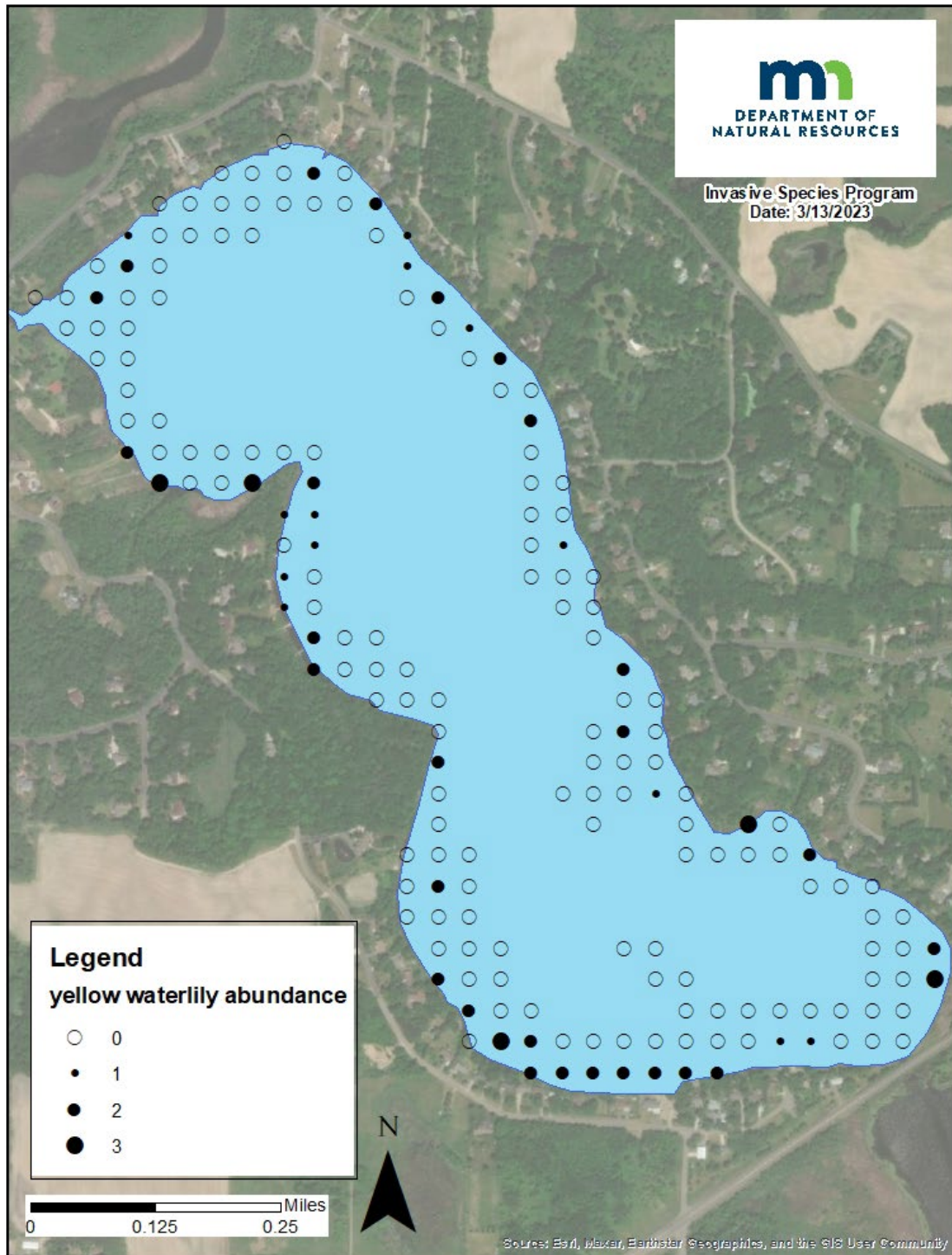


Figure 3 – Yellow waterlily (*Nuphar variegata*) Distribution. Plant distribution from the 2022 MN DNR point-intercept survey for yellow waterlily in Comfort Lake, Chisago County (DOW#13005300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

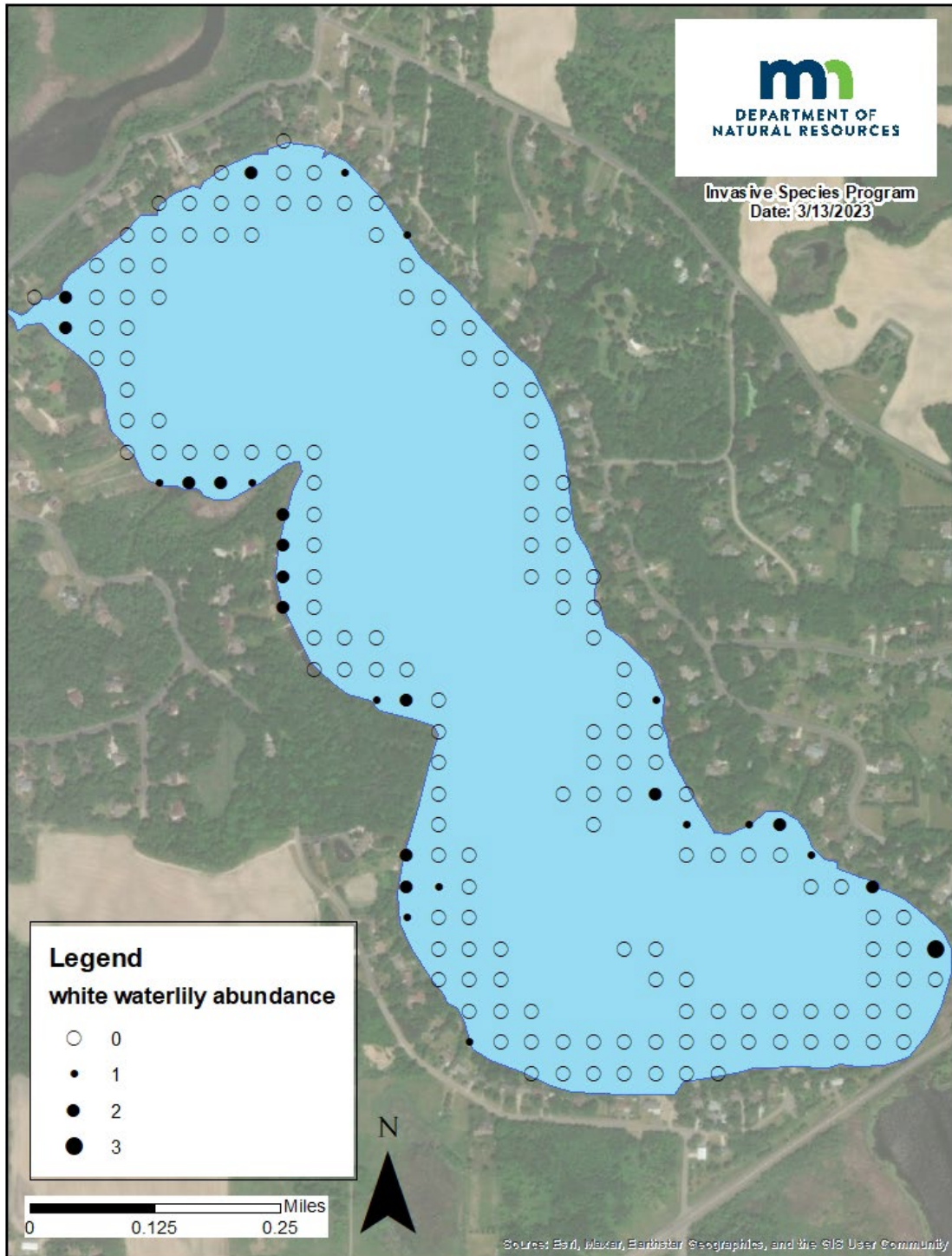


Figure 4 – White waterlily (*Nymphaea odorata*) Distribution. Plant distribution from the 2022 MN DNR point-intercept survey for white waterlily in Comfort Lake, Chisago County (DOW#13005300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

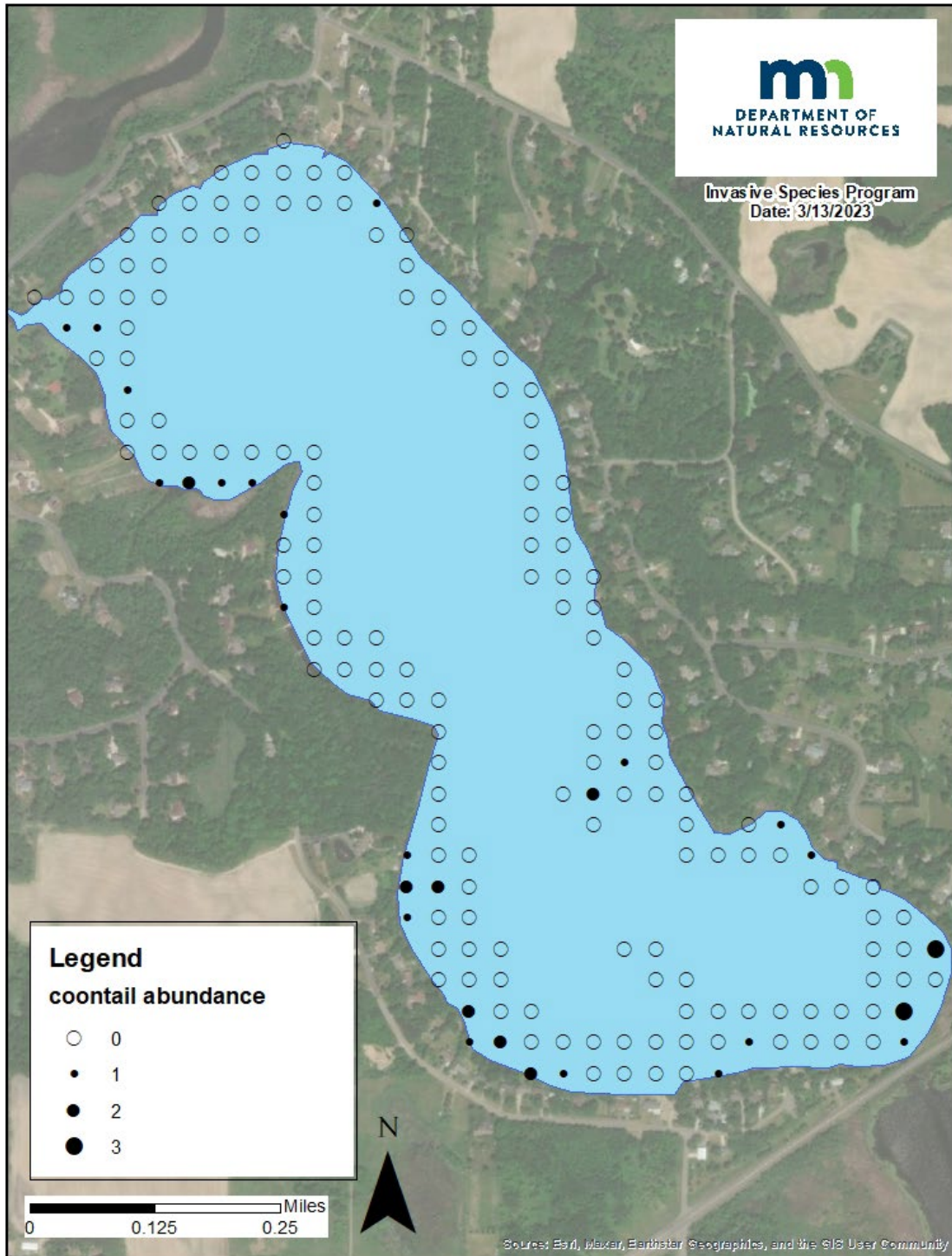


Figure 5 – Coontail (*Ceratophyllum demersum*) Distribution. Plant distribution from the 2022 MN DNR point-intercept survey for coontail in Comfort Lake, Chisago County (DOW#13005300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

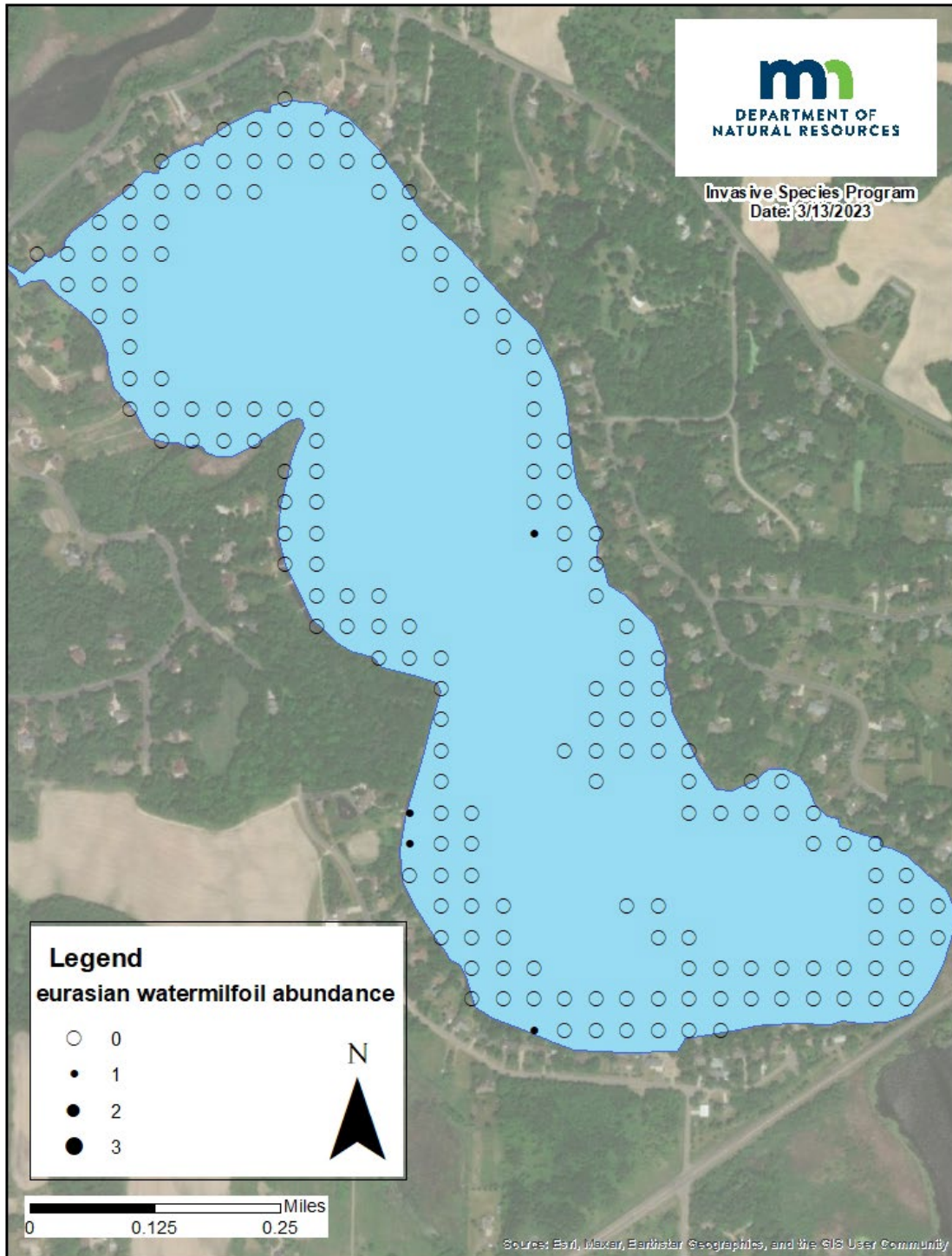


Figure 6 – Eurasian watermilfoil Distribution. Eurasian watermilfoil distribution map from the 2022 MN DNR point-intercept survey in Comfort Lake, Chisago County (DOW#13005300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

Literature Cited

Crow, G.E. and C.B. Hellquist. (2000). *Aquatic and wetland plants of Northeastern North America*. (Vols. 1 & 2). Madison, WI: The University of Wisconsin Press.

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.