
LONG LAKE, ISANTI COUNTY: 2020 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: Long (DOW# 30007200)

Lake Surface Area: 387.4 acres

Littoral Area: 381.6 acres

County: Isanti County

Survey Type: Point-intercept

Date of Survey (most recent): July 6, 2020

Observer[s]: MN DNR, Invasive Species Program (ISP): Emelia Hauck Jacobs (MN DNR), Chris Jurek (2020), Lake Habitat Program (LHP): Stephanie Simon, Ben Froelich and Emelia Hauck (2013), ISP: Dan Swanson and Matt Pierce (2010), Wendy Crowell, Brenda Asmus and Steve Ries (2007), Wendy Crowell, Christa Drake and Alan Einck (2008), University of Minnesota (U of MN) Ajay Jones and James Johnson (2008) and Fisheries: Neil Vanderbosch, Tim Ohman, Joel Stiras and John Schoon (2006).

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Report Details

C. Jurek and E. Hauck Jacobs. 2021. Long Lake, Isanti County: 2020 MN DNR Aquatic Vegetation Report. Minnesota Department of Natural Resources, Division of Ecological and Water Resources, Invasive Species Program, 1035 South Benton Drive, Sauk Rapids, MN 56379. 15 pp.

Summary

The most recent aquatic vegetation point-intercept survey of Long Lake (DOW #30007200) occurred on July 6, 2020. Plants were present throughout the lake to a depth of 7.2 feet. Within the littoral zone (zone in lake from the 0-15 foot depth range), 25% of the points in the littoral zone had native submersed taxa. The average number of native submersed taxa per sample point was 0.37. In total, six native submersed taxa, one invasive taxa, and two floating-leaf taxa were observed during the 2020 survey.

Lake Description

Long Lake is a 387.4- acre lake located 13 miles southwest of Cambridge, MN in Isanti County. Long Lake and its immediate watershed are within both Bradford and Stanford Townships. Long Lake has three inlets, with the largest originating in German Lake to the west. The lake has two invasive plant species: curly-leaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*). Historically, curly-leaf pondweed was the most dominant plant, although is relatively sparse. The maximum depth of water in Long Lake is slightly over 15 feet, and 99% of the lake is classified as littoral (areas of water depth between 0 to 15 feet, where aquatic plants are most likely to grow). Long Lake is within the North Central Hardwood Forest Ecoregion. According to surveys from the Minnesota Pollution Control Agency (MPCA, 2020), Long Lake is classified as a eutrophic lake, based on its Trophic State Index (TSI) of approximately 70. For years 1974 to 2019 there is no identifiable water clarity trend at this lake. During the last decade (2010 to 2020), the water clarity has improved, although during the most recent year of the analysis, the median water clarity was still 5.6 feet lower than the watershed median (MPCA, 2021). For more information on water quality, go to [Long Lake water quality](https://webapp.pca.state.mn.us/surface-water/impairment/30-0072-00) on the MPCA website (<https://webapp.pca.state.mn.us/surface-water/impairment/30-0072-00>).

Management History

Curly-leaf pondweed was first reported in Long Lake in 1974. Since the 1970's, the presence of this plant had expanded and grown to a point of recreational hindrance. Between 2007 and

2011, Long Lake participated in the MN DNR Pilot Program for lake-wide curly- leaf pondweed control to reduce its frequency and distribution. During these years, treatments exceeded 15% of the littoral area. Following these treatments, there was a consistent decline of curly-leaf pondweed. By 2018, the treatment acreage had decreased to 3 acres and no treatments were conducted in 2019 or 2020 because of the lack of curly-leaf pondweed. Management has been organized by the Long Lake Improvement District (Table 1), with treatments ranging from 3 to 352 acres.

Table 1 - Invasive Plant Management Summary. Characteristics and history of partial lake invasive plant treatments for Long Lake, Isanti County (DOW#30007200). Total acres: 387.4, Littoral acres: 381.6, 15% of Littoral acres: 57.2. Abbreviations are as followed: curly-leaf pondweed (CLP). Note: Total acres permitted does not reflect the actual treatment or known acreage of the taxa in the lake.

Date	Target Species	Total Acres Permitted	Herbicide	Licensed Commercial Applicator
2006	CLP	53	Endothall	Lake Restoration
2007	CLP	295	Endothall	Lake Restoration
2008	CLP	352	Endothall	Lake Restoration
2009	CLP	350	Endothall	Lake Restoration
2010	CLP	192	Endothall	Lake Restoration
2011	CLP	186	Endothall	Lake Restoration
2012	CLP	30	Endothall	Lake Restoration
2013	CLP	31	Endothall	Lake Restoration
2014	CLP	54	Endothall	Lake Restoration
2015	CLP	23	Endothall	Clarke Aquatic Services
2016	CLP	58	Endothall	Clarke Aquatic Services
2017	CLP	20	Endothall	Clarke Aquatic Services
2018	CLP	3	Endothall	Lake Restoration

Survey Objectives

Point-intercept survey was used to assess the distribution of aquatic plants in Long Lake. The primary purpose for this type of survey was to 1) determine the frequency and distribution of

curly- leaf pondweed, 2) develop baseline knowledge of the current plant community in a lake, and over time, 3) compare year to year plant variation (in plant presence and spatial location). In addition, these surveys had monitored the native plant communities and evaluated possible responses to invasive aquatic plant management via herbicide control. It is important to note that distributions of aquatic plants may vary from year to year due to effects such as differences in weather, as well as the effects from management efforts.

Survey Methods

Since 2006, 11 point-intercept surveys have been conducted on Long Lake. Although, the most recent survey occurred in 2020. MN DNR surveyors used a point-intercept survey method developed by John Madsen in “Aquatic Plant Control Technical Note MI-02, 1999” to sample the frequency and distribution of aquatic plants. Sampling points were placed 60 meters apart using a Geographic Information System. A total of 135 points within 15 feet were established on a grid (Figure 1). Plant samples were collected by throwing and dragging a double-sided rake along the lake bottom at each point. Frequencies of occurrence percentages (i.e., how often a plant species was sampled in the lake) were calculated based on the littoral zone.

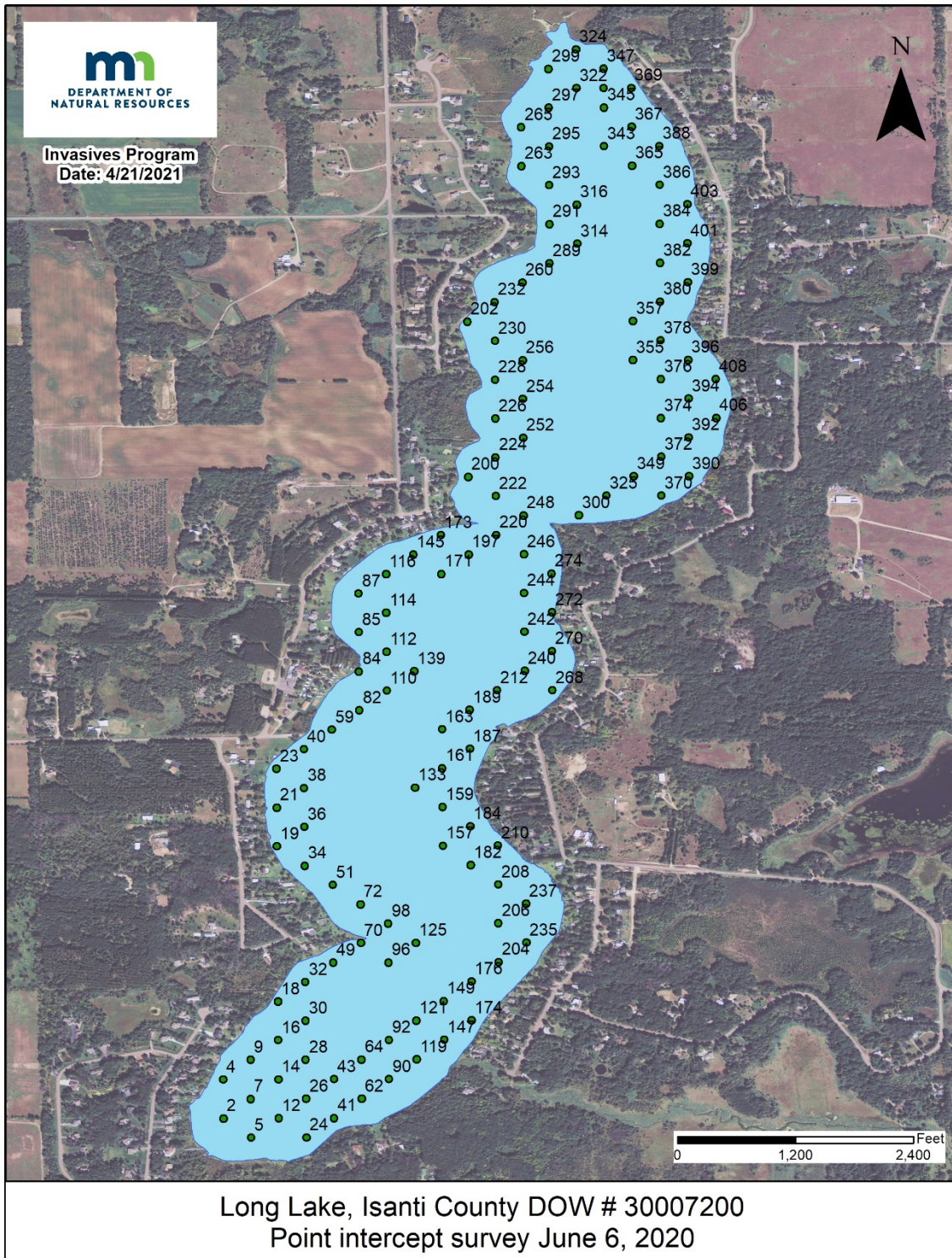


Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Long Lake, Isanti County (DOW#30007200). Point-intercept survey included 135 points, 60 meters apart.

Survey Observations

In 2020, aquatic plants in Long Lake ranged in water depths from 0.5 to 7.2 feet. Most plants were growing in the depth range between 0.5 and 4.1 feet. In the littoral zone, 25% of the surveyed points had submersed native vegetation (Table 2). In total, we found six submersed taxa and two floating-leaf species during the survey (Table 3). Northern watermilfoil (*Myriophyllum sibiricum*) was the most commonly occurring plant, at 14% of all sites in the littoral zone (Figure 2), followed by muskgrass (*Chara*, Figure 3), and white waterlily (*Nymphaea odorata*, Figure 4). Curly- leaf pondweed was the only invasive species present during the survey and relatively sparse at 5% (Figure 5) and Eurasian watermilfoil was not observed. Long Lake's aquatic plant community has an average of 0.37 species per a sampling site (Figure 6).

Overall, these surveys provided a summary of submerged aquatic plants in the lake over time. Curly- leaf pondweed has shown significant reductions in frequency since 2006, while the frequency of submersed native taxa increased to 25% (Table 2). During the last decade, improvements in the number of submerged native species were also observed, although Long Lake still has a low diversity of aquatic plants. The mean number of submersed native plants per a point still remains below 0.5. The depth of rooted aquatic plant growth during the summer months has also improved which is likely correlated to the increase in water clarity. Future aquatic plants will determine if there will continue to be an upward trend in native aquatic plants.

In addition to point-intercept surveys, the Minnesota Biological Survey (MBS) surveyed aquatic plants in 2013 resulting in a total of five native submerged aquatic plants, one invasive aquatic plant, one free floating, two floating- leaf, five emergent, and 23 shoreline plants (refer to MBS report, 2013).

Table 2 - Point-intercept Metrics. Summary of point-intercept metrics for Long Lake, Isanti County (DOW#30007200). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	APRIL 2006	SEPT 2006	MAY 2007	JUNE 2007	AUG 2007	MAY 2008	JUNE 2008*	AUG 2008*	AUG 2010	JULY 2013	JULY 2020
Surveyor	MN DNR	MN DNR	MN DNR	MN DNR	MN DNR	MN DNR	U of M	U of M	MN DNR	MN DNR	MN DNR
Total # Points Sampled	408	407	408	408	408	408	408	408	179	224	135
Max Depth of Growth (95%)	11.0	4.7	4.5	3.4	3.0	3.1	2.6	1.2	4.0	8.0	5.2
# Points in Littoral (0-15 feet)	408	408	408	408	408	408	408	408	179	224	135
% Points w/ Submersed Native Taxa	4	2	3	5	2	9	--	--	17	19	25
Mean Submersed Native Taxa/ Point	0.04	0.03	0.05	0.08	0.05	0.10	0.20	0.10	0.18	0.32	0.37
# Submersed Native Taxa	2	3	4	3	3	2	2	2	4	8	6
# Submersed Non-Native Taxa	1	0	1	1	0	1	0	0	0	2	1
% Points w/ Submersed Non- native Taxa	81	<1	75	1	0	50	0	0	0	6	5

Table 3 - Plant Frequency of Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Long Lake, Isanti County (DOW#30007200).

Taxonomic Name	Common Name	APRIL 2006	SEPT 2006	MAY 2007	JUNE 2007	AUG 2007	MAY 2008	JUNE 2008*	AUG 2008*	AUG 2010	JULY 2013	JULY 2020
SUBMERSED NON-NATIVE												
<i>Potamogeton crispus</i>	Curly-leaf pondweed	82	0	75	1	0	50	0	0	0	1	5
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	0	<1	0	0	0	0	0	0	0	6	0
SUBMERSED NATIVE												
<i>Ceratophyllum demersum</i>	Coontail	1	1	1	<1	0	4	0	0	4	10	5
<i>Chara sp.</i>	Muskgrass	3	<1	2	4	1	8	20	7	12	3	13
<i>Elodea canadensis</i>	Canadian waterweed	0	0	0	0	0	0	0	0	0	8	1
<i>Heteranthera dubia</i>	Water star-grass	0	0	0	0	0	0	0	0	0	1	0
<i>Myriophyllum sibiricum</i>	Northern watermilfoil	0	<1	<1	0	<1	0	0	0	1	2	14
<i>Najas flexilis</i>	Naiad	0	0	0	0	0	0	1	0	0	0	0
<i>Potamogeton sp.</i>	Narrow-leaved pondweed	0	0	<1	0	0	0	0	0	0	0	1
<i>Stuckenia pectinata</i>	Sago pondweed	0		0	<1	1	0	0	1	0	1	1
<i>Vallisneria americana</i>	Wild celery	0	0	0	0	0	0	<1	0	0	0	0
FLOATING LEAF												
<i>Brasenia schreberi</i>	Watershield	0	0	0	0	0	0	6	<1	1	0	0
<i>Nymphaea odorata</i>	White waterlily	0	1	<1	1	1	1	3	3	4	4	6
<i>Nuphar variegata</i>	Yellow waterlily	0	<1	0	<1	1	0	2	<1	0	0	1
FREE FLOATING												
<i>Lemna sp.</i>	Duckweed species	0	0	1	1	2	0	<1	1	1	1	0

*Data collected by the U of MN

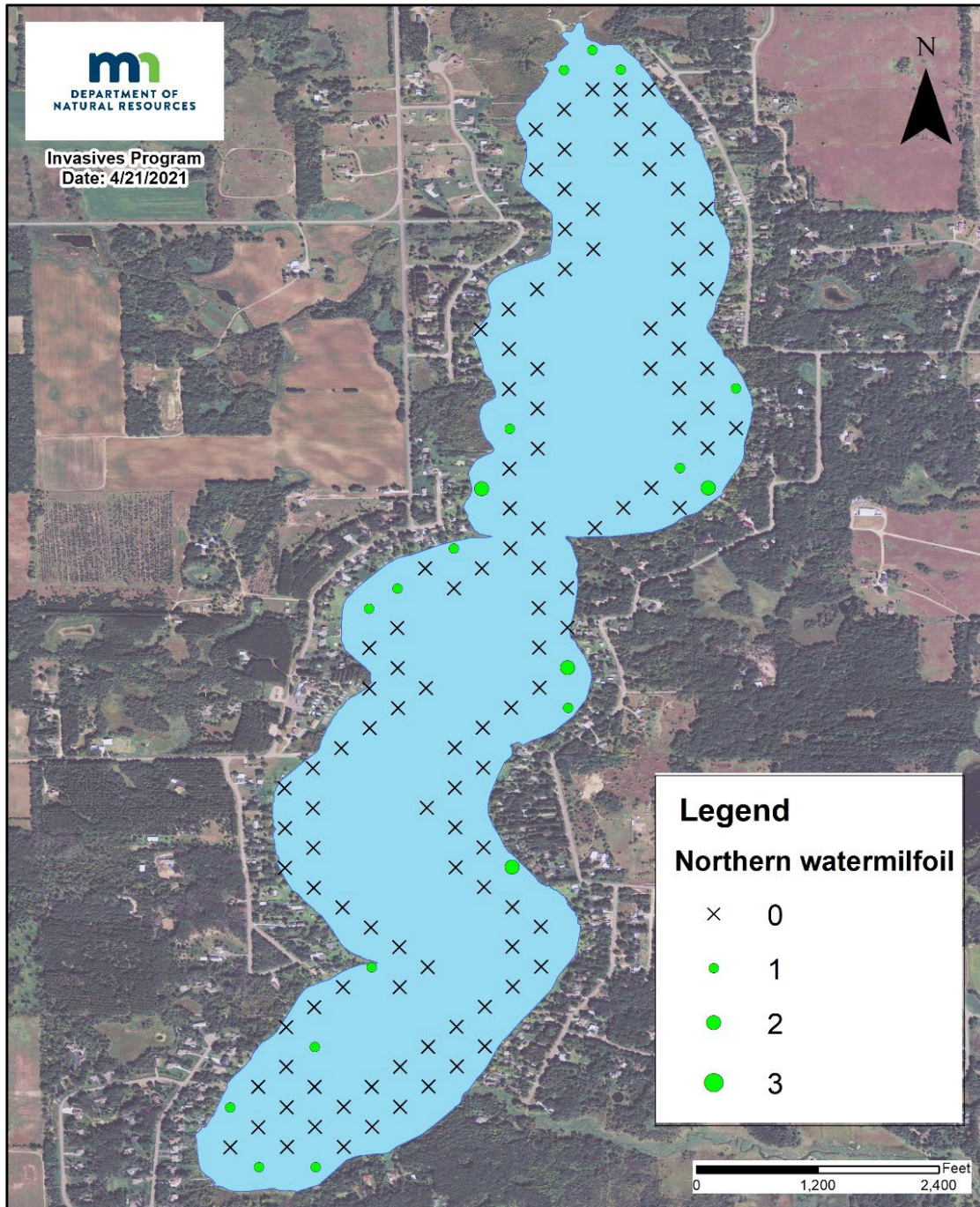


Figure 2 – 2020 Northern watermilfoil Distribution. Plant distribution from the June 6, 2020 point-intercept survey for northern watermilfoil in Long Lake, Isanti County (DOW#30007200). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

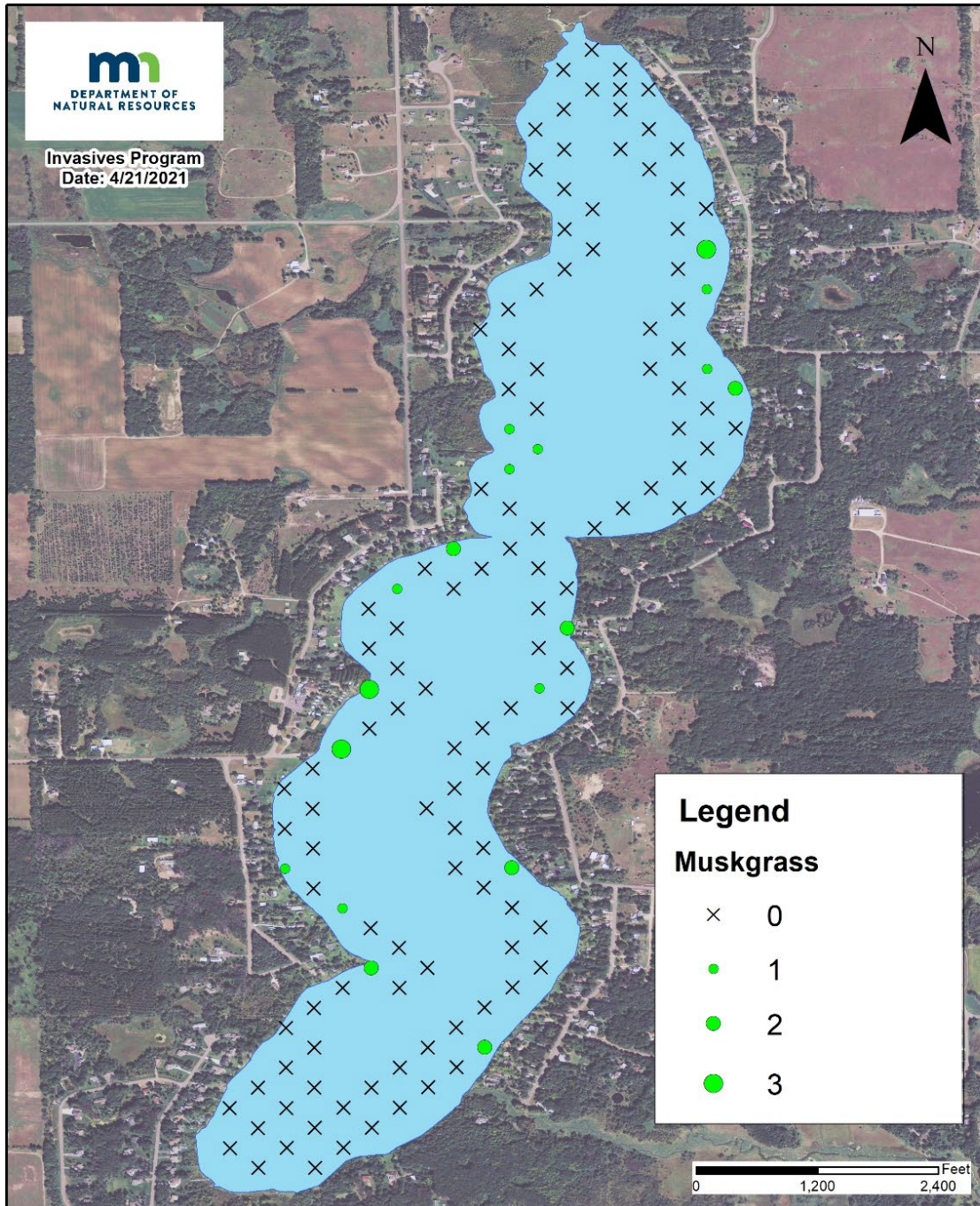


Figure 3 – 2020 Muskgrass Distribution. Plant distribution from the June 6, 2020 point-intercept survey for muskgrass in Long Lake, Isanti County (DOW#30007200). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

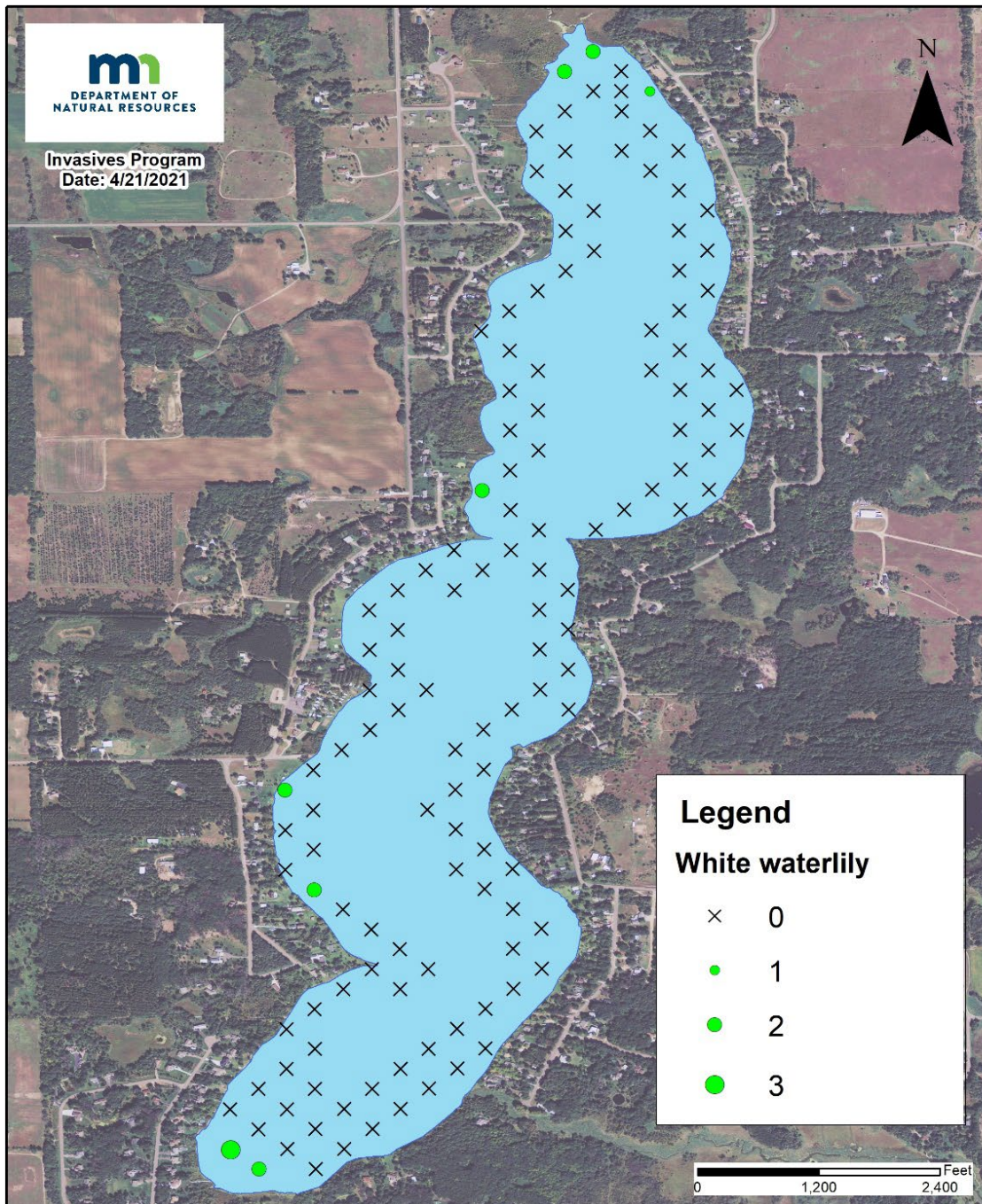


Figure 4 – 2020 White waterlily Distribution. Plant distribution from the June 6, 2020 point-intercept survey for white waterlily in Long Lake, Isanti County (DOW#30007200). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

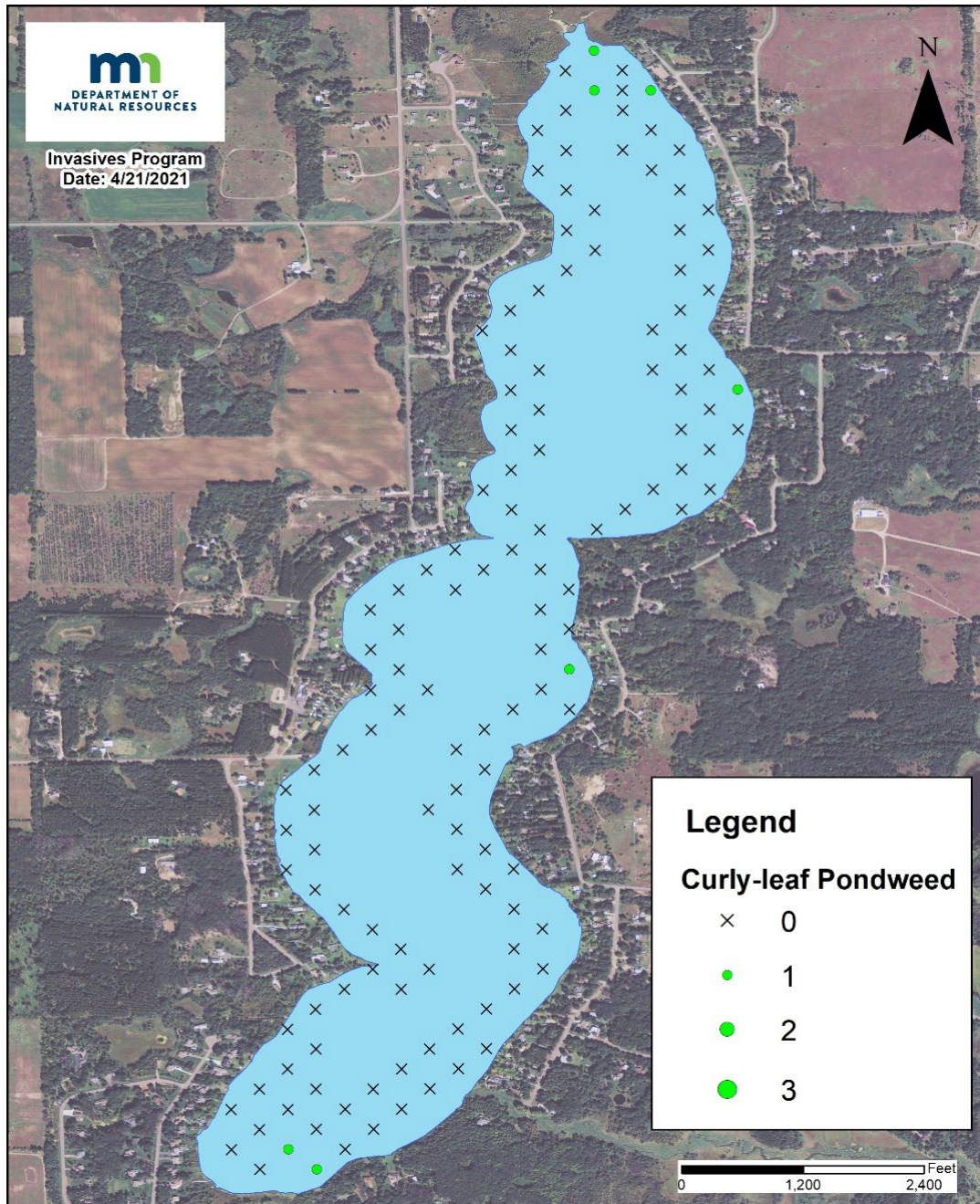


Figure 5 – 2020 Curly-leaf pondweed Distribution. Plant distribution from the June 6, 2020 point-intercept survey for curly-leaf pondweed in Long Lake, Isanti County (DOW#30007200). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

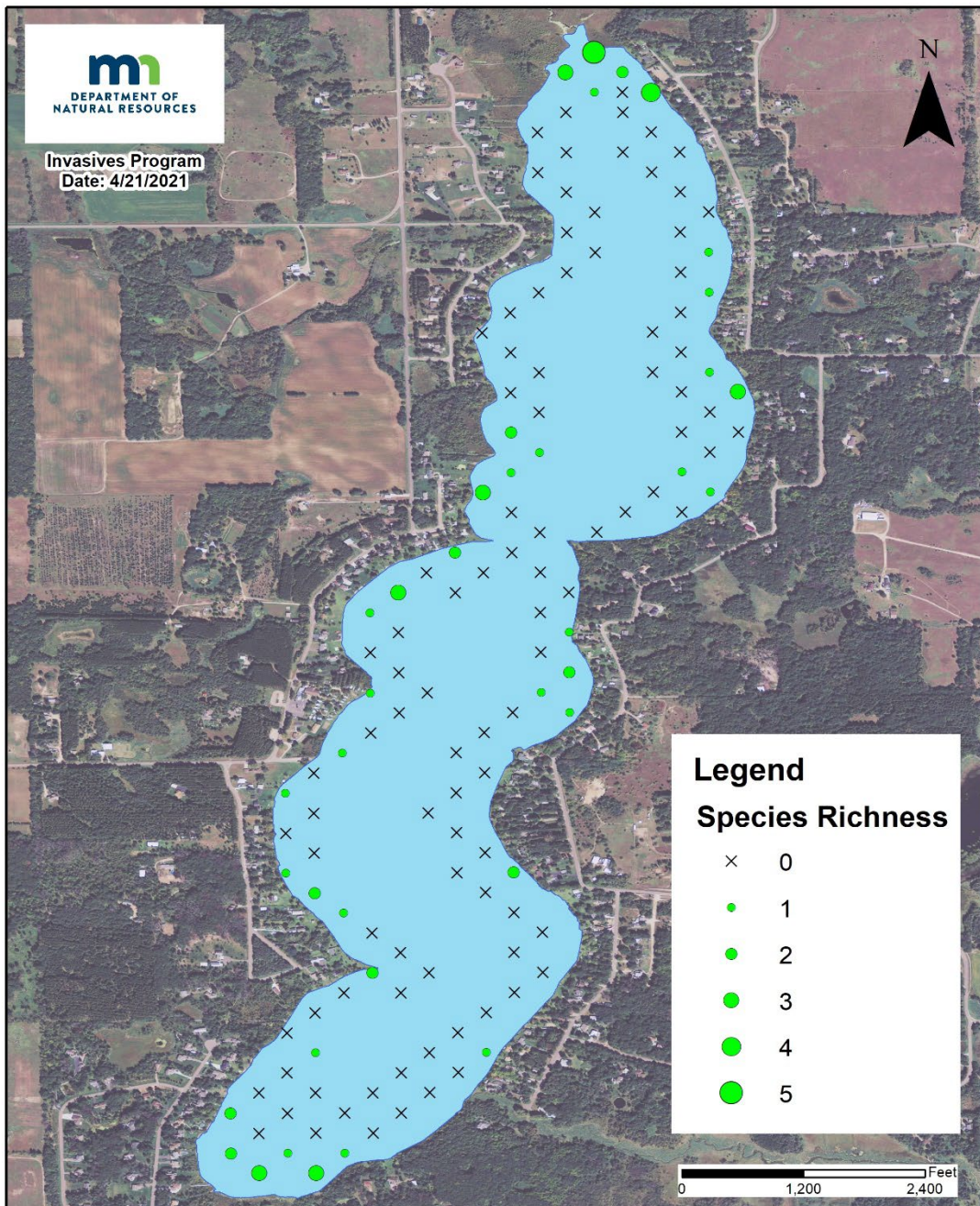


Figure 6 – Number of species per site. Maps of number of species from the June 6, 2020 point-intercept survey in Long Lake, Isanti County (DOW#30007200).

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