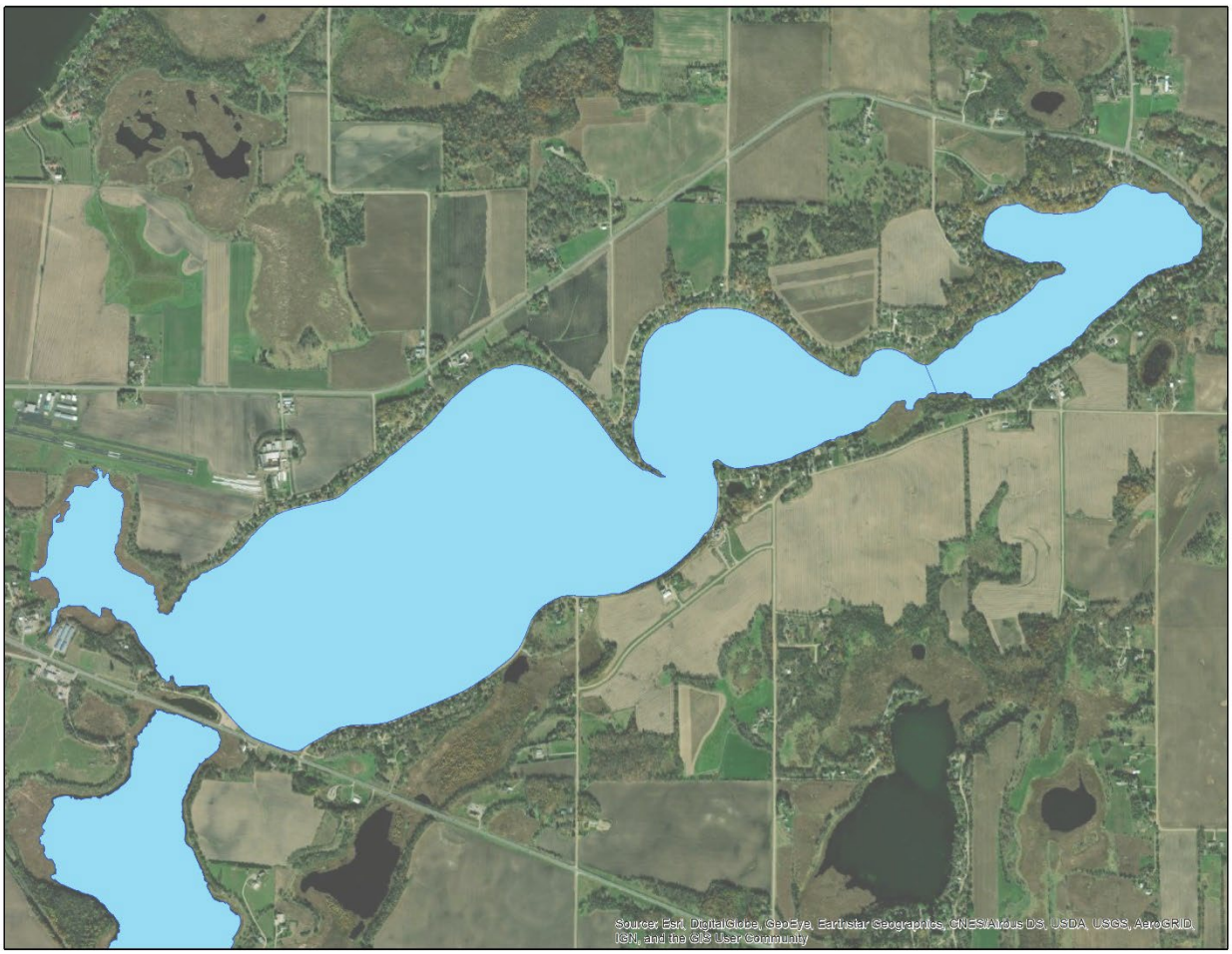
Maple Lake, Wright County
Aquatic Vegetation Management Report

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



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Project Details

Lake: Maple (DOW# 86013400)

Lake Surface Area: 862 acres

Littoral Area: 393 acres

County: Wright County

Survey Type: Point-intercept

Date of Survey (most recent): July 31, 2012

Observer[s]: MN DNR, Invasive Species Program (ISP): Christine Jurek and Courtney Millaway

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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 Maple Lake, Wright County between 2012 and present. 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

Maple Lake is a 862- acre lake located 1 mile east of Maple Lake, MN in Wright County. The maximum depth of water in Maple Lake is 76 feet, and approximately 46% of the lake is classified as littoral (water depths between 0 to 15 feet, where aquatic plants are most likely to grow). Water clarity during the 2012 survey, indicated Secchi depths of 1.5 feet. According to surveys from the Minnesota Pollution Control Agency (MPCA, 2021), Maple Lake is classified as a eutrophic lake, based on its Trophic State Index (TSI) of approximately 47. Eutrophication is associated with excessive nutrients, which stimulates dense plant growth and can cause depletion of dissolved oxygen. 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 Maple Lake water quality on the MPCA website (https://webapp.pca.state.mn.us/wqd/surface-water/waterunit-details?wid=86-0134-01).

Management History

The lake has two invasive plant species: curly-leaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*). Invasive aquatic plant management in Maple Lake has most recently focused on curly-leaf pondweed using diquat and Procellacor ® on Eurasian watermilfoil. The most recent treatment was for Eurasian watermilfoil in 2021 for 39 acres, organized by the Maple Lake Improvement District (Table 1), although past treatments have ranged from 7 to 44 acres. Curly-leaf pondweed management has ranged from 10 to 54

acres. 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 Maple Lake, Wright County (DOW#86013400). Total acres: 862, Littoral acres: 393, 15% of Littoral acres: 51%). Abbreviations are as follows: curly-leaf pondweed (CLP), Eurasian watermilfoil (EWM), Professional Lake Management (PLM). 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	Licensed Commercial Applicator
2012	CLP	54	Endothall	PLM
2014	CLP	30	Endothall	PLM
2016	CLP	20	Endothall	PLM
2017	CLP	10	Endothall	PLM
2018	CLP	10	Endothall	PLM
2019	CLP	10	Endothall	PLM
2020	CLP	10	Diquat	PLM
2021	CLP	10	Diquat	PLM
2012	EWM	38	Auxin-mimic	PLM
2013	EWM	7	Auxin-mimic	PLM
2014	EWM	12	Auxin-mimic	PLM
2015	EWM	29	Auxin-mimic	PLM
2016	EWM	19	Auxin-mimic	PLM
2018	EWM	15	Auxin-mimic	PLM
2019	EWM	44	Procellacor	PLM
2020	EWM	24	Procellacor	PLM
2021	EWM	39	Auxin-mimic	PLM

Survey Objectives

A point-intercept survey was used to assess the distribution of aquatic plants in Maple 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. Moreover, this survey will help the DNR 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

We used a point-intercept survey method developed by John Madsen in "Aquatic Plant Control Technical Note MI-02, 1999". Sampling points were placed 120 meters apart using a Geographic Information System. Actual sampling points varied by depth of rooted vegetation and surveyor. The most recent survey was comprised of 111 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

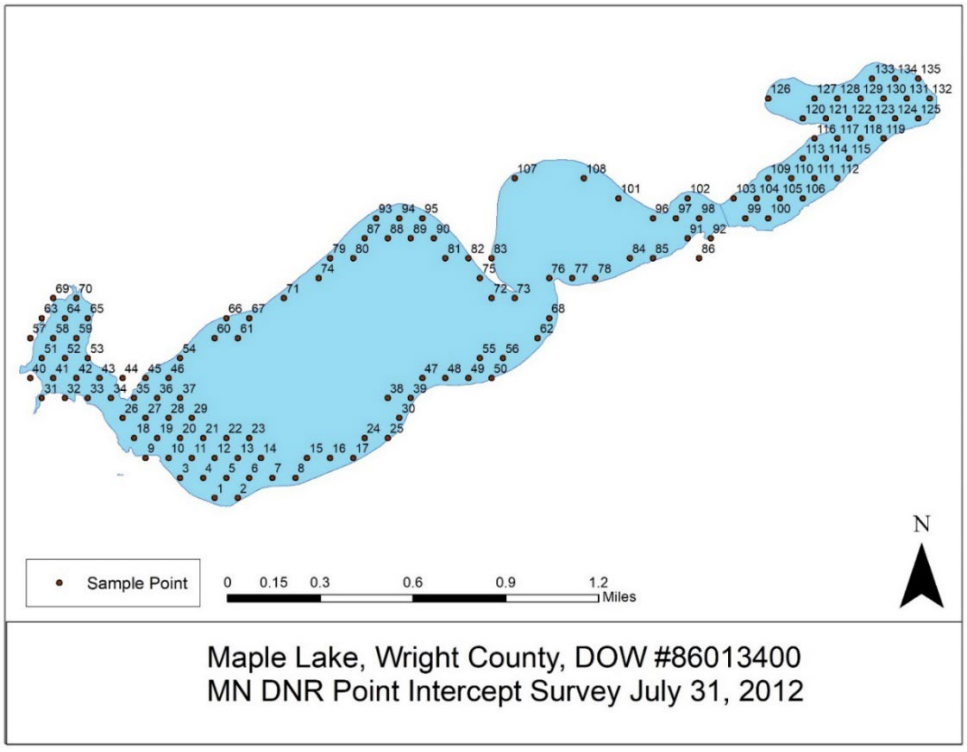

Figure 1. Point-intercept Survey Grid. Point-intercept survey grid for Maple Lake, Wright County (DOW#86013400). Point-intercept survey included 111 points, 120 meters apart.

Survey Observations

The most recent aquatic vegetation point-intercept survey of Maple Lake (DOW #86013400) occurred on July 31, 2012. Plants were rooted to a maximum depth (95%) of 12.8 feet, with depths ranging from 1.4 to 18.6 feet. In the littoral zone (water depth from 0 to 15 feet, where aquatic plants are likely to be found), 88% of the points had submersed native vegetation with a mean submersed native taxa per point of 2.3 (Table 3). Maple Lake has up to 16 submersed native taxa (Table 4) and two non-native submerged taxa (curly-leaf pondweed and Eurasian watermilfoil).

Table 3. Point-intercept Metrics. Summary of point-intercept metrics for Maple Lake, Wright County (DOW#86013400). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	JULY 2012
Surveyor	MN DNR (ISP)
Total # Points Sampled	111
Depth Range of Rooted Veg (ft.)	1.4 – 18.6
Max Depth of Growth (95%)	12.8
# of Points in Max Depth Range	86
# Points in Littoral (0-15 feet)	92
% Points w/ Submersed Native Taxa	88
Mean Submersed Native Taxa/ Point	2.3
# Submersed Native Taxa	16
# Submersed Non-Native Taxa	2
% Points w/ Submersed Non- native Taxa	7

Based on the 2012 point-intercept survey, the native plant community within the littoral area in Maple Lake was primarily dominated by: Coontail (*Ceratophyllum demersum*) at 51.1% (Figure 2), followed by water celery (*Valisneria americana*, Figure 3), clasping-leaf pondweed (*Potamogeton richardsonii*) and sago pondweed (*Stuckenia pectinata*). These aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Maple Lake has a diverse aquatic plant community with a species a total of 18 taxa. Figure 4

displays the spatial distribution and species richness (# of species per sample point) of all native submersed species from the most recent point-intercept survey. Maple lake also has the following emergent and floating- leaf vegetation: floating leaf pondweed (*Potamogeton natans)* and white waterlily (*Nymphaea odorata*). These 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. The invasive aquatic plant surveyed in the lake was curly-leaf pondweed (4.3%; Figure 5) and Eurasian watermilfoil (2.2%; Figure 6).

Table 4. Plant Frequency of Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Maple Lake, Wright County (DOW#86013400).

Taxonomic Name	Common Name	JULY 2012
MN DNR Surveyors		**(ISP)**
SUBMERSED NON-NATIVE		
Myriophyllum spicatum	Eurasian watermilfoil	2.2
Potamogeton crispus	curly-leaf pondweed	4.3
SUBMERSED NATIVE		
Ceratophyllum demersum	coontail	51.1
Chara sp.	muskgrass	12
Drepanocladus sp.	watermoss	2.2
Elodea canadensis	Canadian waterweed	1.1
Myriophyllum sibiricum	northern watermilfoil	37
Najas flexilis	northern naiad	17.4
Nitella sp.	stonewort species	3.3
Potamogeton amplifolius	large-leaf pondweed	3.3
Potamogeton illinoensis	Illinois pondweed	8.7
Potamogeton praelongus	white-stem pondweed	5.4
Potamogeton richardsonii	clasping-leaved pondweed	21.7
Potamogeton zosteriformis	flat-stem pondweed	9.8
Ranunculus sp.	buttercup species	3.3
Stuckenia pectinata	sago pondweed	21.7
Utricularia sp.	bladderwort species	3.3
Vallisneria americana	water celery	26.1
FLOATING LEAF		
Potamogeton natans	floating-leaf pondweed	2.2
Nymphaea odorata	white waterlily	7.6

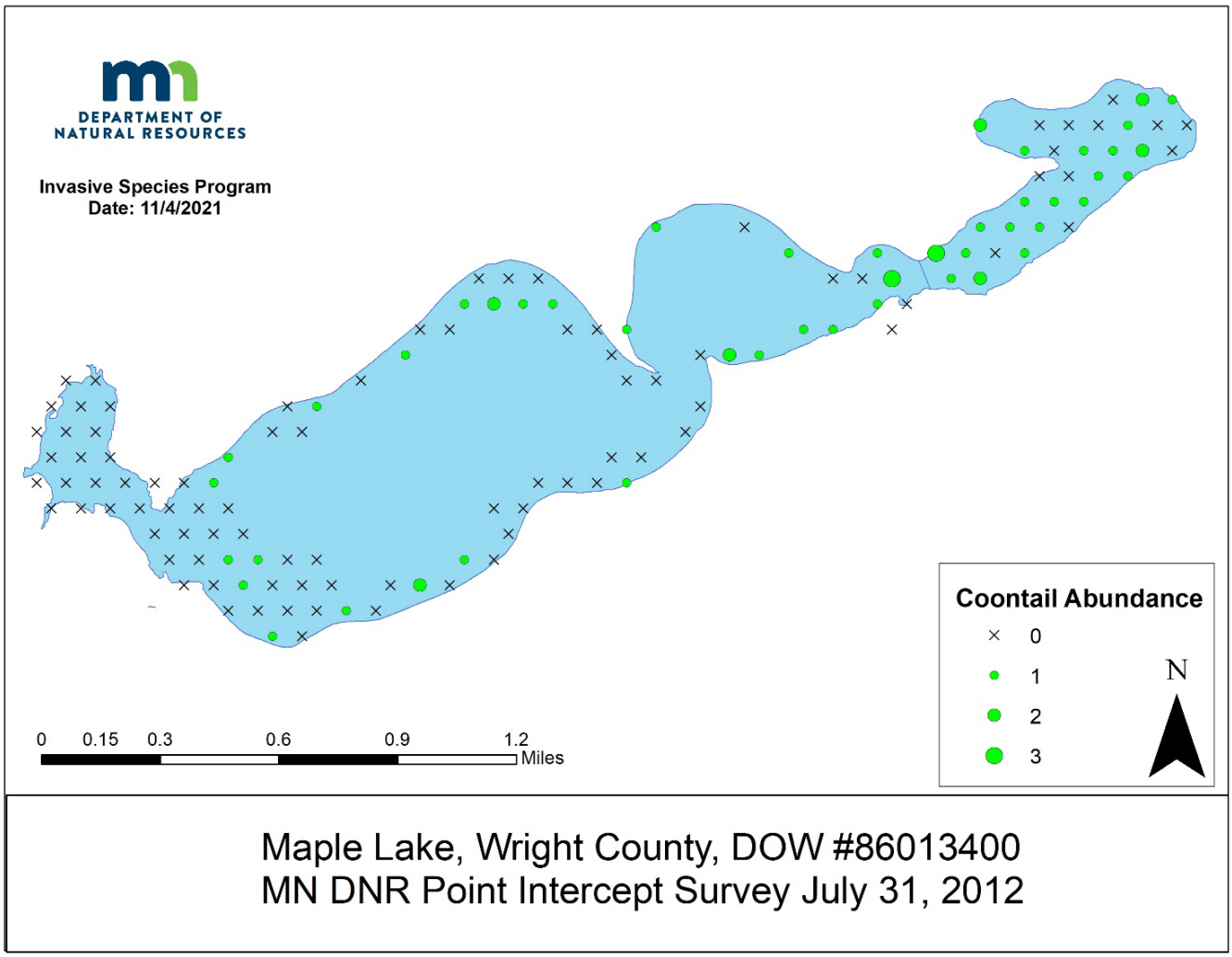

Figure 2. Coontail Distribution. Plant distribution from the July 31, 2012 point-intercept survey for coontail in Maple Lake, Wright County (DOW#86013400). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

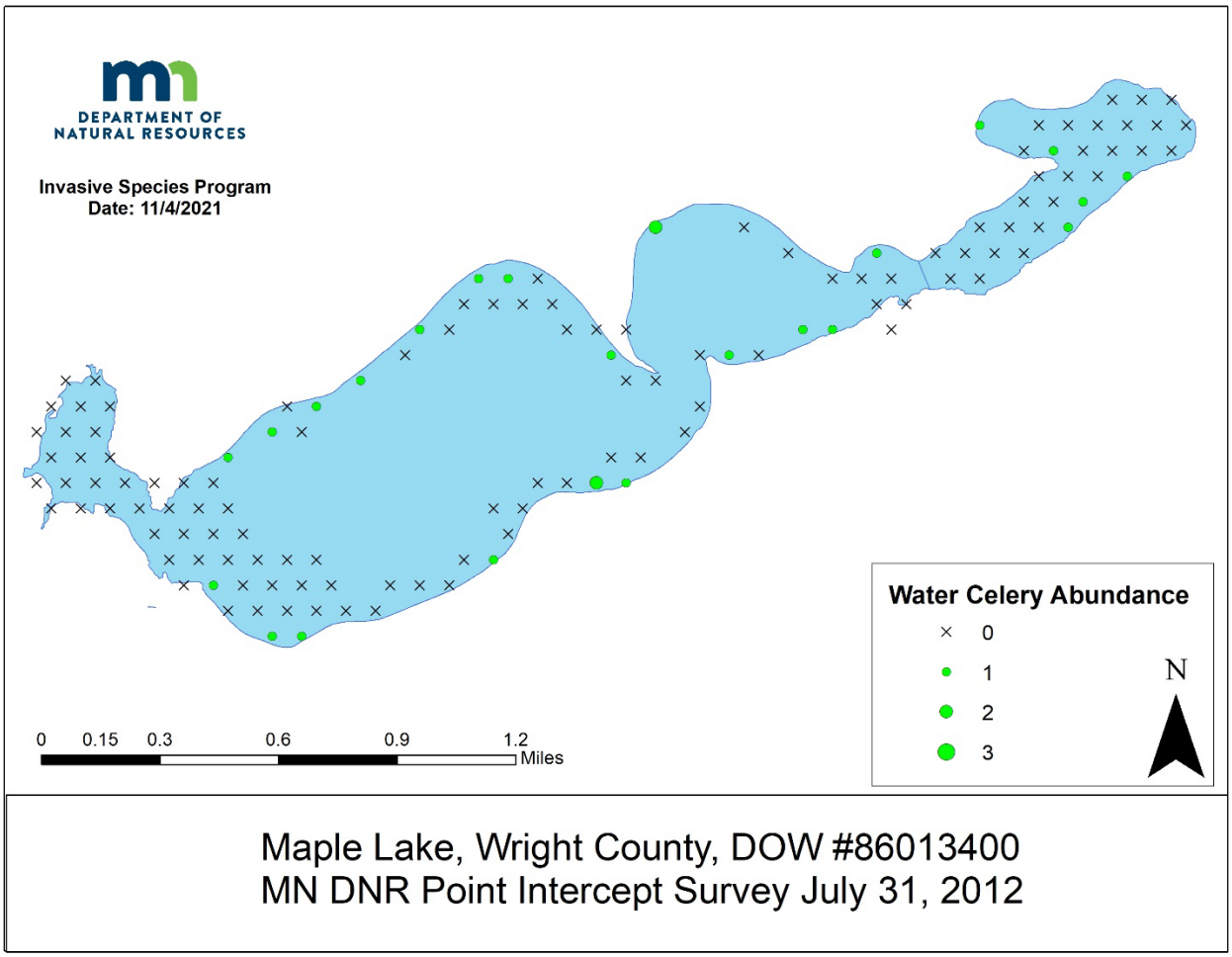

Figure 3. Water Celery Distribution. Plant distribution from the July 31, 2012 point-intercept survey for water celery in Maple Lake, Wright County (DOW#86013400). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

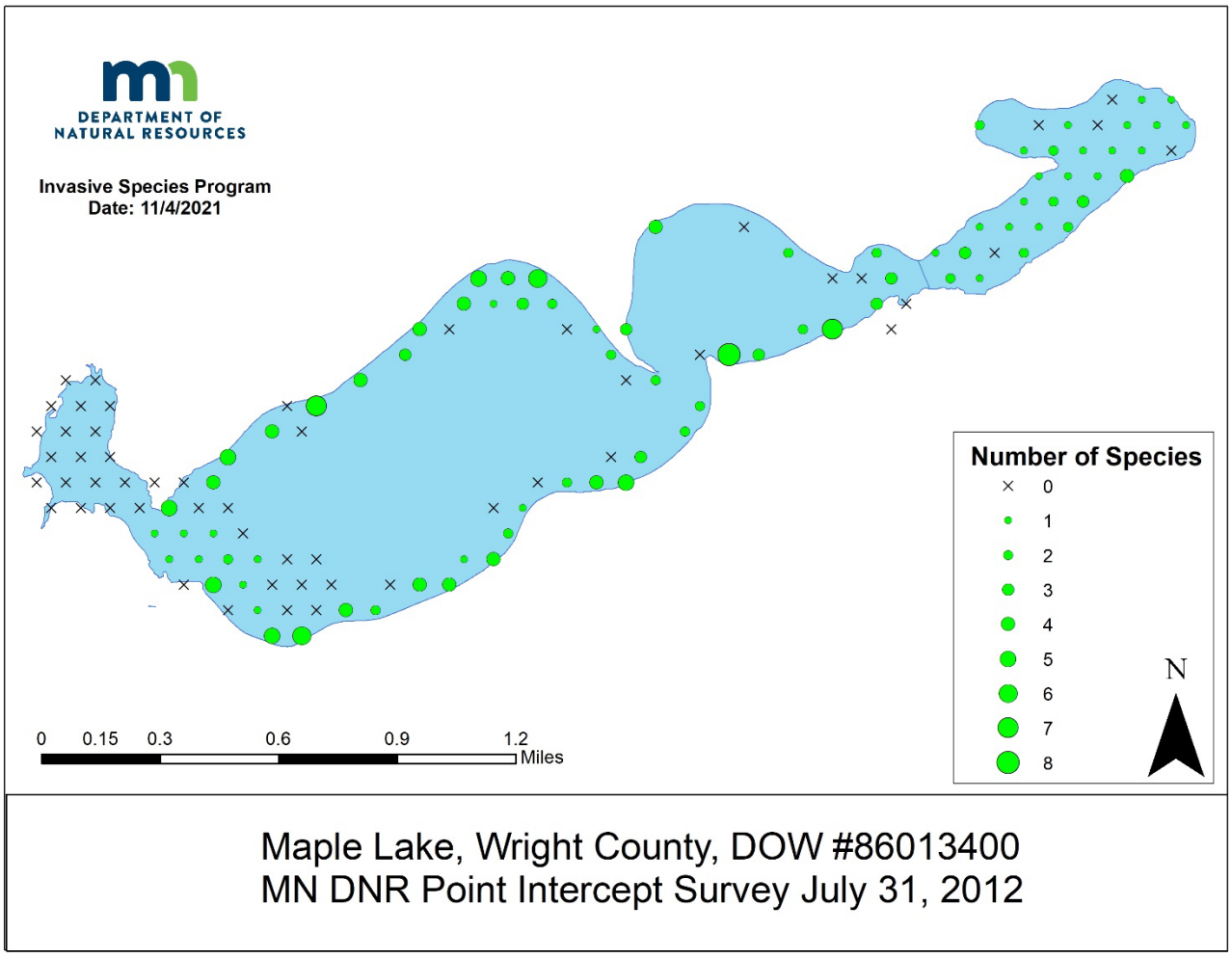

Figure 4. Species Richness. Number of native species per a sampling point based on the July 31, 2012 point-intercept survey in Maple Lake, Wright County (DOW#86013400).

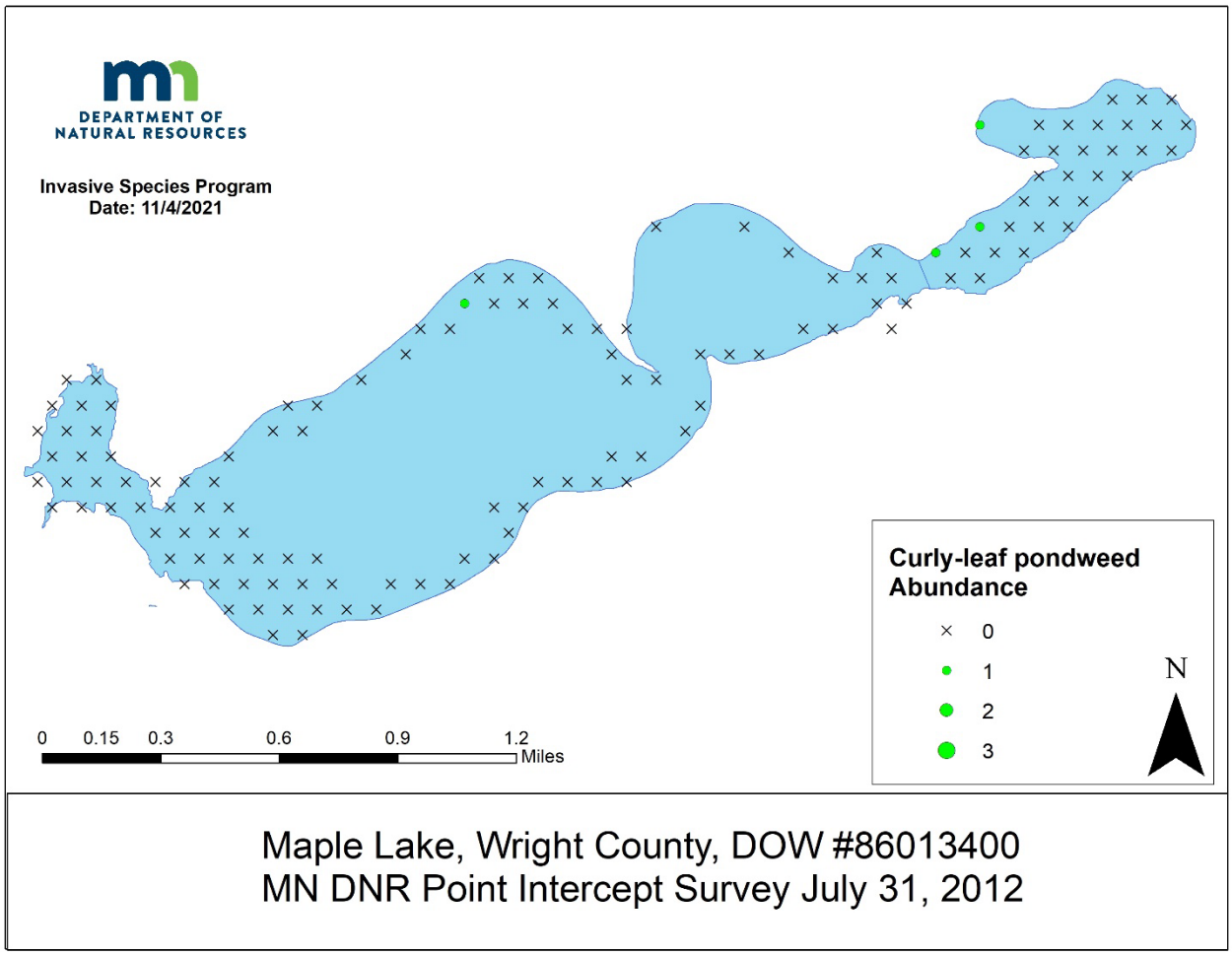

***Figure 5. Curly-leaf pondweed Distribution*.** Plant distribution from the July 31, 2012 point-intercept survey for curly-leaf pondweed in Maple Lake, Wright County (DOW#86013400). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

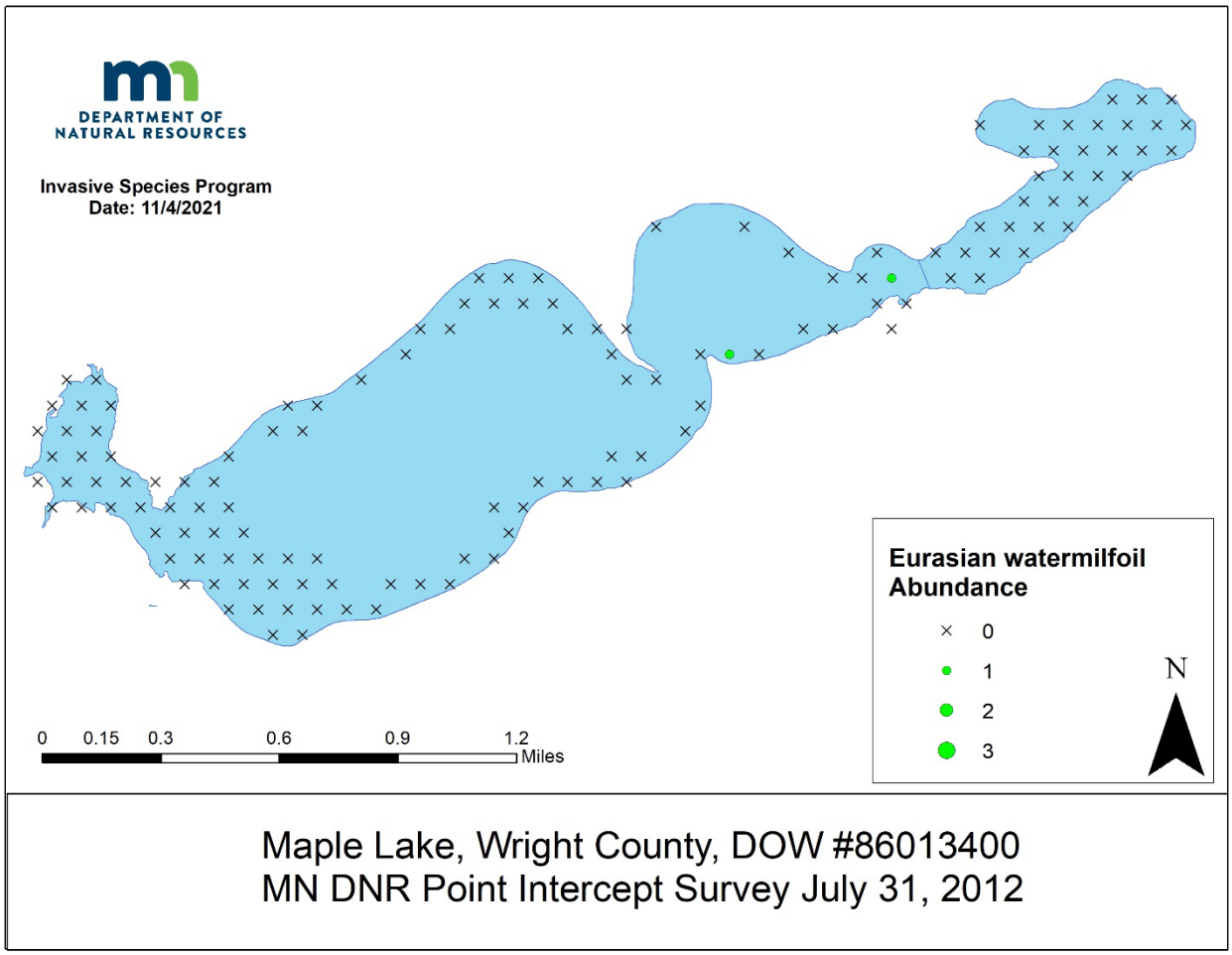

***Figure 6. Eurasian watermilfoil Distribution*.** Plant distribution from the July 31, 2012 point-intercept survey for Eurasian watermilfoil in Maple Lake, Wright County (DOW#86013400). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

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