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# Ann Lake, Sherburne County

## 2018 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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**Prepared by:**

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## Project Details

**Lake:** Ann (DOW# 71006900)

**Lake Surface Area:** 183 acres

**Littoral Area:** 133 acres

**County:** Sherburne County

**Survey Type:** Point-intercept

**Date of Survey (most recent):** July 6, 2018

**Observer[s]:** Emelia Hauck Jacobs (MN DNR), Aliesha Bradford (MN DNR)

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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 Ann Lake, Sherburne County between 2012 and 2018. 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

Ann Lake is a 183- acre lake located five miles west of Zimmerman, MN in Sherburne County. The maximum depth of water in Ann Lake is 25 feet, and 73% of the lake is classified as littoral (areas of water depth between 0 to 15 feet, where aquatic plants are most likely to grow). Ann Lake has good clarity and low algae levels throughout the open water season. According to surveys from the Minnesota Pollution Control Agency (MPCA, 2018), Ann Lake is classified as a mesotrophic lake, based on its Trophic State Index (TSI) of approximately 46. 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 [Ann Lake water quality](https://cf.pca.state.mn.us/water/watershedweb/wdip/details.cfm?wid=71-0069-00) on the MPCA website (<https://cf.pca.state.mn.us/water/watershedweb/wdip/details.cfm?wid=71-0069-00>).

## Management History

Ann Lake has one invasive plant species, curly-leaf pondweed (*Potamogeton crispus*). Invasive aquatic plant management in Ann Lake has focused on curly-leaf pondweed using an endothall herbicide. The most recent treatment was for curly-leaf pondweed in 2018 was for 3.6 acres, organized by the Lake Ann Improvement Association (Figure 1, Table 1). Past treatments have ranged from 0.6 to 3.6 acres. Over time, the curly-leaf pondweed has been managed and tends to co-exist with native pondweeds. 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 Ann Lake, Sherburne County (DOW#71006900). 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
2012	CLP	2.0	Endothall	Ann Lake Association
2013	CLP	2.5	Endothall	Aquatic Solutions of MN
2014	CLP	0.6	Endothall	Ann Lake Association
2015	CLP	0.6	Endothall	Ann Lake Association
2016	CLP	0.0	n/a	n/a
2017	CLP	3.6	Endothall	Ann Lake Association
2018	CLP	3.6	Endothall	Ann Lake Association

### Survey Objectives




A point-intercept survey was used to assess the distribution of aquatic plants in Ann 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) to 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.

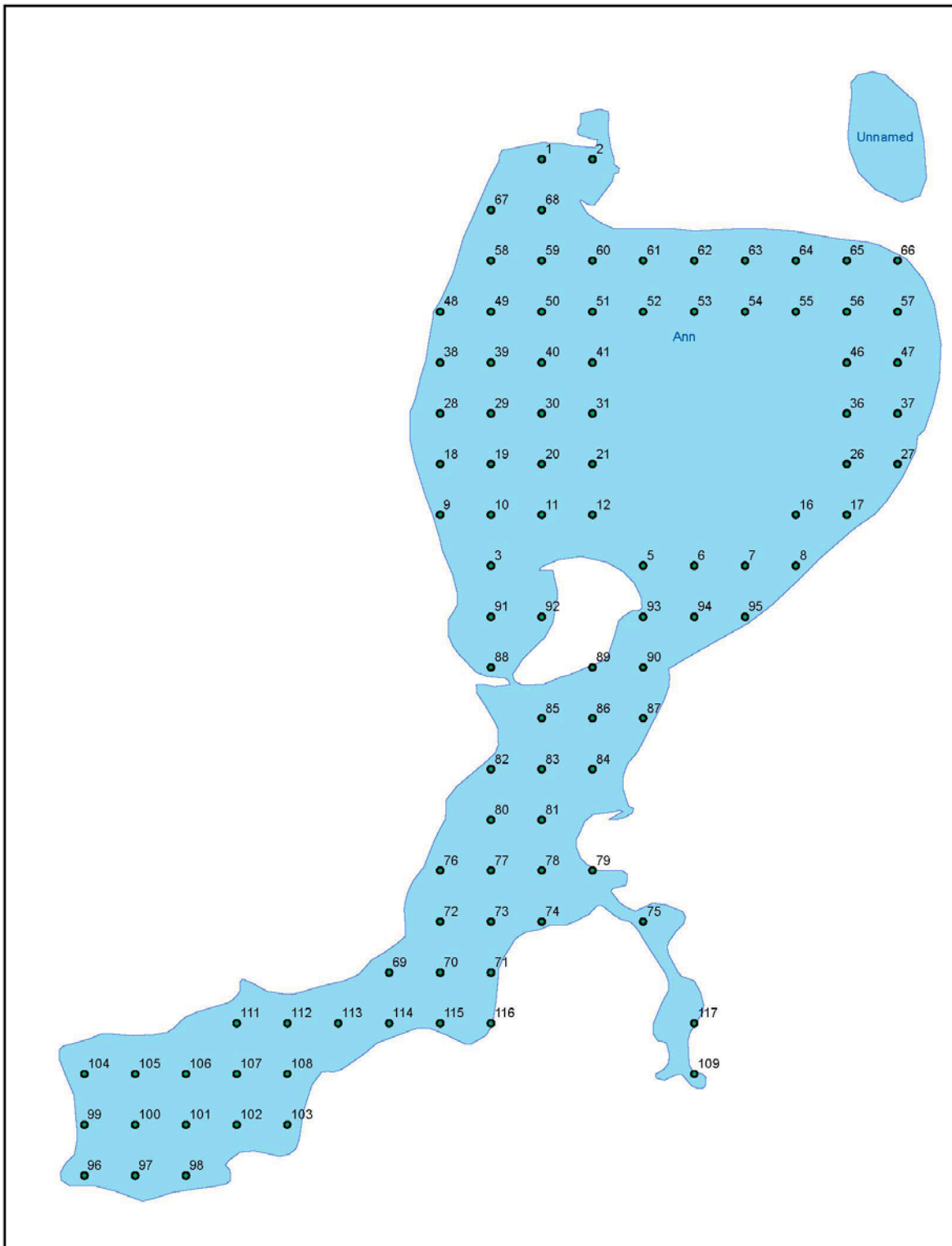
### Survey Methods

In 2018, MN DNR surveyors used a point-intercept survey method developed by John Madsen in “Aquatic Plant Control Technical Note MI-02, 1999”. Sampling points were placed 80 meters apart using a Geographic Information System. A total of 100 points within 15 feet were

established on a grid (Figure 1), although only 59 points were accessible by boat. Therefore, this type of survey primarily focused on submerged aquatic plants. 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 95<sup>th</sup> 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 Ann Lake, Sherburne County (DOW#71006900). Point-intercept survey included 100 points, 80 meters apart. Only 59 points were accessible due to shallow depths and thick emergent and floating-leaf vegetation.

## Survey Observations

The most recent aquatic vegetation point-intercept survey of Ann Lake (DOW #71006900) occurred on July 6, 2018. Plants were rooted to a maximum depth (95%) of 18 feet, with most plants growing between 2 and 15 feet. In the littoral zone (water depth from 0 to 15 feet, where aquatic plants are likely to be found), 100% of the points had submersed native vegetation (Table 3) with a mean submersed native taxa per point of 2.7. Ann Lake has up to 17 submersed native taxa (Table 4) and one non-native submerged taxa (curly-leaf pondweed), comprising of 6% of the littoral area.

**Table 3- Point-intercept Metrics.** Summary of point-intercept metrics for Ann Lake, Sherburne County (DOW#71006900). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	JULY 2018
Surveyor	MN DNR
Total # Points Sampled	59
Depth Range of Rooted Veg (ft.)	1 - 18
Max Depth of Growth (95%)	18
# of Vegetated Points in Max Depth Range	51
# Points in Littoral (0-15 feet)	50
% Points w/ Submersed Native Taxa	100
Mean Submersed Native Taxa/ Point	2.7
# Submersed Native Taxa	17
# Submersed Non-Native Taxa	1
% Points w/ Submersed Non- native Taxa	6

Based on the 2018 point- intercept survey, the native plant community within the littoral area in Ann Lake was primarily dominated by robbin’s pondweed (*Potamogeton robbinsii*; Figure 2), followed by Canadian waterweed (*Elodea Canadensis*, Figure 3), coontail (*Ceratophyllum demersum*, Figure 4) and northern watermilfoil (*Myriophyllum sibiricum*). These aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Ann Lake has a diverse aquatic plant community with an average of 2.7 species per a sampling site. Figure 5 displays the spatial distribution and species richness (# of species per sample point) of all native submersed species from the point-intercept survey. In addition, emergent and floating- leaf vegetation dominant the lake providing habitat and food sources,

especially 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 (6%; Figure 6). Purple loosestrife (*Lythrum salicaria*) is also present near the shoreline, although not included in this survey. Water bulrush, (*Schoenoplectus subterminalis*), an uncommon aquatic plant was also documented.

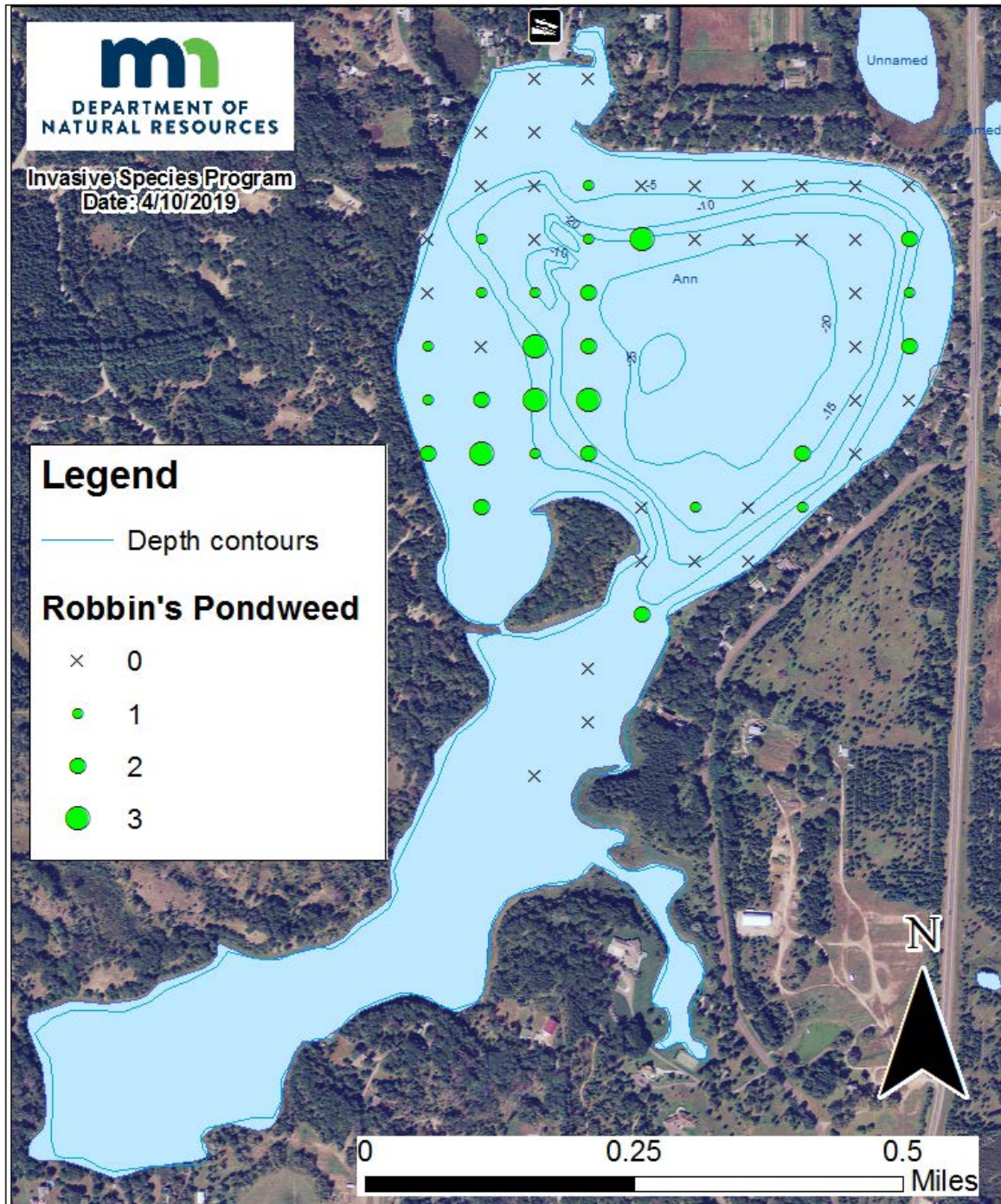
**Table 4- Plant Frequency of Occurrence.** Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Ann Lake, Sherburne County (DOW#71006900).

Taxonomic Name	Common Name	JULY 2018
<b>SUBMERSED NON-NATIVE</b>		
<i>Potamogeton crispus</i>	curly-leaf pondweed	6
<b>SUBMERSED NATIVE</b>		
<i>Ceratophyllum demersum</i>	coontail	44
<i>Chara</i> sp.	muskgrass	14
<i>Elodea canadensis</i>	Canadian waterweed	48
<i>Heteranthera dubia</i>	water star-grass	8
<i>Myriophyllum sibiricum</i>	northern watermilfoil	30
<i>Nitella</i> sp.	nitella species	2
<i>Najas</i> sp.	naiad species	6
<i>Potamogeton illinoensis</i>	Illinois pondweed	4
<i>Potamogeton freisii</i>	Fries' pondweed	10
<i>Potamogeton praelongus</i>	whitestem pondweed	24
<i>Potamogeton richardsonii</i>	clasping-leaved pondweed	4
<i>Potamogeton robbinsii</i>	Robbin's pondweed	50
<i>Potamogeton</i> spp.	narrow-leaf pondweed	10
<i>Stuckenia pectinata</i>	sago pondweed	2
<i>Utricularia</i> sp.	bladderwort species	8
<i>Vallisneria americana</i>	wild celery	2
<b>EMERGENT</b>		
<i>Schoenoplectus</i> sp.	bulrush species	2
<b>FLOATING LEAF</b>		
<i>Brasenia schreberi</i>	watershield	12
<i>Nymphaea odorata</i>	white waterlily	16
<i>Nuphar variegata</i>	yellow waterlily	8



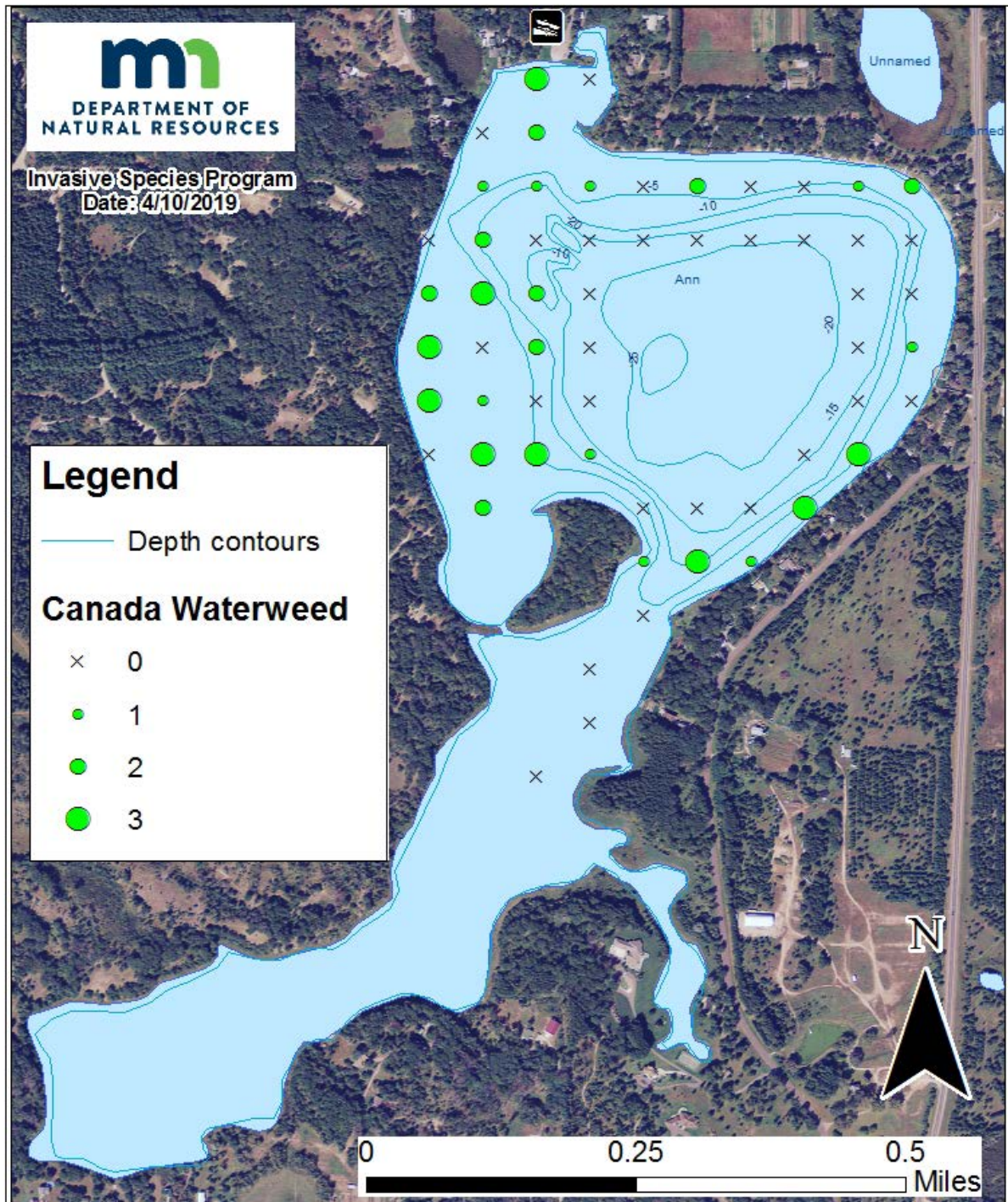
### Comparison to previous years

In addition to the point-intercept survey conducted by the Invasive Species Program, MN DNR Fisheries conducted an aquatic plant survey using the transect method and mapped emergent vegetation in August of 2011. The most commonly found plants in 2011 were Canadian waterweed, coontail, flatstem pondweed and robbin's pondweed. In 2011, curly- leaf pondweed occupied 1.4% of the lake.



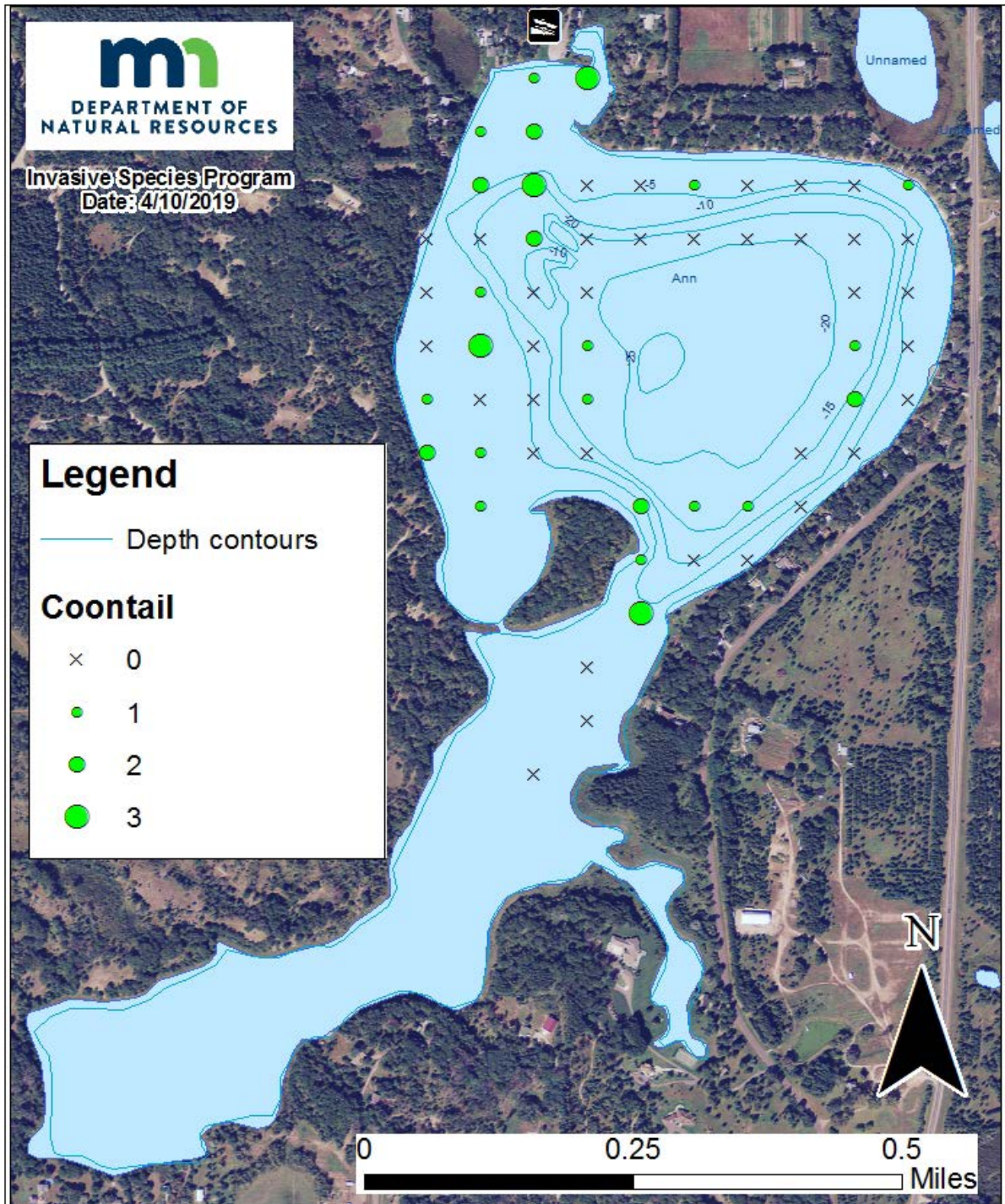
**Figure 2– Robbin's pondweed Distribution.** Plant distribution from the 2018 point-intercept survey for Robbin's pondweed in Ann Lake, Sherburne County (DOW#71006900). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.





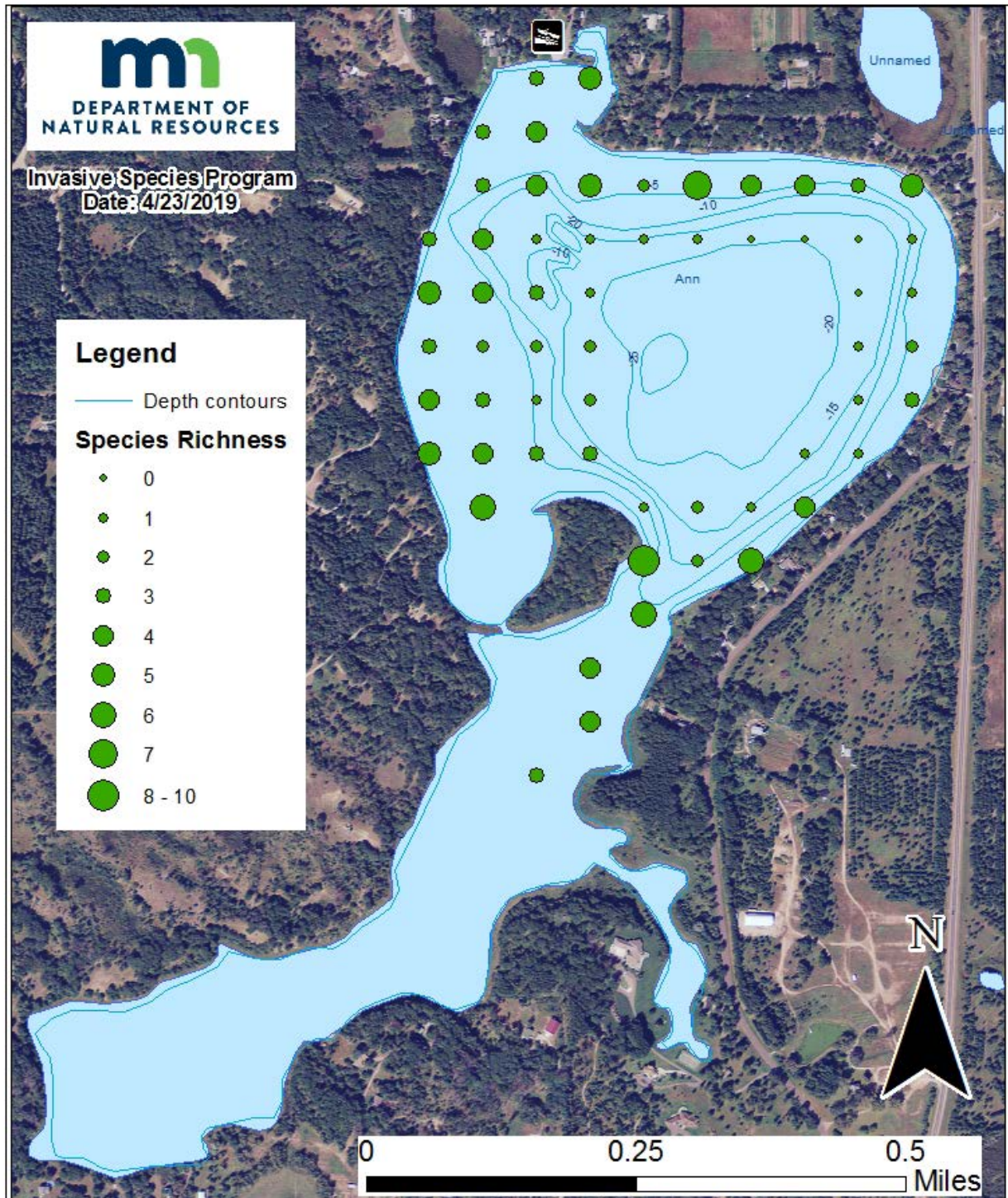
**Figure 3– Canadian waterweed Distribution.** Plant distribution from the 2018 point-intercept survey for Canada waterweed in Ann Lake, Sherburne County (DOW#71006900). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.





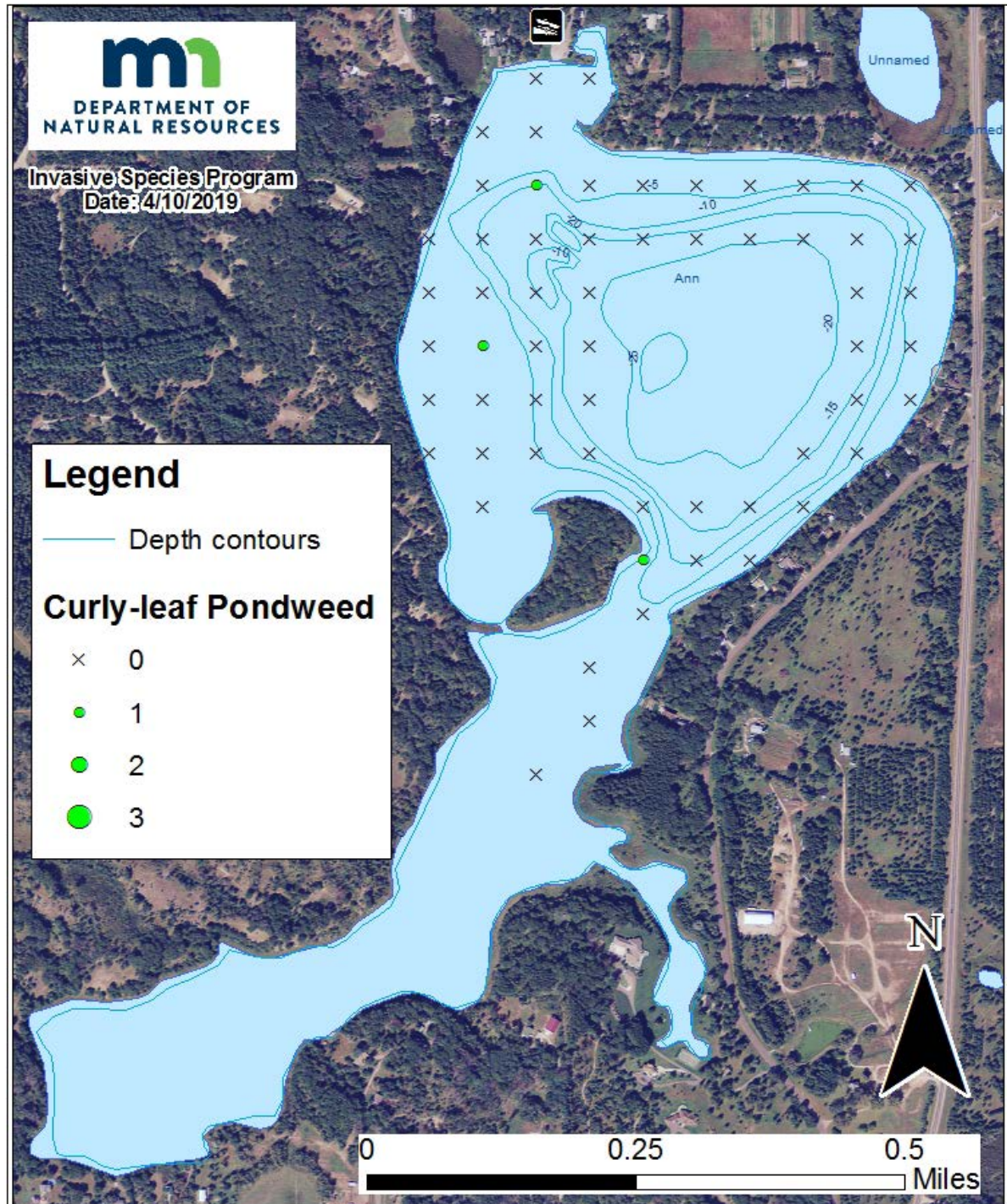
**Figure 4— Coontail Distribution.** Plant distribution from the 2018 point-intercept survey for coontail in Ann Lake, Sherburne County (DOW#71006900). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.





**Figure 5— Species Richness Distribution.** Number of species per a sampling point based on the 2018 point-intercept survey in Ann Lake, Sherburne County (DOW#71006900).





**Figure 6– Curly-leaf pondweed Distribution.** Plant distribution from the 2018 point-intercept survey for curly-leaf pondweed in Ann Lake, Sherburne County (DOW#71006900). 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.