
ORONO LAKE, SHERBURNE COUNTY: 2012 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: Orono (DOW# 71001300)

Lake Surface Area: 300.5 acres

Littoral Area: 246.6 acres

County: Sherburne County

Survey Type: Point-intercept

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

Observer[s]: MN DNR, Invasive Species Program (ISP): Emelia Hauck Jacobs (MN DNR), Chris Jurek (MN DNR) and Tiffany Determan (Sherburne Soil and Water Conservation District)

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Report Details

C. Jurek and E. Hauck Jacobs. 2021. Orono Lake, Sherburne County: 2012 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. 12 pp.

Summary

The most recent aquatic vegetation point-intercept survey of Orono Lake (DOW #71001300) occurred on May 31, 2012. Plants were present throughout the lake to a depth of 10 feet. Within the littoral zone (zone in lake from the 0-15 foot depth range), 45% of the points had native submersed taxa. The average number of native submersed taxa per sample point was 0.8. In total, six submersed taxa, one invasive taxa, and one floating-leaf taxa were observed during the 2012 survey.

Lake Description

Orono Lake is a 300.5- acre reservoir located in the city of Elk River, MN in Sherburne County. The reservoir was formed by a dam in the Elk River at the City of Elk River. The dam was initially built in 1851, then in re-built in 1916 and 1980. Sedimentation issues led to two drawdowns in 1999 and 2020 with dredging. As of 2020, the lake has two invasive plant species: curly-leaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*), as well as, rusty crayfish (*Orconectes rusticus*) and zebra mussels (*Dreissena polymorpha*) which were also documented in 2020. The maximum depth of water in Orono Lake is 17 feet, and 82% of the lake is classified as littoral (areas of water depth between 0 to 15 feet, where aquatic plants are most likely to grow). According to surveys from the Minnesota Pollution Control Agency (MPCA, 2012), Orono Lake is classified as a eutrophic lake, based on its Trophic State Index (TSI) of approximately 63. For more information on water quality, go to [Orono Lake water quality](https://webapp.pca.state.mn.us/surface-water/station/71-0013-01-202) on the MPCA website (<https://webapp.pca.state.mn.us/surface-water/station/71-0013-01-202>).

Management History

Invasive aquatic plant management in Orono Lake has focused on curly-leaf pondweed and most recently Eurasian watermilfoil (Table 1). Management of these invasive taxa have been organized by the Lake Orono Water Quality Committee, with past treatments ranging from 8.7 to 35 acres. Hand-pulling of curly- leaf pondweed was also permitted between 2013 and 2015 within 42 acres of the lake.

Table 1 - Invasive Plant Management Summary. Characteristics and history of partial lake invasive plant treatments for Orono Lake, Sherburne County (DOW#71001300). Total acres: 300.5, Littoral acres: 246.6, 15% of Littoral acres: 37). Abbreviations are as followed: curly-leaf pondweed (CLP), Eurasian watermilfoil (EWM). 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	Treatment	Licensed Commercial Applicator
2013	CLP	42	Handpulling	NA
2014	CLP	42	Handpulling	NA
2015	CLP	42	Handpulling	NA
2017	CLP	4.3	Endothall	Lake Management
2018	CLP	35	Endothall	Lake Management
2019	CLP	25.4	Endothall	Lake Management
2020	CLP	25.5	Endothall	Lake Management
2020	EWM	8.7	Triclopyr	Lake Management

Survey Objectives

A point-intercept survey was used to assess the distribution of aquatic plants in Orono Lake. The primary purpose for this type of survey is to 1) document the frequency and distribution of curly- leaf pondweed, and to 2) develop baseline knowledge of the current plant community in a lake, and over time. Future aquatic plant surveys would be beneficial to monitor aquatic plant communities and to evaluate the responses to invasive aquatic plant management via herbicide control, impacts from other aquatic invasive species in the lake and dredging. 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

The only survey conducted by the MN DNR occurred in 2012 using 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. A total of 104 points within 15 feet were established on a grid (Figure 1), although only 86 points were

accessible by boat. 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.

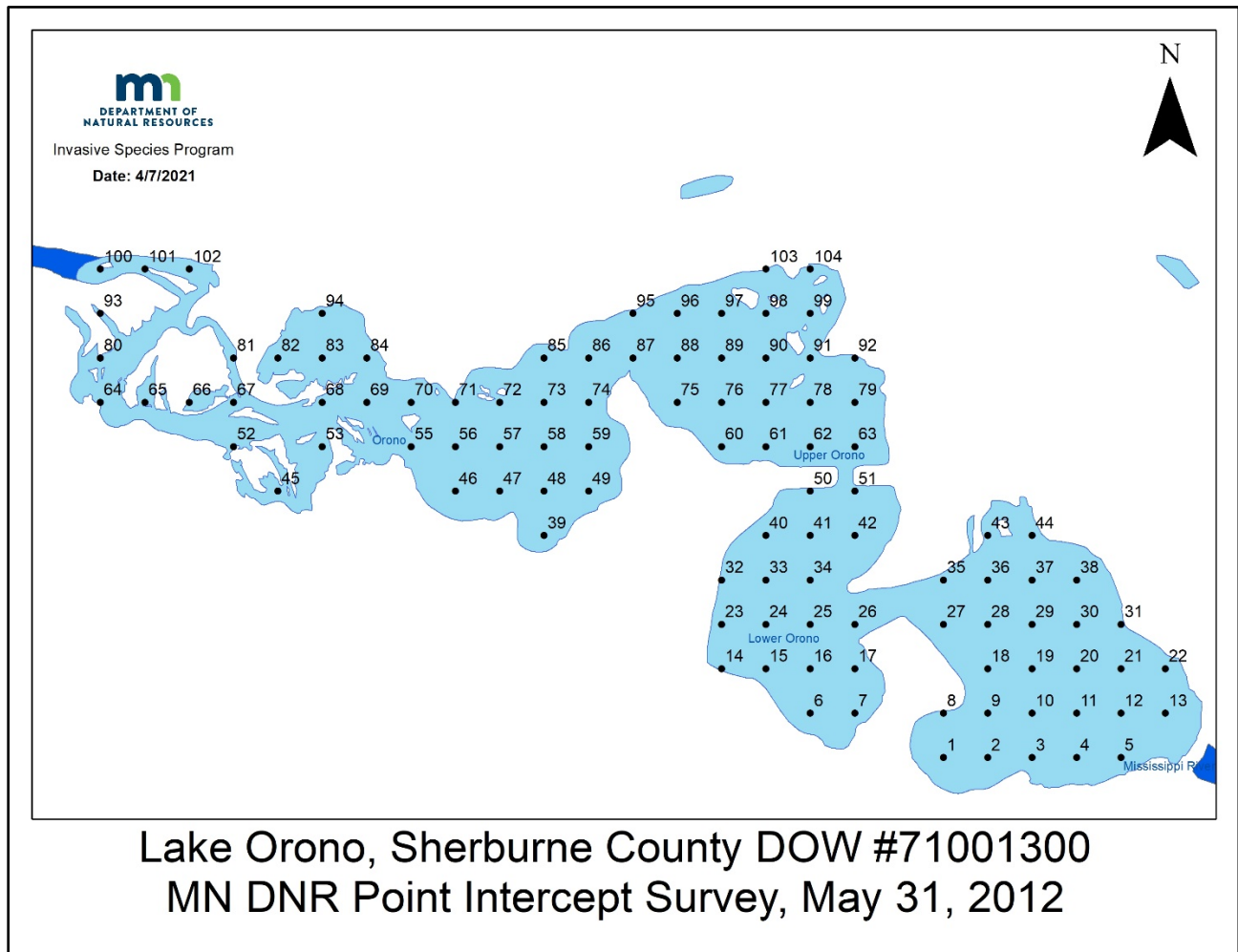


Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Orono Lake, Sherburne County (DOW#71001300). Point-intercept survey included 104 points, 120 meters apart. Only 86 points were accessible due to shallow depths and thick emergent and floating-leaf vegetation.

Survey Observations

In 2012, we found plants in Orono Lake in a range of water depth from 1 to 10 feet. Most plants were growing in the depth range between 2 and 5 feet. In the littoral zone, 45% of the surveyed points had submersed native vegetation (Table 2). In total, we found six submersed taxa and one floating-leaf species during the survey (Table 3). Canadian waterweed (*Elodea canadensis*) was the most commonly occurring plant, at 34% of all sites in the littoral zone (Figure 2),

followed by coontail (*Ceratophyllum demersum*, Figure 3), and curly-leaf pondweed (Figure 4). Other species sampled during the survey were: flat-stem pondweed (*Potamogeton zosteriformis*), water celery (*Vallisneria americana*), long-leaf pondweed (*Potamogeton nodosus*), sago pondweed (*Stuckenia pectinata*), and white water lily (*Nymphaea odorata*). Orono Lake has an aquatic plant community with an average of 0.8 species per a sampling site (Figure 5). Overall, this survey provides a summary of submerged aquatic plants in the lake, but underrepresents emergent, floating- leaf vegetation and other aquatic plants that were inaccessible to include with this survey. In addition to the point-intercept survey conducted by the Invasive Species Program, MN DNR Fisheries conducted emergent vegetation mapping in 2002 and 2008 & curly-leaf pondweed mapping in 2005.

Table 2 - Point-intercept Metrics. Summary of point-intercept metrics for Orono Lake, Sherburne County (DOW#71001300). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	MAY 2012
Surveyor	MN DNR
Total # Points Sampled	86
Depth Range of Rooted Veg (ft.)	1 - 10
Max Depth of Growth (95%)	6.7
# Points in Littoral (0-15 feet)	86
% Points w/ Submersed Native Taxa	45
Mean Submersed Native Taxa/ Point	0.8
# Submersed Native Taxa	6
# Submersed Non-Native Taxa	1
% Points w/ Submersed Non- native Taxa	14

Table 3 - Plant Frequency of Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Orono Lake, Sherburne County (DOW#71001300).

Taxonomic Name	Common Name	May 2012
SUBMERSED NON-NATIVE		
<i>Potamogeton crispus</i>	Curly-leaf pondweed	14
SUBMERSED NATIVE		
<i>Ceratophyllum demersum</i>	Coontail	22
<i>Elodea canadensis</i>	Canadian waterweed	34
<i>Potamogeton nodosus</i>	River pondweed	2
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	13
<i>Stuckenia pectinata</i>	Sago pondweed	1
<i>Vallisneria americana</i>	Wild celery	6
FLOATING LEAF		
<i>Nymphaea odorata</i>	White waterlily	3

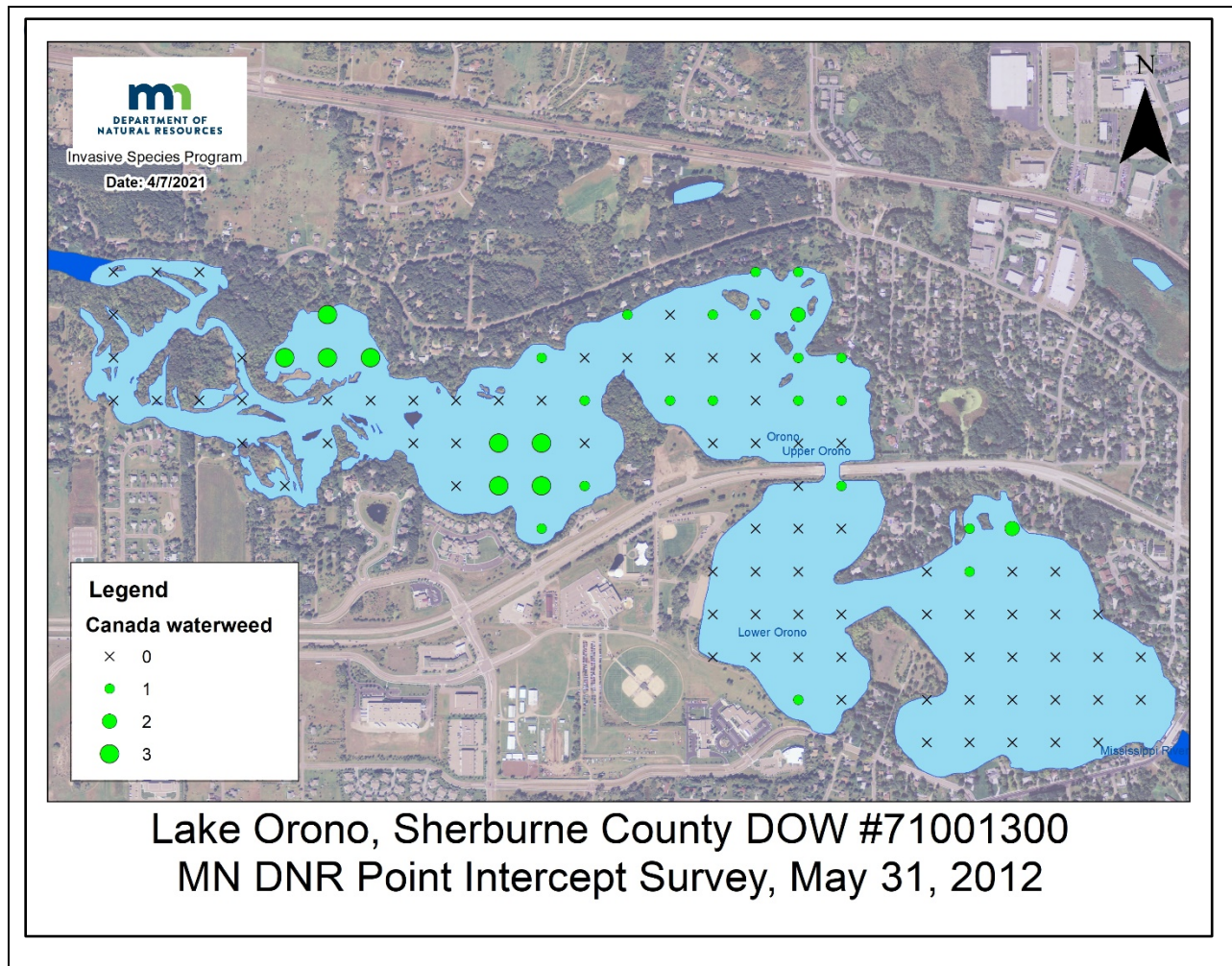


Figure 2 – 2012 Canadian waterweed Distribution. Plant distribution from the 2012 point-intercept survey for Canadian waterweed in Orono Lake, Sherburne County (DOW#71001300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

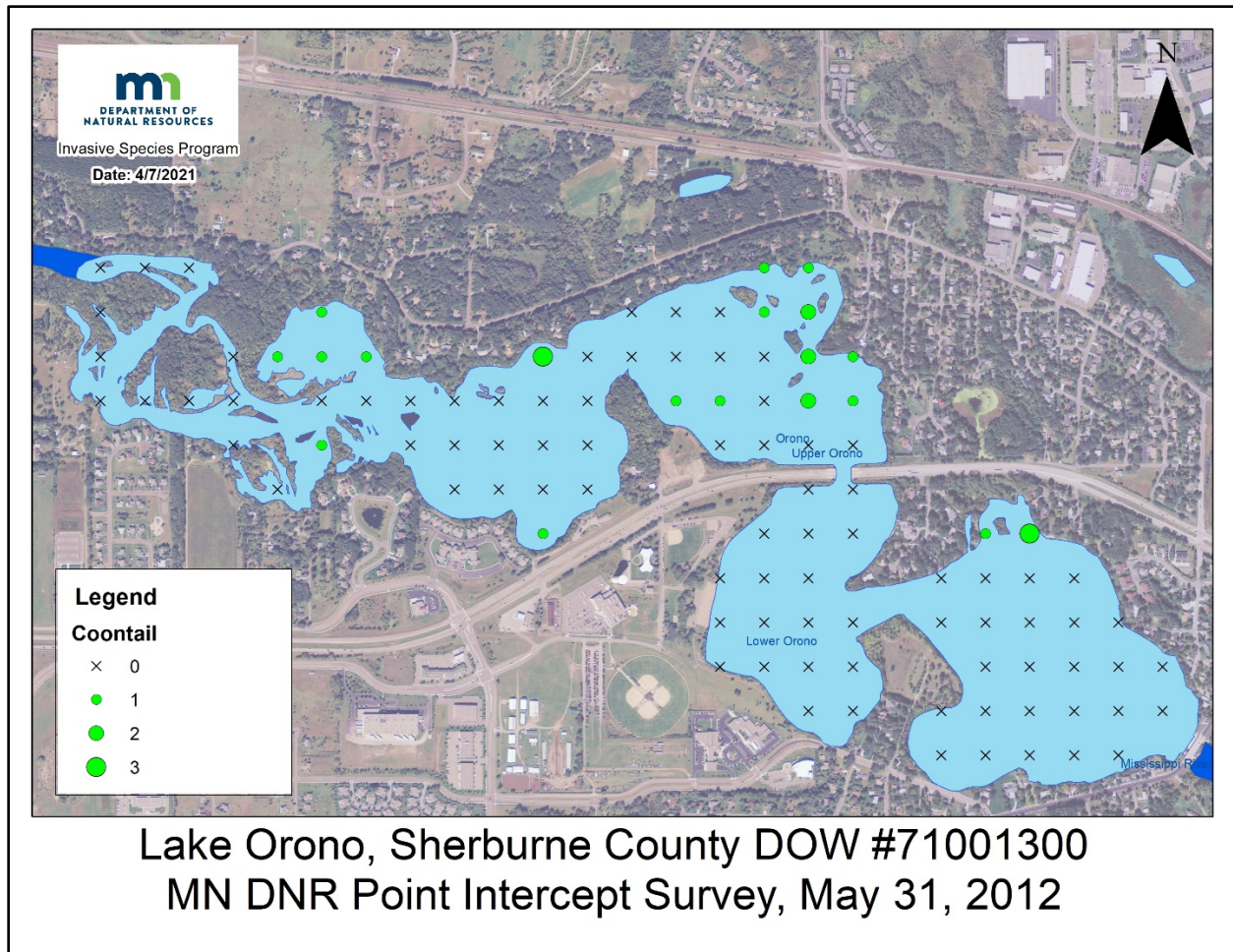


Figure 3 – 2012 Coontail Distribution. Plant distribution from the 2012 point-intercept survey for Coontail in Orono Lake, Sherburne County (DOW#71001300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

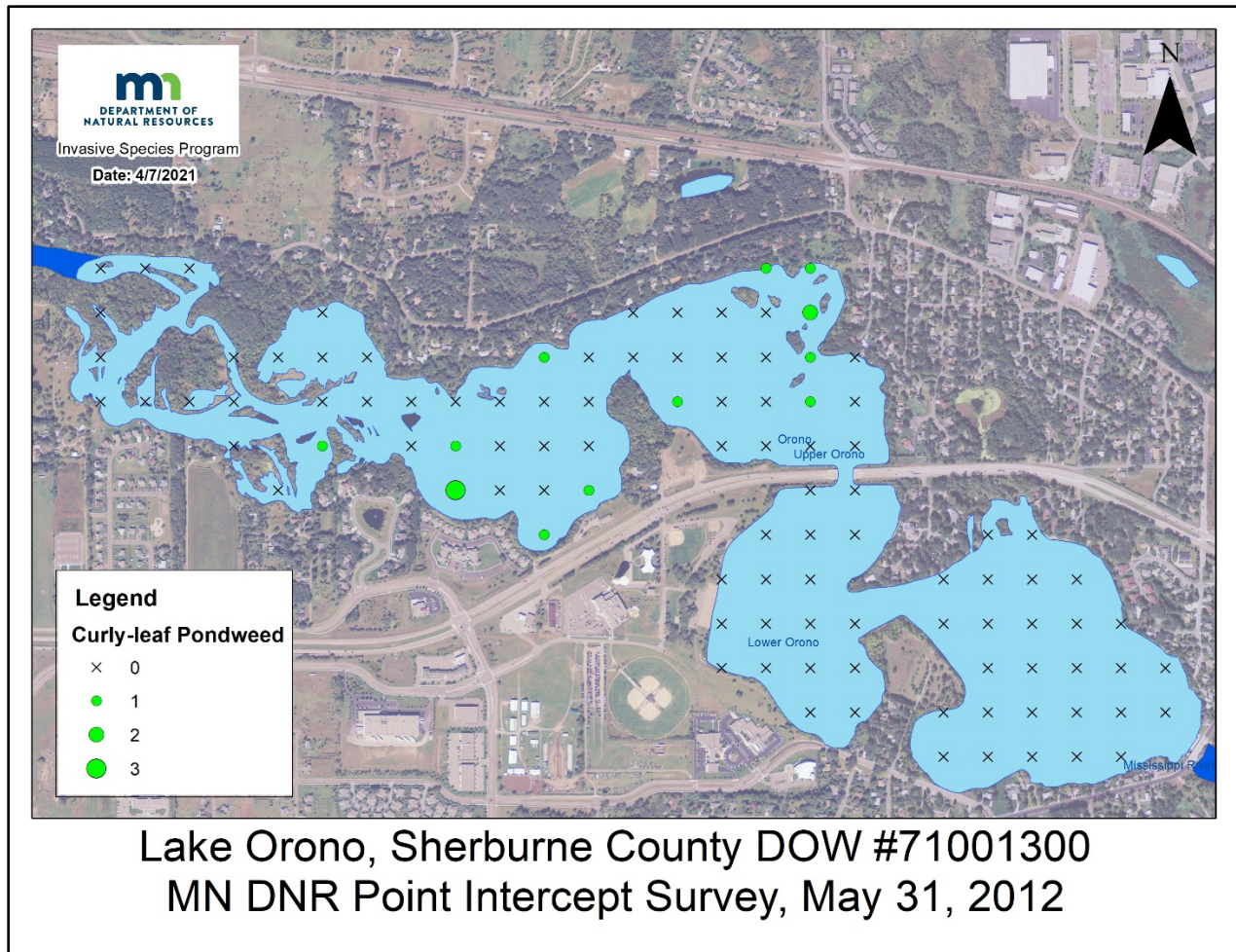


Figure 4 – 2012 Curly-leaf pondweed Distribution. Plant distribution from the 2012 point-intercept survey for Curly-leaf pondweed in Orono Lake, Sherburne County (DOW#71001300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

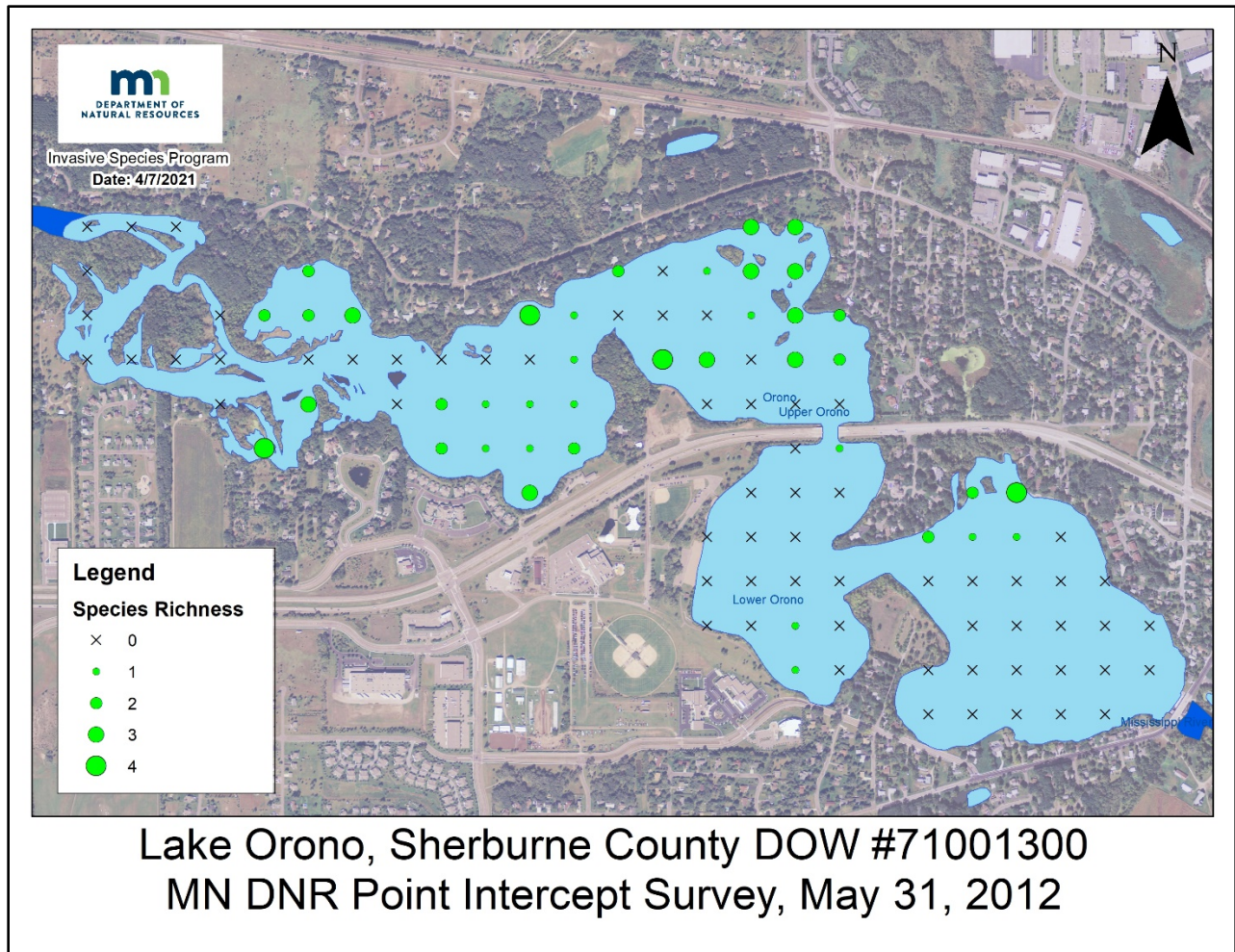


Figure 5 – Number of species per site. Maps of number of species from the 2012 point-intercept survey in Orono Lake, Sherburne County (DOW#71001300).

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