
BEEBE LAKE, WRIGHT 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: Beebe (DOW# 86002300)

Lake Surface Area: 323 acres

Littoral Area: 135 acres

County: Wright County

Survey Type: Point-intercept

Date of Survey (most recent): July 7, 2020

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

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Report Details

C. Jurek and E. Hauck Jacobs. 2021. Beebe Lake, Wright 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. 14 pp.

Summary

The most recent aquatic vegetation point-intercept survey of Beebe Lake (DOW #86002300) occurred on July 7, 2020. Plants were present throughout the lake to a depth of 8.5 feet. Within the littoral zone (zone in lake from the 0-15 foot depth range), 24% of the points had native submersed taxa. The average number of native submersed taxa per sample point was 0.31. In total, eight submersed taxa, two invasive taxa, and floating-leaf and emergent taxa were sparse during the 2020 survey.

Lake Description

Beebe Lake is a 323- acre lake located near St. Michael, MN in Wright County. The lake has two invasive plant species: curly-leaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*). The maximum depth of water in Beebe Lake is 27 feet, and 42% of the lake is classified as littoral (areas of water depth between 0 to 15 feet, where aquatic plants are most likely to grow). Between 1976 and 2019, the water clarity in Beebe Lake did not show any change and during the most recent year of analysis by Minnesota Pollution Control Agency (2021), the median water clarity was 1.97 feet lower than the watershed median. Beebe Lake is also classified as an eutrophic lake, based on its Trophic State Index (TSI) of approximately 58. For more information on water quality, go to Beebe Lake water quality on the MPCA website: <https://webapp.pca.state.mn.us/surface-water/impairment/86-0023-00>.

Management History

Invasive aquatic plant management in Beebe Lake has focused on curly-leaf pondweed using an endothall herbicide. The most recent treatment was for curly-leaf pondweed was in 2020 for 14.4 acres, organized by the Beebe Lake Improvement Association (Table 1). Past treatments have ranged from small scale treatments to lake wide management. Eurasian watermilfoil management has occurred since 2016, with the most recent treatment of 3.7 acres in 2020 using a 2, 4-D herbicide.

Survey Objectives

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

Table 1 - Invasive Plant Management Summary 2010- 2020. Characteristics and history of invasive aquatic plant treatments for Beebe Lake, Wright County (DOW#86002300). Total acres: 323, Littoral acres: 135, 42% of Littoral acres: 135). Abbreviations are as followed: curly-leaf pondweed (CLP) and Eurasian watermilfoil (EWM). Herbicides used were endothall for CLP and an auxin-mimic herbicide for 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	Herbicide	Licensed Commercial Applicator
2010	CLP	70.0	Endothall	Lake Restoration
2011	CLP	112.0	Endothall	Lake Restoration
2012	CLP	110.0	Endothall	Lake Restoration
2013	CLP	20.0	Endothall	Lake Restoration
2014	CLP	20.0	Endothall	Lake Restoration
2015	CLP	20.0	Endothall	Lake Restoration
2016	CLP	20.0	Endothall	Lake Restoration
2017	CLP	26.5	Endothall	Lake Restoration
2018	CLP	26.5	Aquathol K	Lake Restoration
2019	CLP	26.5	Aquathol K	Lake Restoration
2020	CLP	14.4	Aquathol K	Lake Restoration
2016	EWM	20.0	Auxin-mimic	Lake Restoration
2018	EWM	9.5	Auxin-mimic	Lake Restoration
2020	EWM	3.7	Auxin-mimic	Lake Restoration

Survey Methods

In 2020, 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 100 meters apart using a Geographic Information System. A total of 87 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.

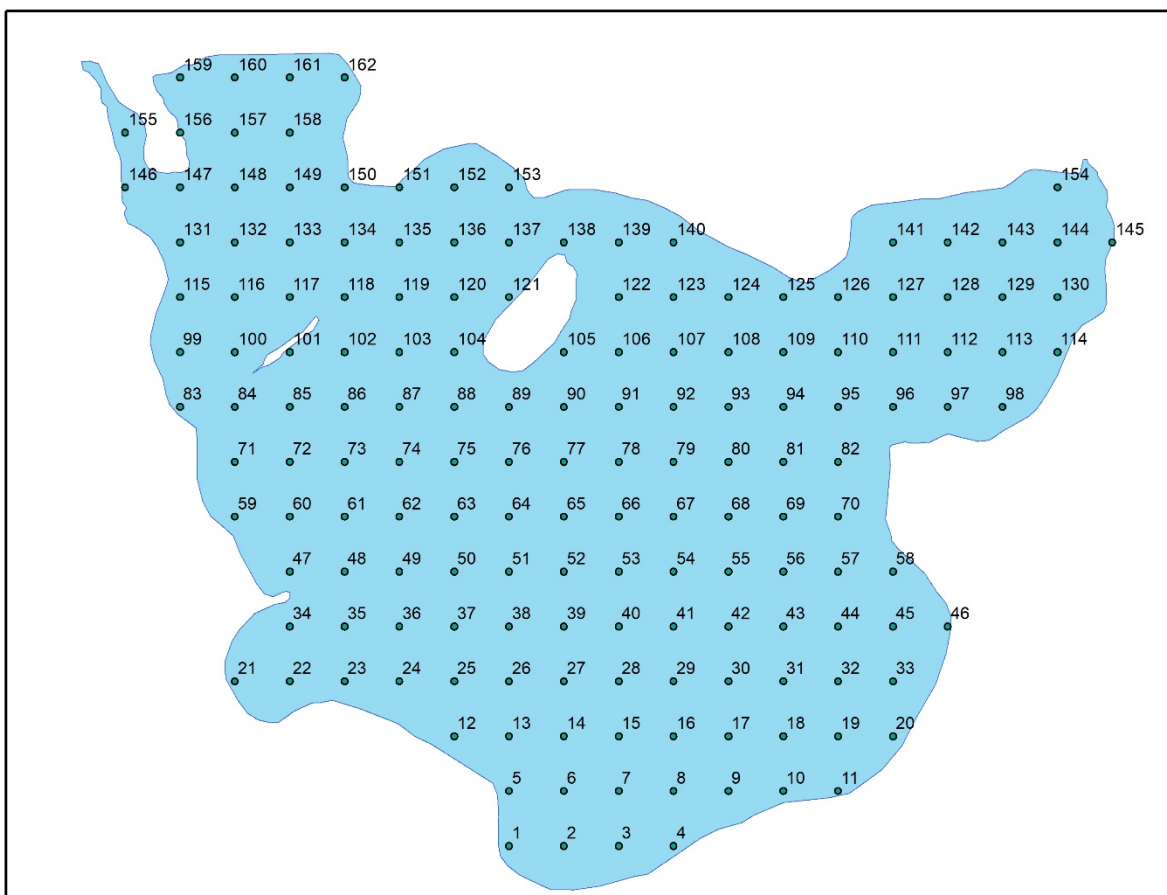


Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Beebe Lake, Wright County (DOW# 86002300). Point-intercept survey included 99 points, 100 meters apart.

Survey Observations

In 2020, we found submersed aquatic plants in Beebe Lake ranging in depth from 2.0 to 8.6 feet. The maximum depth of growth was 8.5 feet. In the littoral zone, 24% of the surveyed points had submersed native vegetation (Table 2). In total, we found 8 native submersed taxa and two invasive aquatic plants during the survey (Table 3). Eurasian watermilfoil was the most commonly occurring plant at 13% of all sites in the littoral zone (Figure 2), followed by coontail (*Ceratophyllum demersum*, Figure 3), Najas (*Naiad* sp., Figure 4) and curly- leaf pondweed (Figure 5). Beebe Lake’s aquatic plant community averages 0.31 species per a sampling site (species richness; Figure 6).

Table 2 - Point-intercept Metrics. Summary of point-intercept metrics for Beebe Lake, Wright County (DOW#86002300). Shaded values were calculated from littoral depth range (0-15 feet). Metrics are not available for 2009.

Metric	AUG 2010	AUG 2011	JULY 2020
Surveyor	MN DNR	MN DNR	MN DNR
Total # Points Sampled	57	86	99
Depth Range of Rooted Veg (ft.)	4.0-10.6	5.0-14.4	2.0-8.6
Max Depth of Growth (95%)	10.3	13.9	8.5
# Point in Max Depth Range	25	53	45
# Points in Littoral (0-15 feet)	57	69	87
% Points w/ Submersed Native Taxa	32	54	24
Mean Submersed Native Taxa/ Point	0.49	0.71	0.31
# Submersed Native Taxa	5	3	8
# Submersed Non-Native Taxa	1	2	2
% Points w/ Submersed Non- native Taxa	21	49	17

Table 3 - Plant Frequency of Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Beebe Lake, Wright County (DOW#86002300).

Taxonomic Name	Common Name	JULY 2009	AUG 2010	AUG 2011	JULY 2020
SUBMERSED NON-NATIVE					
<i>Potamogeton crispus</i>	Curly-leaf pondweed	56	0	33	7
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	33	21	36	13
SUBMERSED NATIVE					
<i>Ceratophyllum demersum</i>	Coontail	13	30	42	8
<i>Chara</i> sp.	Muskgrass	2	0	0	5
<i>Heteranthera dubia</i>	Water star-grass	0	0	0	3
<i>Myriophyllum sibiricum</i>	Northern watermilfoil	2	2	0	1
<i>Najas</i> sp.	Naiad species	0	9	23	7
<i>Potamogeton praelongus</i>	Whitestem pondweed	0	0	0	5
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed	2	2	0	0
<i>Ranunculus</i> sp.	Buttercup	0	0	0	1
<i>Stuckenia pectinata</i>	Sago pondweed	3	7	6	1
<i>Zannichellia palustris</i>	Horned pondweed	2	0	0	0
EMERGENT					
<i>Schoenoplectus</i> sp.	Bulrush species	1	0	0	1
<i>Typha</i> sp.	Cattail species	1	4	0	0
FLOATING LEAF					
<i>Wolffia</i> sp.		Present	Absent	Absent	Absent
OTHER					
	Filamentous algae	38	11	14	.

Comparison to previous years

In addition to the point-intercept surveys conducted by the Invasive Species Program, MN DNR Fisheries conducted an aquatic plant and emergent vegetation mapping survey during the June of 2009. At this time, a total area of 95.3 acres (29.5% of the entire lake) was mapped for curly-leaf pondweed. To compare, the most recent treatment of curly-leaf pondweed in 2020 comprised of approximately 14 acres while the most recent survey conducted after management (July 7, 2020) had indicated a 6% lake wide frequency of curly-leaf pondweed or a 7% frequency within the littoral zone. Eurasian watermilfoil frequency of occurrence has also fluctuated among years surveyed. Management of this species had only occurred in 2016, 2018, 2020.

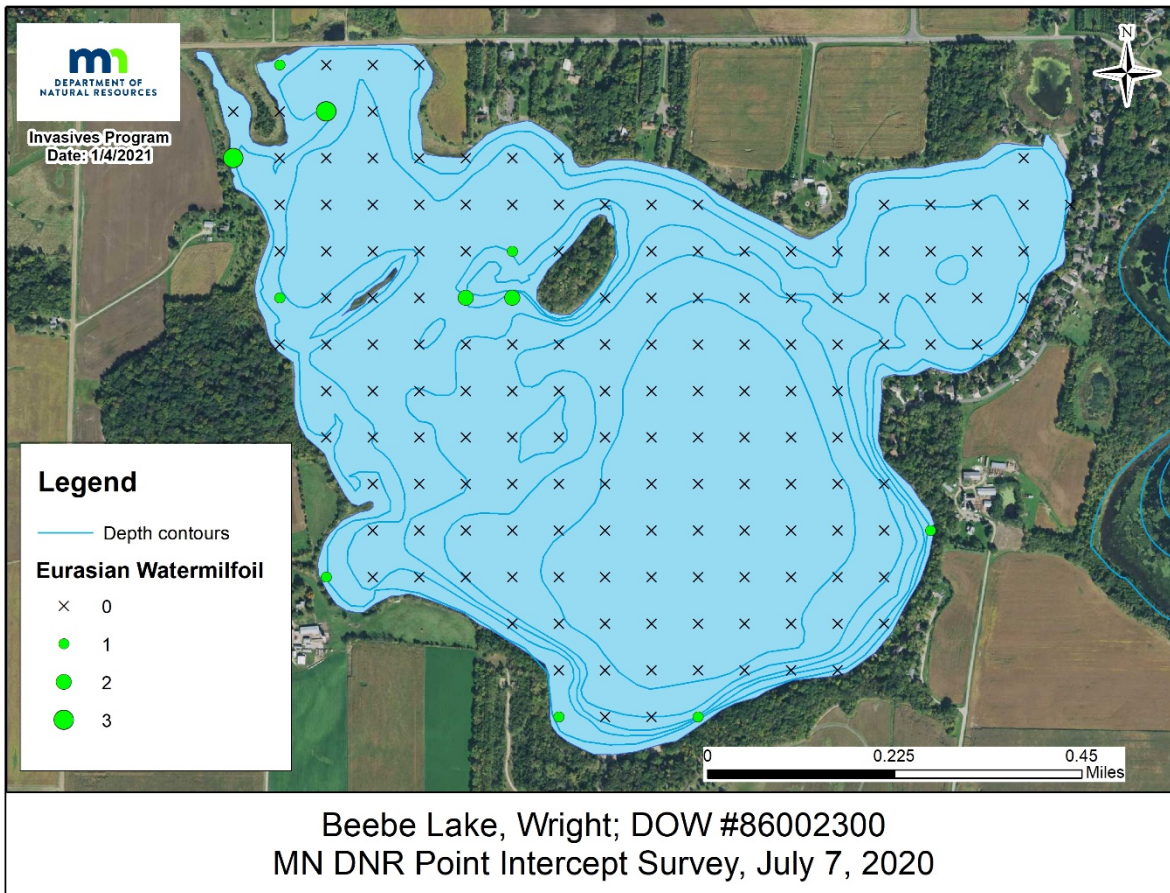


Figure 2 – 2020 Eurasian watermilfoil Distribution. Plant distribution from the 2020 point-intercept survey for Eurasian watermilfoil in Beebe Lake, Wright County (DOW#86002300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

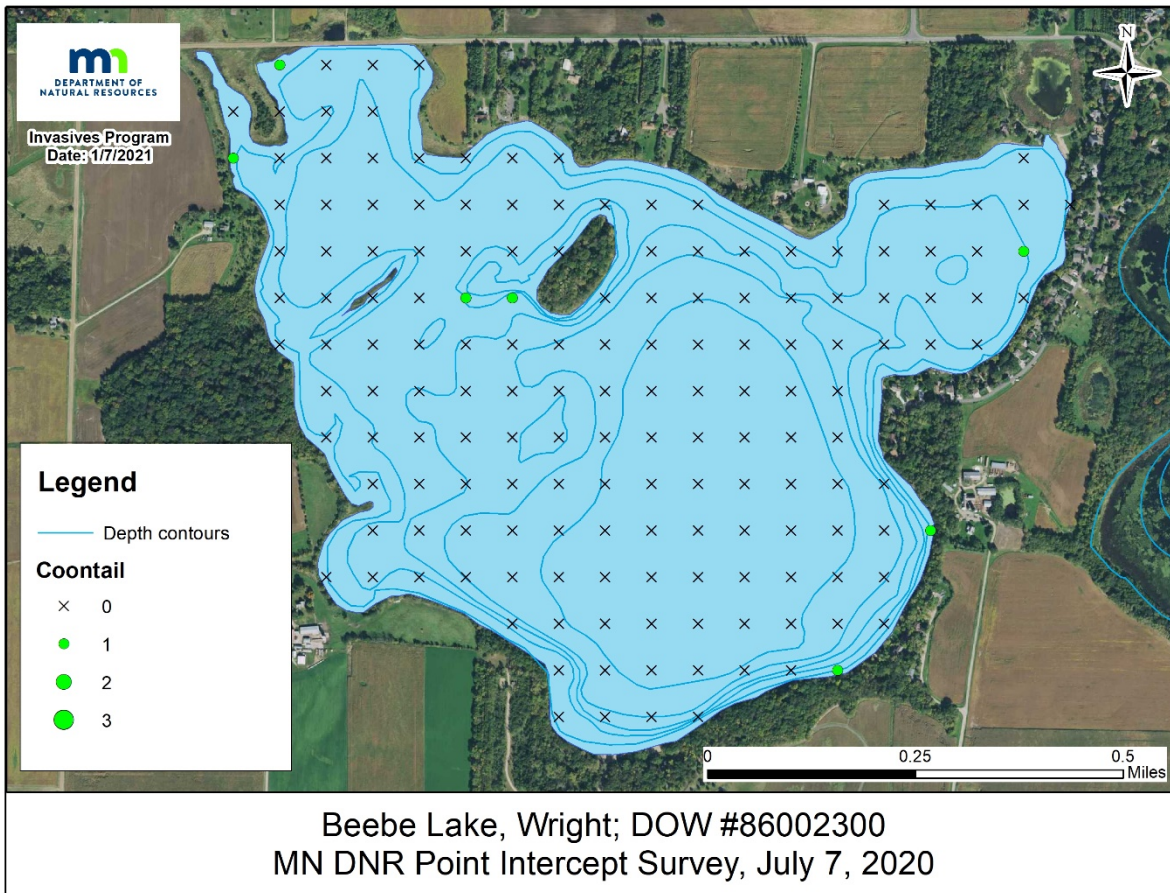


Figure 3 – 2020 Coontail Distribution. Plant distribution from the 2020 point-intercept survey for coontail in Beebe Lake, Wright County (DOW#86002300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

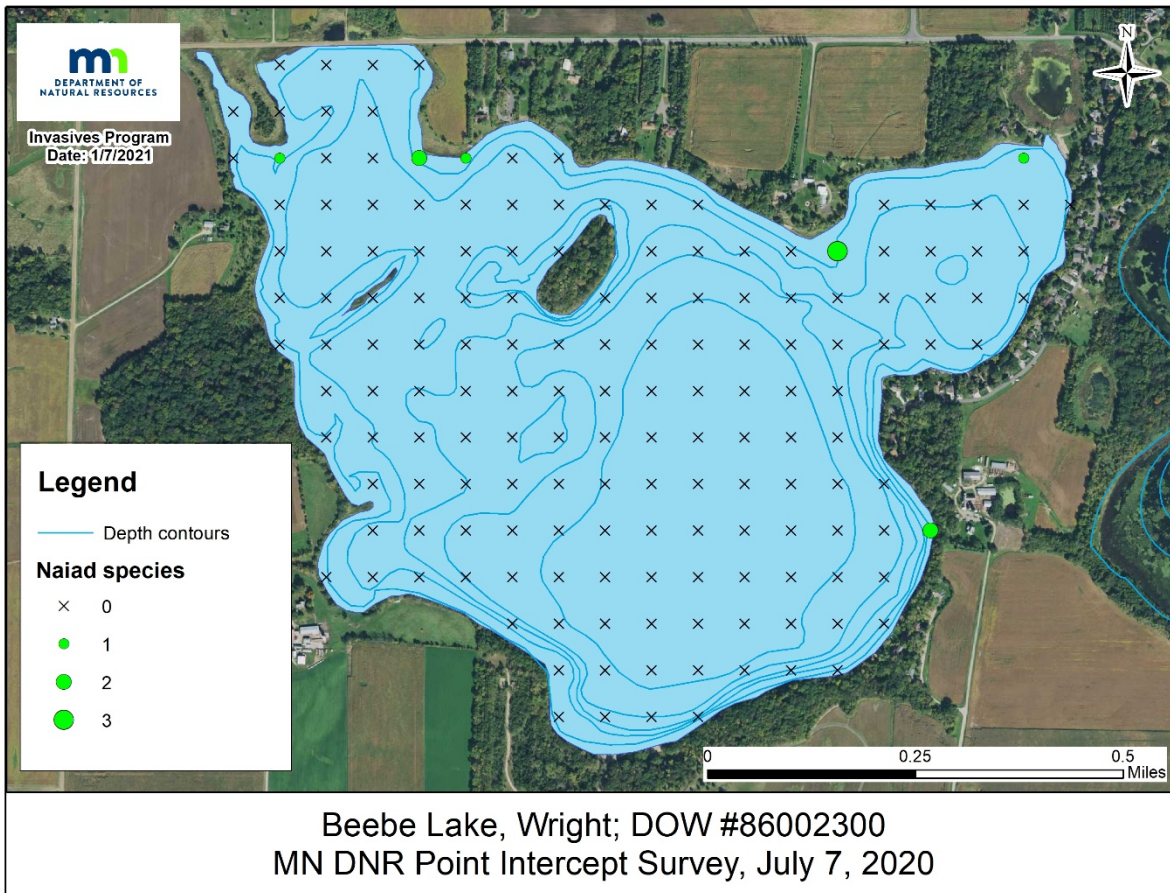


Figure 4 – 2020 Naiad Distribution. Plant distribution from the 2020 point-intercept survey for naiad in Beebe Lake, Wright County (DOW#86002300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

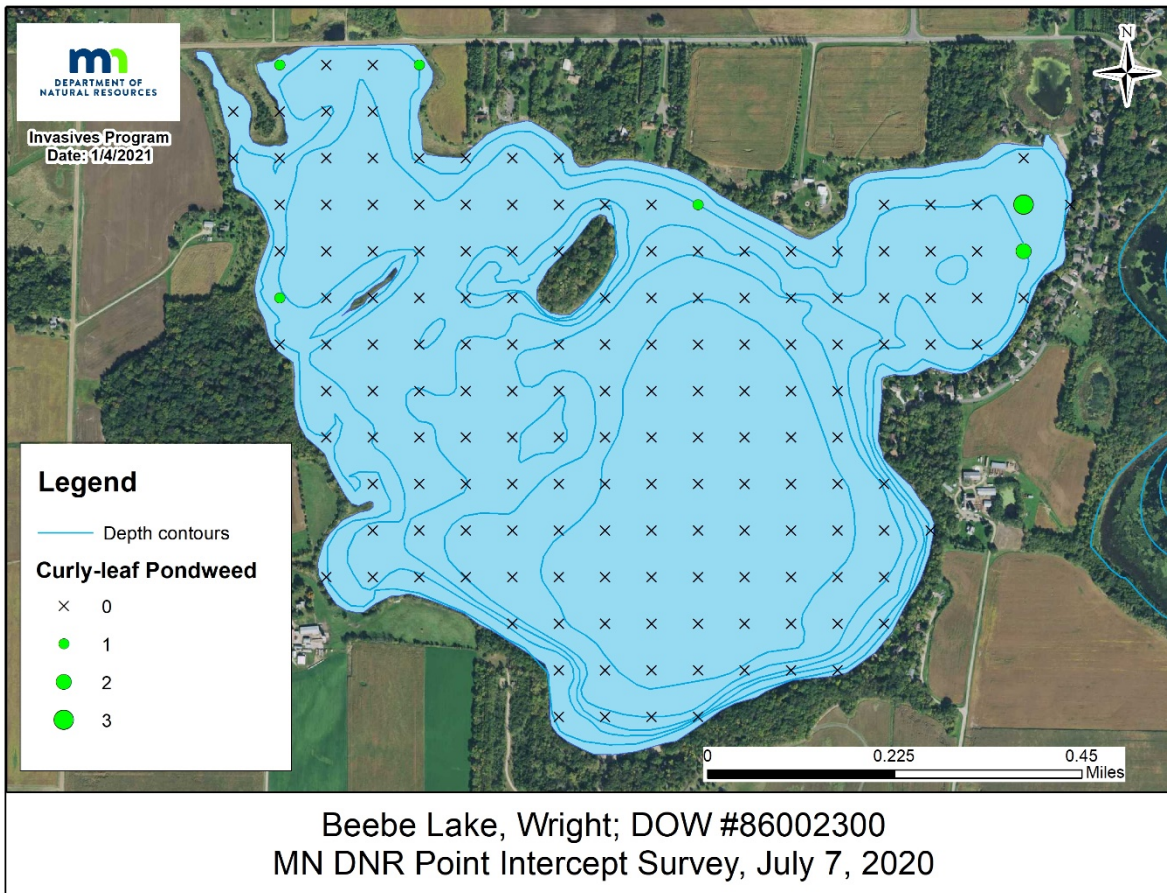


Figure 5 – 2020 curly-leaf pondweed Distribution. Plant distribution from the 2020 point-intercept survey for naiad in Beebe Lake, Wright County (DOW#86002300). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

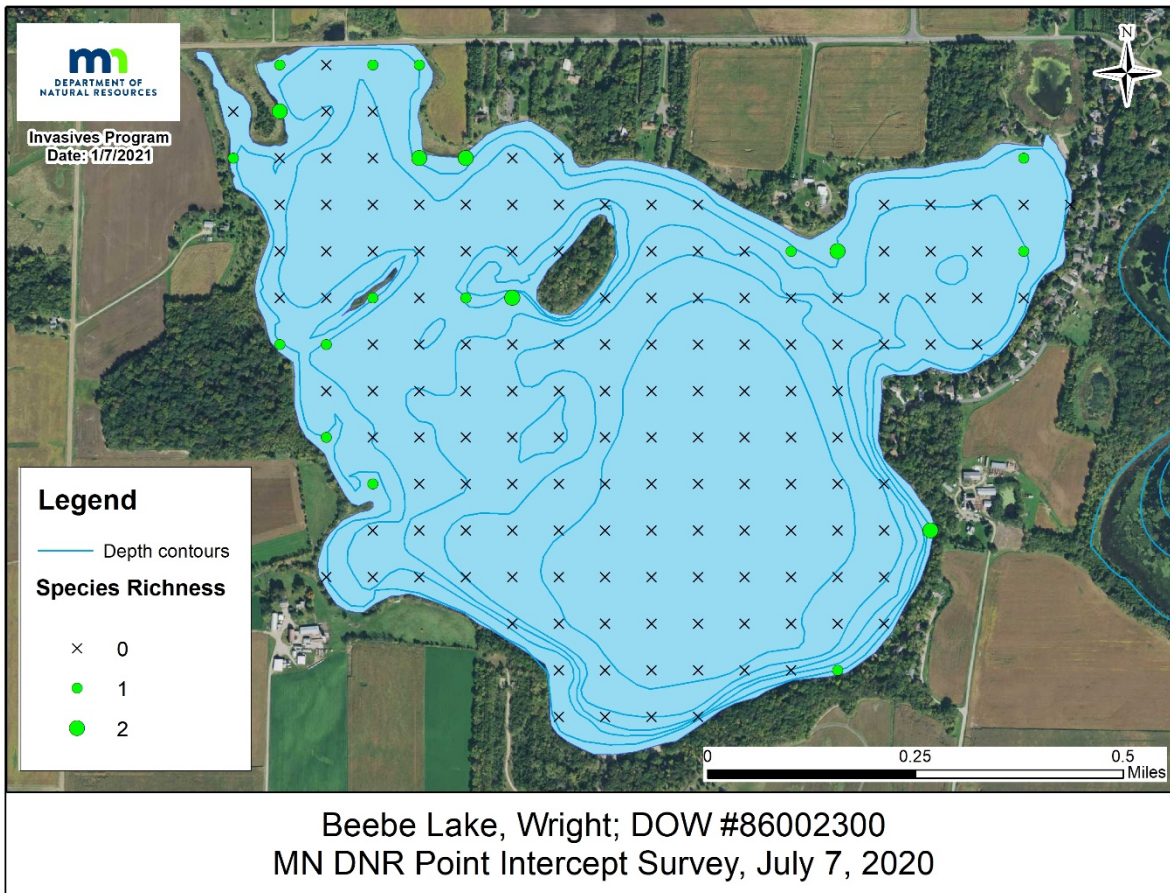


Figure 3 – Number of species per site. Map of number of species (species richness) from the 2020 point-intercept survey in Beebe Lake, Wright County (DOW#86002300).

Literature Cited

- Crow G, Hellquist C. 2000a. Aquatic and wetland plants of northeastern North America. Vol. 1. Pteridophytes, Gymnosperms and Angiosperms: Dicotyledons. University of Wisconsin Press, Madison, WI. 480 pp.
- Crow G, Hellquist C. 2000b. Aquatic and wetland plants of northeastern North America. Vol. 2. Angiosperms: Monocotyledons. University of Wisconsin Press, Madison, WI. 400 pp.
- Madsen J. 1999. Point and line intercept methods for aquatic plant management. APCRP Technical Notes Collection (TN APCRP-M1-02), U.S. Army Engineer Research and Development Center, Vicksburg, MS. 16 pp.