

Meadow Lake, Becker County, MN 2022 Aquatic Vegetation Management Report



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Project Details

Lake: Meadow (EQuIS# 03-0371-00-201)

Lake Surface Area: 71 acres Littoral Area: 30 acres County: Becker

Survey Type: Point-intercept aquatic plant surveys (2022)

Date of Survey (most recent): August 10, 2022 (PRWD)

Surveyor[s]: Beatrice Jaszczak & Blaine Henderson

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Author[s]:

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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 Meadow Lake, Becker County in 2022. Historical data on water quality, invasive aquatic plant management permits and point-intercept surveys are all summarized in this report. This summary will guide future invasive aquatic plant control projects and can evaluate changes in native plant communities.

Lake Description

Meadow Lake is located approximately 4.5-miles SW of the City of Detroit Lakes. Despite its relatively small size, the lake is quite deep, reaching a maximum depth of 72 feet. Approximately 42% (30 acres) of the 71-acre lake is considered littoral and less than 15 feet.

Located in the upper part of the Lake Melissa watershed, Meadow has no surface water inlet and is recharged primarily by groundwater interaction and some surface water runoff. There is no true outlet to the lake, however, there is a culvert below Highway 59 that connects Meadow to a wetland and another culvert below CSAH 17 that connects the wetland to Lake Melissa.

Attempts were made by the MN DNR between 1987 through 2009 to regularly stock Rainbow and Brown Trout, however this had limited success. The MN DNR also began stocking walleye in 2010, however, further study found that the lake best supports Largemouth Bass, Bluegill, Crappie, and Northern pike population, so stocking efforts ceased. Because the lake is deep enough to support both warm and cold fisheries, there is a small population remaining of Trout and Cisco (Tullibee).

There are three residential homes on the western shoreline and a campground located on southeast portion. There is some agricultural (row crop) activity to the north of the lake that is separated from the lake by a forested buffer, 150-300 feet wide. Emergent vegetation is present along most of the shoreline except for about 1000 feet near the campground area, which may have been removed for the installation of a sand beach and docking area. There is moderate macrophyte growth in the littoral area of the lake (<15 ft). Lake depths begin to drop sharply about 150-250 feet offshore, where plant growth becomes much more limited.

The District has monitored Meadow Lake since 1999 and the water quality has always been good. Currently the lake is sampled for both chemistry and clarity every three years. The water quality is stable with a 10-year average clarity of 16.5 and total phosphorus concentration of 14 ppb.

Management History

The lake has no known Aquatic Invasive Plant Species (AIS) currently (2022), PRWD will continue to monitor the lake for AIS.



Survey Objectives

In 2022, a Point-intercept Survey assessed the distribution of aquatic plants in Meadow 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 PRWD 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

PRWD surveyors used a point-intercept survey method developed by John Madsen in "Aquatic Plant Control Technical Note MI-02, 1999" during the 2022 Survey. Points were placed 72 meters apart using a Geographic Information System (GIS), comprising of 44 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 Skawinski (2018). 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 3). Frequencies of occurrence percentages (i.e., how often a plant species was sampled in the lake) were calculated based on the littoral zone.

Table 1 - Quantitative rake abundance ranking (0-3) used to estimate plant abundance for each species based on rake coverage and/or visual observation (PRWD). A zero (0) ranking indicates no target plants were retrieved or observed in a sample.

Abundance Ranking	Rake Coverage	Description
1	hinter the	Sparse; plants covering <25% of the rake head
2	Market Market	Common; plants covering 25%-75% of the rake head
3	Printing of	Abundant; plants covering >75% of the rake head





Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Meadow Lake, Becker County (EQuIS# 03-0371-00-201). A total of 45 points were surveyed in 2022 at 72 meters apart.





Figure 2 – Species Richness Distribution. Number of species at each site from the 2022 point-intercept survey in Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Densities ranged from 0 to 5 at each point, with a 5 indicating the richness in species presence and 0 indicating no species.



Survey Observations

The first vegetation point-intercept survey of Meadow Lake (EQuIS# 03-0358-00-201 conducted by the PRWD occurred on August 10^{th} , 2022. Plants were rooted to a maximum depth (95%) of 15.1 feet, with depths ranging from 0 – 72 feet. However, since 86 acres is considered the littoral zone (< 15 feet deep and where aquatic plants are likely to be found) it was very rare to find any rooted plants deeper than 15 feet. 84% of the points had submersed native vegetation (Table 2) with a mean submersed native taxa per point of 2.6. Meadow Lake has up to 4 submersed native taxa (Table 3).

Table 2 - Point-intercept Metrics. Summary of PRWD point-intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	August 2022
Surveyor	PRWD
Total # Points Sampled	45
Max depth of growth	15
Depth Range of Rooted Veg (ft.)	0.0 - 15.0
Max Depth of Growth (95%) (ft.)	15
# of Vegetated Points in Max Depth Range	45
# Points in Littoral (0-15 feet)	45
% Points w/ Submersed Native Taxa	84
Mean Submersed Native Taxa/ Point	2.6
# Submersed Native Taxa	4
# Submersed Non-Native Taxa	0
% Points w/ Submersed Non- native Taxa	0

Based on the 2022 point-intercept survey, the native plant community within the littoral area in Meadow Lake was primarily dominated by Common Stonewort (*Chara Contraria*) 80%, Coontail (*Ceratophyllum demersum*) 7%, Sago Pondweed (*Stuckenia pectinate*) 5%, and White-stem Pondweed (*Potamogeton praelongus*) 2% (Figures 3,4,5, and 6). These aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Meadow Lake also has the following floating leaf and emergents: Bulrush (*Schoenoplectus* sp.) 27%, Cattail (*Typha sp.*) 20%, Water Lilies (*Nymphaeaceae spp.*) 32% (Figures 7, 8 and 9) These emergent 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.

Meadow Lake has an average of four species per sampling site. Figure 2 displays the spatial distribution and species richness (# of species per sample point) of all native species from the 2022 point-intercept survey.



Table 3 - Plant Frequency Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201).

		August 2022 <i>b</i>			
Taxonomic Name	Common Name	Frequency (%)			
SUBMERSED NON-NATIVE					
These plants spread or have been introduced beyond its native range and are either causing harm or					
	have the potential to cause harm				
	None Observed				
SUBMERSED NATIVE					
These plants are rooted plants with flaccid or limp stems and most of their vegetative mass is below the water surface, although small portions may stick above the water.					
Ceratophyllum demersum	Coontail	7%			
Chara Contraria	Common Stonewort	80%			
Potamogeton praelongus	Whitestem Pondweed	2%			
Stuckenia pectinata	Sago Pondweed	5%			
FLOATING LEAF These plants are rooted in the lake bottom and have leaves that float on the water surface. Many have colorful flowers that extend above the water. Water Lilies Water Lilies					
Nymphaeaceae spp.	EMERCENT	5270			
EIVIERGENT These plants extend well above the water surface and are usually found in shallow water, near shore.					
Schoenoplectus sp.	Bulrush Species	27%			
<i>Typha</i> sp.	Cattail Species	20%			
EMERGENT NON-NATIVE					
These plants spread or have been introduced beyond its native range and are either causing harm or have the potential to cause harm.					
	None Observed				
FREE FLOATING					
These plants float freely on the water surface. The entire plant is suspended on the water, allowing the plant to be moved around the pond by wind and water currents.					
	None Observed				

b Percent frequency for 2022 (PI Survey Method) calculated for 0-15 feet zone.





Figure 3 – Common Stonewort Distribution. Plant distribution from the 2022 point-intercept survey for Common Stonewort in intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.





Figure 4 – Coontail Distribution. Plant distribution from the 2022 point-intercept survey for Coontail in intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.





Figure 5 – Sago Pondweed Distribution. Plant distribution from the 2022 point-intercept survey for Sago Pondweed in intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.





Figure 6 – White-stem Pondweed Plant distribution from the 2022 point-intercept survey for White-stem Pondweed in intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.





Figure 7 – Bulrush Distribution. Plant distribution from the 2022 point-intercept survey for Bulrush in intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.





Figure 8 – Cattail Distribution. Plant distribution from the 2022 point-intercept survey for Cattail in intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Densities ranged from 0 to 2 at each point, with a 2 indicating dense plant presence and 0 indicating no plants.





Figure 9 – Water Lilies Distribution. Plant distribution from the 2022 point-intercept survey for Water Lilies in intercepts Meadow Lake, Becker County (EQuIS# 03-0371-00-201). Densities ranged from 0 to 3 at each point, with a 3 indicating dense plant presence and 0 indicating no plants.



Literature Cited

Skawinski, Paul M. (2018). *Aquatic Plants of the Upper Midwest*. (Third Edition). Wisconsin: Paul M. Skawinski.

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.