
RUSH LAKE, SHERBURNE COUNTY: AQUATIC VEGETATION MANAGEMENT REPORT

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



Prepared by:

Christine Jurek and Emelia Hauck Jacobs
Division of Ecological and Water Resources
Minnesota Department of Natural Resources
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Project Details

Lake: Rush (DOW# 71014700)

Lake Surface Area: 161 acres

Littoral Area: 161 acres

County: Sherburne County

Survey Type: Point-intercept

Date of Survey (most recent): August 10, 2018 (James Johnson, Freshwater Scientific Services)

Observer[s]: Minnesota Department of Natural Resources:

MN DNR- 2003: Donna Perleberg and Audrey Kuchinksi; 2004: Wendy Crowell and Dan Swanson; 2005: Audrey Kuchinksi and Cody Peterson; 2010: Dan Swanson and Matt Pierce; 2012: Courtney Millaway and Peter Borash).

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Author[s]:

Christine Jurek (MN DNR), christine.jurek@state.mn.us, 320-223-7847

Emelia Hauck Jacobs (MN DNR), emelia.hauck-jacobs@state.mn.us, 320-223-7855

Report Details

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Summary

The most recent aquatic vegetation point-intercept survey of Rush Lake (DOW #71014700) occurred on August 10, 2018 by an independent contractor. Plants were present throughout the lake to a depth of 5.6 feet (95%). The average number of native submersed taxa per sample point was 1.8. In total, eleven native submersed taxa, two invasive taxa, four floating-leaf and two emergent taxa were observed during the 2018 survey.

Lake Description

Rush Lake is a 161- acre lake located 6 miles northeast of Clear Lake, MN in Sherburne County. The lake has two invasive plant species: curly-leaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*). The maximum depth of water in Rush Lake is 12 feet, and 100% of the lake is classified as littoral (areas of water depth between 0 to 15 feet, where aquatic plants are most likely to grow). Water clarity during the summer averaged 3 feet in 2020. According to the Minnesota Pollution Control Agency (MPCA, 2020), Rush Lake is classified as a eutrophic lake based on its Trophic State Index (TSI) of approximately 69. For more information on water quality, go to [Rush Lake water quality](https://webapp.pca.state.mn.us/wqd/surface-water/waterunit-details?wid=71-0147-00) on the MPCA website (<https://webapp.pca.state.mn.us/wqd/surface-water/waterunit-details?wid=71-0147-00>).

Management History

Invasive aquatic plant management in Rush Lake has focused on curly-leaf pondweed using an endothall herbicide, with the most recent treatment in 2021 for 24 acres. Management has been organized by the Three Lake Improvement District, with past treatments ranging from 2.0 to 35.6 acres. (Figure 1, Table 1).

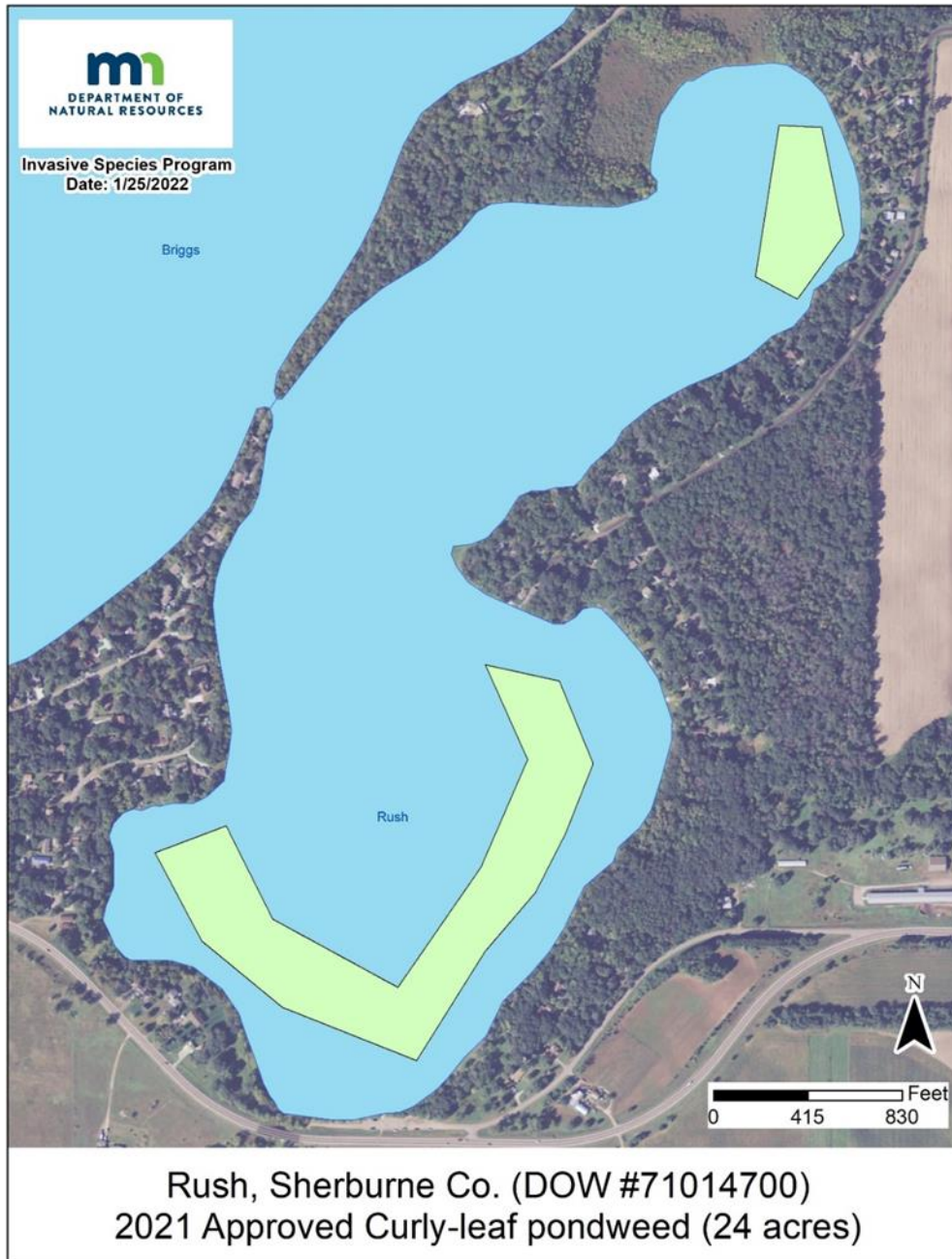


Figure 1 – 2021 Curly-leaf Pondweed Treatment for Rush Lake, Sherburne County (DOW#71014700).

Survey Objectives

Point-intercept surveys are used to assess the distribution of aquatic plants in Rush 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. Characteristics and history of partial lake invasive plant treatments for Rush Lake, Sherburne County (DOW#71014700). Total acres: 161, Littoral acres: 161, 15% of Littoral acres: 24). 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	Herbicide	Licensed Commercial Applicator
2012	CLP	35.6	Endothall	Lake Management
2013	CLP	20.3	Endothall	Lake Management
2014	CLP	20.0	Endothall	Lake Management
2014	EWM	5.4	Auxin-mimic	Lake Management
2015	CLP	8.0	Endothall	NA
2015	EWM	12.0	Auxin-mimic	NA
2016	CLP	20.0	Endothall	Lake Management
2016	EWM	4.8	Auxin-mimic	Lake Management
2017	CLP	13.7	TBD	Lake Management
2017	EWM	5.1	Auxin-mimic	Lake Management
2018	CLP	10.8	Endothall	Lake Management
2018	EWM	12.4	Auxin-mimic	Lake Management
2019	CLP	2.0	Endothall	Lake Management
2020	CLP	24.0	Endothall	Lake Management
2021	CLP	24.0	Endothall	Lake Management

Survey Methods

A total of six point-intercept surveys have been conducted between 2003 and 2018, using the point-intercept survey method developed by John Madsen in “Aquatic Plant Control Technical Note MI-02, 1999”. Sampling points were pre-determined using Geographic Information System and varied among survey year and surveyor. 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.

Survey Observations

In 2018, aquatic plants were found in Rush Lake at a maximum depth of 5.6 ft. (95%). In the littoral zone, 56% of the surveyed points had submersed native vegetation (Table 2). In total, eleven native submersed taxa, two emergent, and four floating-leaf species were found during the survey (Table 3). Canada waterweed (*Elodea canadensis*) was the most commonly occurring plant at 42% of all sites in the littoral zone followed by coontail (*Ceratophyllum demersum*) with a percent frequency of 33%. Curly-leaf pondweed and Eurasian watermilfoil are the invasive species present, although at low frequencies. Rush Lake has a small aquatic plant community with an average of 1.8 species per a sampling site. Over the past 15 years (2003- 2018), there has been an increase in the mean submersed native taxa per a point from 0.1 to 1.8 species, a large increase in the percent frequency of submerged aquatic plants from 7% to 56% and an increase of native taxa from 4 to 11 taxa.

Table 2 - Point-intercept Metrics. Summary of point-intercept metrics for Rush Lake, Sherburne County (DOW#71014700). Shaded values were calculated from littoral depth range (0-15 feet). Freshwater Scientific Services (FSS*), Surveyor: James Johnson.

Metric	JULY 2003	MAY 2004	AUG 2005	AUG 2010	AUG 2012	AUG 2018
Surveyor	MN DNR	MN DNR	MN DNR	MN DNR	MN DNR	FSS
Total # Points Sampled	109	110	111	70	48	112
Max Depth of Veg (ft.) 95%	1 - 7	2 - 11	1 - 5	1 - 5	1 – 7.3	--
# Points in Littoral (0-15 feet)	109	110	111	70	48	112
% Points w/ Submersed Native Vegetation	7	5	12	64	17	56*
Mean Submersed Native Taxa/ Point	0.1	0.1	0.2	1.0	0.3	1.8
# Submersed Native Taxa	4	3	5	7	5	11
# Submersed Non-Native Taxa	1	1	0	0	0	2
% Points w/ Submersed Non- native Taxa	1	76	0	0	0	--

*% of littoral points vegetated (native and non-native species)

Table 3 - Plant Frequency of Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Rush Lake, Sherburne County (DOW#71014700).

Taxonomic Name	Common Name	JULY 2003	MAY 2004	AUG 2005	AUG 2010	AUG 2012	AUG 2018
SUBMERSED NON-NATIVE							
<i>Potamogeton crispus</i>	Curly-leaf pondweed	1	76	0	0	0	Present
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	0	0	0	0	0	Present
SUBMERSED NATIVE							
<i>Chara</i>	Muskgrass	3	1	2	21	4	13
<i>Ceratophyllum demersum</i>	Coontail	3	4	2	3	2	33
<i>Elodea canadensis</i>	Canada waterweed	2	0	2	61	2	42
<i>Eleocharis acicularis</i>	Needle spikerush	0	0	0	0	0	1
<i>Heteranthera dubia</i>	Water star-grass	0	0	1	3	0	11
<i>Myriophyllum sibiricum</i>	Northern watermilfoil	0	0	0	0	0	3
<i>Najas flexilis</i>	Northern naiad	2	0	9	1	13	10
<i>Najas guadalupensis</i>	Southern naiad	0	0	0	0	0	4
<i>Potamogeton</i> species	Narrowleaf pondweed	0	1	0	3	0	9
<i>Potamogeton pusillus</i>	Small pondweed	0	0	0	0	0	9
<i>Stuckenia pectinata</i>	Sago pondweed	0	0	0	4	4	8
<i>Vallisneria americana</i>	Wild celery	0	0	0	0	0	3
FLOATING LEAF							
<i>Lemna</i> sp.	Duckweed	0	0	0	0	2	13
<i>Spirodela polyrhiza</i>	Greater duckweed	0	0	0	0	0	12
<i>Nymphaea odorata</i>	White waterlily	1	3	3	4	8	11
<i>Wolffia</i> sp.	Watermeal species	0	0	0	0	0	13
<i>Nuphar variegata</i>	Yellow waterlily	0	0	0	3	0	0
EMERGENT							
<i>Schoenoplectus</i> sp.	Bulrush species	0	0	0	0	0	Present
<i>Typha</i> sp.	Cattail species	0	0	0	0	0	Present

Literature Cited

Crow, G.E. and C.B. Hellquist. 2000. Aquatic and wetland plants of Northeastern North America. 2 volumes. The University of Wisconsin Press.

Johnson, J. 2018. Aquatic Plant Community of Rush Lake: 2018. Survey, Analysis and Report by Freshwater Scientific Services, LLC. 11pp.

Madsen, J. 1999. Point intercept and line intercept methods for aquatic macrophytes management. APCRP Technical Notes Collection (TN APCRP-M1-02). U.S. Army Engineer Research and Development Center, Vicksburg, MS.