
LAKE JOHANNA, RAMSEY COUNTY: 2022 AQUATIC VEGETATION REPORT

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

Lake: Johanna (DOW# 62007800)

Lake Surface Area: 215 acres

Littoral Area: 93 acres

County: Ramsey

Survey Type: Point-intercept

Date of Survey (most recent): July 16th, 2022

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2022 Summary:

The most recent aquatic vegetation point-intercept survey of Lake Johanna (DOW #62007800) was completed on July 16, 2022. Submersed plants were present throughout the lake to a maximum depth of 3.35 meters (11 feet). Within the littoral zone (area in the lake from the 0 – 15-foot depth range [0 – 4.5 meters]), 79% of the sampled points contained native submersed vegetation. The average number of native submersed plants per sampling point was 2.0. Thirteen submersed plant species were observed during the 2022 survey. Eurasian watermilfoil was first discovered in Lake Johanna in 2009 but has not presented a recreational nuisance and has been left unmanaged.

Summary Table. Summary of aquatic submersed plants in Lake Johanna, Ramsey County, Minnesota (DOW# 62007800) as indicated by the results of point-intercept surveys. Values were calculated from the littoral depth range (0 – 15 feet).

PI Survey Date	% Frequency of EWM*	Max Depth of Growth in feet [95%] [†]	% Points w/ Native Submersed Taxa	Mean Native Submersed Taxa/ Point	# Submersed Taxa	AVG Secchi Depth [m]
MAY 2009	2	14	69	1	6	2.7
JUL 2013	0	11	88	2.3	10	2.5
JUL 2019	20	11	70	2.0	15	2.9
JUL 2022	13	12	79	2.0	13	3.0

*EWM is short for Eurasian watermilfoil

[†]95th percentile calculated based on all vegetated sampling points

Taxa refers to groups of submersed aquatic plant species or genera

AVG Secchi depth (water clarity measurement) from May – September

Lake Description:

Lake Johanna is a 215-acre lake located near Arden Hills, Minnesota. The lake has two invasive aquatic plant species: Eurasian watermilfoil (*Myriophyllum spicatum*, abbreviated as EWM) and curly-leaf pondweed (*Potamogeton crispus*, abbreviated as CLP). The maximum depth of water is 3.35 meters (11 feet). Approximately 43% of the lake is littoral (water depth zone from 0 – 15 feet where aquatic plants are likely to be found). For more information on Lake Johanna water quality see:

<https://lakes.rs.umn.edu/#62007800>

Table 1 – Secchi Averages. Secchi disk observations in meters for Lake Johanna, Ramsey County, Minnesota (DOW #62007800). Data gathered from Ramsey County Environmental Services (2009 – 2019).

YEAR	MAY	JUNE	JULY	AUG	SEPT	Secchi Depth Average [May – Sept]
2009	4.8	3.1	1.6	1.8	2.1	2.7
2010	3.2	1.4	1.2	1.5	1.4	1.7
2011	2.0	3.3	2.4	1.0	1.0	1.9
2012	3.9	2.2	1.4	1.4	1.4	2.0
2013	1.6	4.1	1.8	2.3	2.9	2.5
2014	2.6	4.3	2.0	1.8	1.9	2.5
2015	5.9	3.1	1.7	1.5	1.5	2.7
2016	4.8	2.9	1.9	1.4	1.5	2.5
2017	3.2	2.6	1.7	1.5	1.7	2.1
2018	4.3	4.2	1.9	1.1	-	2.9
2019	6.0	4.4	1.2	1.5	1.3	2.9
2022*	4.0	3.9	3.1	2.3	1.9	3.0

*Data taken from Minnesota Pollution Control Agency station 62-0078-00-101

Management History:

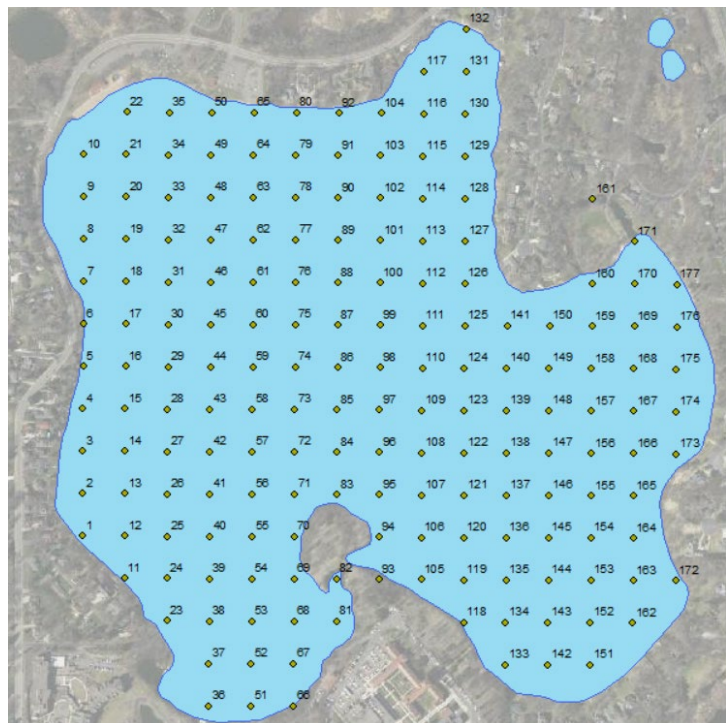
Lake Johanna serves as a non-treatment reference lake and can be compared to other area lakes where Eurasian watermilfoil has been or is being managed. Eurasian watermilfoil growth has hovered under nuisance levels since it was first observed in 2009. Curly-leaf pondweed has been managed with a contact herbicide – diquat – for the past four years under 15% of the littoral level (13.94 acres).

Survey Objectives:

Point-intercept surveys were used to assess the distribution of aquatic plants in Lake Johanna. 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 Minnesota Department of Natural Resources and our partners monitor native plant communities and evaluate possible responses to invasive aquatic plant management efforts. 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 plant and water quality management.

Survey Methods:

We used a point intercept survey method developed by John Madsen in [“Aquatic Plant Control Technical Note MI-02, 1999”](#). Survey points were placed 55-70 meters apart using a Geographic Information System (GIS). This spacing allowed for the placement of 92 – 144 points. Plant samples were collected by throwing and dragging a double-sided rake along the lake bottom at each point for approximately three meters. Plant samples were assessed on the boat to determine plant species, and rake fullness was used as a surrogate for density (scale



of zero [no plants] to 3 [dense plants, matted on the surface] was used in 2019 and 2022 (MN DNR survey), and a zero to 5 scale in 2009 and 2013 (Ramsey Conservation District & Ramsey County Public Works). Frequency of occurrence percentages (i.e., how often a plant species was found in the lake) were calculated based on the littoral zone (the portion of the lake that is less than 15 feet in depth).

Survey Observations:

A point intercept survey was conducted for the first time by the Minnesota Department of Natural Resources in 2019. Historical surveys were conducted by the Ramsey Conservation District and Ramsey County Public Works. Maximum depth of rooted vegetation ranged between 3.4 and 4.3 meters (11 – 14 feet) from 2009 to 2022 (see **Table 2 – Point Intercept Metrics** for historical point-intercept survey calculations, and **Figure 2** for plant growth depth ranges). Survey grids differ based on surveyor and year, which resulted in spatial differences in species richness.

In 2022, 13 submersed native aquatic plant species were observed. Surveys in 2009 and 2013 were dominated by coontail and in some years, northern milfoil, leafy pondweed, and water celery (see **Table 3 – Plant Frequency Occurrence** for historical plant frequency observations). In the two most recent surveys, native plant diversity increased to include higher frequencies of the aforementioned aquatic plants, but also included muskgrass, water stargrass, flat-stem pondweed and clasping-leaf pondweed. Less prominent species observed in 2022 were leafy pondweed, narrow-leaf pondweed, and northern watermilfoil.

Eurasian watermilfoil and curly-leaf pondweed – both invasive aquatic plants – have been observed in Lake Johanna. Eurasian watermilfoil was first observed in 2009 at 2% frequency of occurrence and has increased in frequency of occurrence over the last 12 years. Additional summer surveys may need to be completed to understand long term trends in aquatic plant communities and to track invasive plant abundance for future management.



Photo 1 – 3. Submersed aquatic plants observed during the 2013 summer survey taken by Ramsey County staff. Left photo (1): Illinois pondweed, center photo (2): leafy pondweed, right photo (3): coontail.

Table 2 – Point Intercept Metrics. Summary of point intercepts metrics for Lake Johanna, Ramsey County, Minnesota (DOW# 62007800) Shaded values were calculated from littoral depth range (0 – 15 ft). Surveys conducted in 2009 and 2013 by the Ramsey Conservation District and Ramsey County Public Works Environmental Resources. Surveys completed in 2019 and 2022 by the Minnesota Department of Natural Resources.

Survey Metrics	MAY 2009	JUN 2013	JUL 2019	JUL 2022
Treated (Y/N)	N	N	N	N
Surveyor	RCD and RCPW	RCD and RCPW	MN DNR	MN DNR
Total # Points Sampled	92	119	144	96
Max Depth of Growth (95%) in feet	14.3	11.2	11	12
# Point in Max Depth Range	77	93	53	64
# Points in Littoral (0-15 feet)	78	106	79	72
% Points w/ Submersed Native Taxa	69	87	70	79
Mean Submersed Native Taxa/ Point	1.0	2.3	2.0	2.0
# Submersed Native Taxa	4	10	13	12
# Submersed Non-Native Taxa	2	0	2	1

Table 3 – Plant Frequency of Occurrence. Historic percent frequency of occurrence for submersed vegetation within the littoral zone (0 – 15 feet) in Lake Johanna, Ramsey County, Minnesota (DOW# 62007800).

Taxonomic Name	Common Name	MAY 2009	JUL 2013	JUL 2019	JUL 2022
SUBMERSED PLANTS					
<i>Myriophyllum spicatum</i> *	Eurasian watermilfoil*	2	0	20	13
<i>Potamogeton crispus</i> *	Curly-leaf pondweed*	10	0	13	0
<i>Ceratophyllum demersum</i>	Coontail	47	63	43	43
<i>Macroalgae</i>	Muskgrass and stonewort	6	1	16	18
<i>Elodea canadensis</i>	Canadian waterweed	0	0	5	0
<i>Heteranthera dubia</i>	Water stargrass	0	0	9	17
<i>Myriophyllum sibiricum</i>	Northern watermilfoil	24	5	13	7
<i>Najas spp.</i>	Naiad	13	0	16	8
<i>Potamogeton foliosus</i>	Leafy pondweed	0	32	5	6
<i>Potamogeton gramineus</i>	Variable-leaf pondweed	0	0	8	1
<i>Potamogeton illinoensis</i>	Illinois pondweed	0	6	0	0
<i>Potamogeton praelongus</i>	White-water pondweed	10	0	0	1
<i>Potamogeton richardsonii</i>	Clasping-leaf pondweed	0	5	8	13
<i>Potamogeton strictifolius</i>	Narrowleaf pondweed	0	11	0	3
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed	0	4	37	33
<i>Vallisneria americana</i>	Water celery	11	54	43	53

*Denotes an invasive aquatic plant

Floating, free-floating & emergent plants observed: *Lemna trisulca* (forked duckweed), *Nymphaea odorata* (white waterlily), *Nuphar variegata* (bullhead pond lily)

Less common (< 5% frequency) submersed vegetation observed: *Stuckenia pectinata* (sago pondweed) in 2013 and 2019

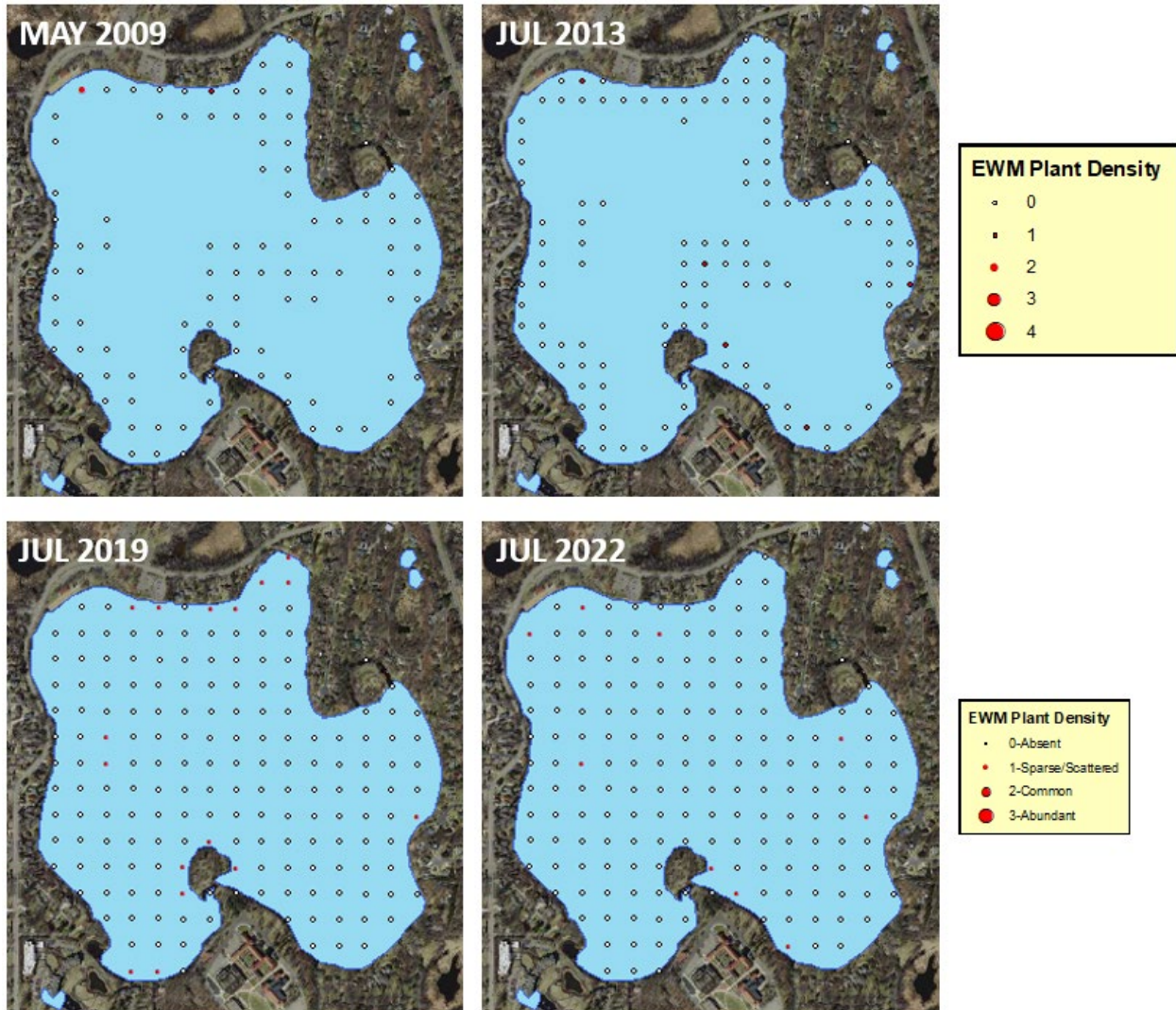


Figure 1 – Eurasian Watermilfoil Density. Spatial distribution and rake density per sample point of Eurasian watermilfoil (EWM). May 2009 and July 2013 (no EWM found) surveys were conducted by the Ramsey Conservation District and Ramsey County Public Works, while surveys in 2019 and 2022 were performed by the Minnesota Department of Natural Resources. Lake Johanna, Ramsey County, Minnesota (DOW# 62007800).

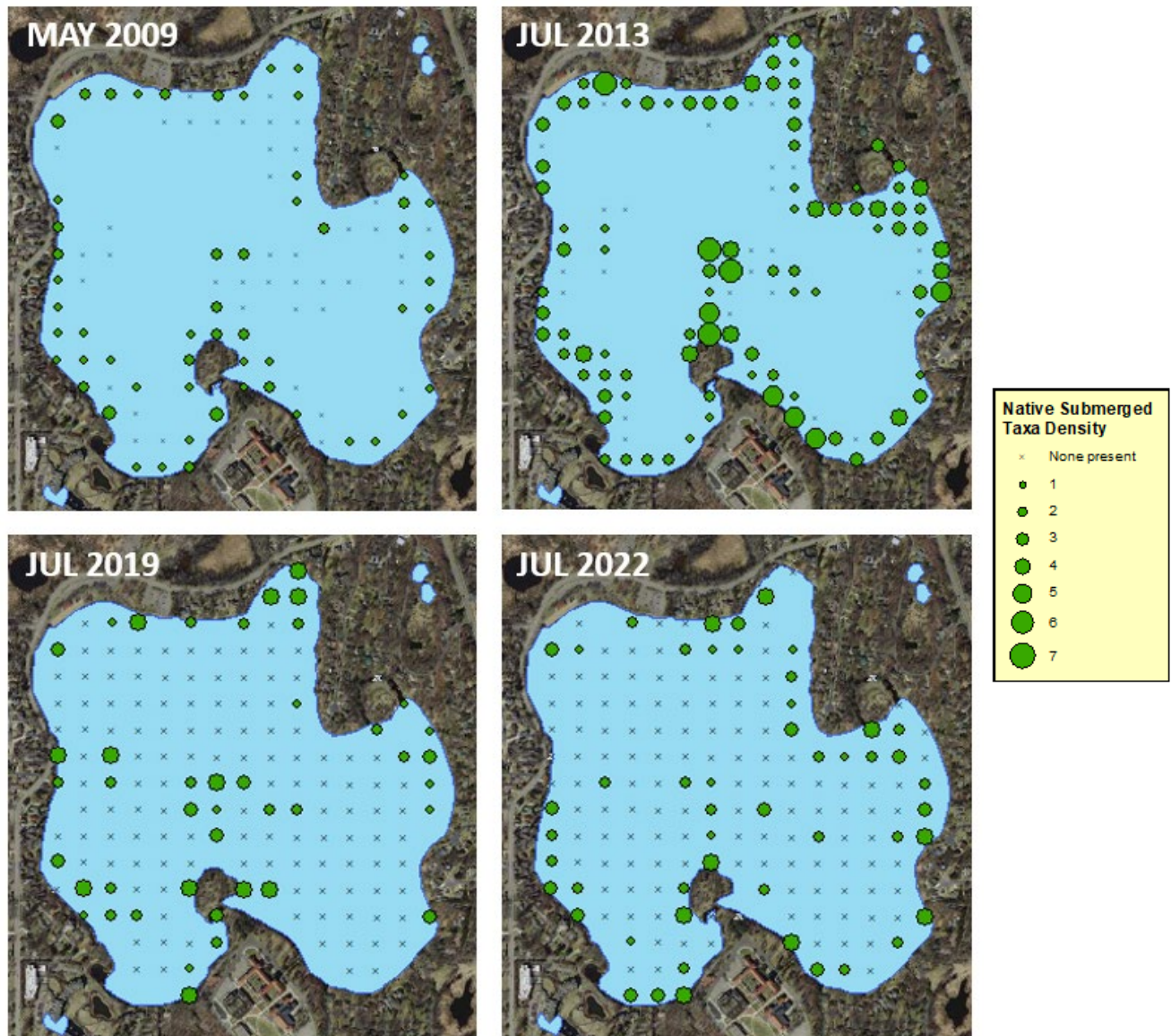


Figure 2 – Native Species Taxa Density. Spatial distribution and species richness (# of native species per sample point) of all submersed plant species. May 2009 and July 2013 surveys were conducted by the Ramsey Conservation District and Ramsey County Public Works, while the 2019 and 2022 surveys were performed by Minnesota Department of Natural Resources. Lake Johanna, Ramsey County, Minnesota (DOW# 6200780).

This information can be made available in alternative formats such as large print, braille or audio tape by emailing info.dnr@state.mn.us or by calling 651-259-5016.