
LAKE JOHANNA, RAMSEY COUNTY: 2023 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 20, 2023

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2023 Summary:

The most recent aquatic vegetation point-intercept survey of Lake Johanna (DOW #62007800) was completed on July 20, 2023. Submersed plants were present throughout the lake to a maximum depth of 2.93 meters (9.6 feet). Within the littoral zone (area in the lake from the 0 – 15-foot depth range [0 – 4.5 meters]), 90% of the sampled points contained native submersed vegetation. The average number of native submersed plants per sampling point was 2.6. Fourteen total submersed plant species were observed during the 2023 survey. Two invasive plants are present in Lake Johanna, Eurasian watermilfoil (EWM; *Myriophyllum spicatum*) and curly-leaf pondweed (CLP; *Potamogeton crispus*). Eurasian watermilfoil was first discovered in Lake Johanna in 2009 but has not presented as a recreational nuisance and has been left unmanaged, while CLP has been managed since 2021.

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
MAY 2009	2	14	69	1	6
JUL 2013	-	11	88	2.3	10
JUL 2019	20	11	70	2.0	15
JUL 2022	13	12	79	2.0	13
JUL 2023	54	10	90	2.6	14

*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

Lake Description:

Lake Johanna is a 215-acre lake located near Arden Hills, Minnesota, USA. The lake has two invasive aquatic plant species: Eurasian watermilfoil and curly-leaf pondweed. 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).

More information on Lake Johanna water quality can be obtained by contacting your local governmental unit (watershed district, county, city) or by visiting: <https://webapp.pca.state.mn.us/surface-water/station/62-0078-00-101> and <https://arcgis.dnr.state.mn.us/ewr/whaflakes/>.

Management History:

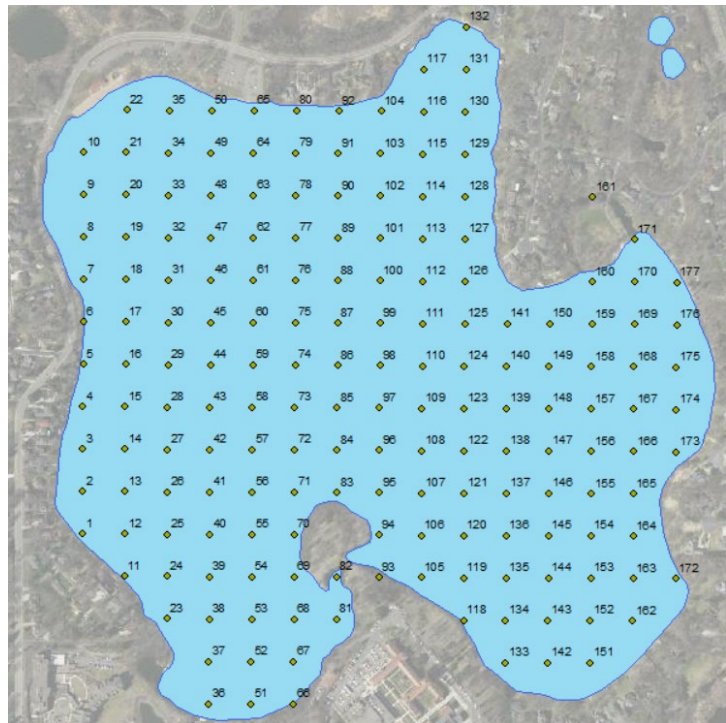
Lake Johanna serves as a non-treatment reference lake and can be compared to other area lakes where Eurasian watermilfoil has been or is being managed. Eurasian watermilfoil growth has hovered under nuisance levels since it was first observed in 2009. Curly-leaf pondweed has been managed with a contact herbicide – diquat – for the past three years (2021 – 2023) under 15% of the littoral level (13.95 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 (MN DNR) 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 – 177 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, 2022, and 2023 (MN DNR survey), and a zero to 4 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).



Photos 1 – 2. Left (1): Minnesota Department of Natural Resource Invasive Species Specialist conducting the 2023 aquatic plant survey. Rake sample displays abundant native plant growth including claspingleaf pondweed, sago pondweed, northern watermilfoil and flat-stem pondweed. Right (2): Claspingleaf pondweed (*Potamogeton richardsonii*) from the 2023 aquatic plant point intercept survey.

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 has ranged between 2.9 and 4.3 meters (10 – 14 feet) from 2009 to 2023 (see **Table 2 – Point Intercept Metrics** for historical point-intercept survey calculations).

In 2023, twelve 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 more recent surveys, native plant diversity increased to include the aforementioned aquatic plants, but also high frequencies of muskgrass, water stargrass, and flat-stem pondweed. Less prominent species observed in 2023 were naiad, variable-leaf pondweed, white-stem pondweed, and clasping-leaf pondweed.

Eurasian watermilfoil and curly-leaf pondweed – both invasive aquatic plants – have been observed in Lake Johanna. Eurasian watermilfoil (EWM) was first observed in 2009 at 2% frequency of occurrence and has increased in frequency over the last 12 years. In 2023 the highest frequency of EWM was documented (54%, see **Table 3 – Plant Frequency Occurrence**). Continued 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 in Lake Johanna.

Table 2 – Point Intercept Metrics. Summary of point intercepts metrics for Lake Johanna, Ramsey County, Minnesota (DOW# 62007800). Shaded values were calculated from the littoral depth range (0 – 15 ft). Surveys conducted in 2009 and 2013 were by the Ramsey Conservation District and Ramsey County Public Works Environmental Resources. Surveys completed in 2019, 2022, and 2023 were by the Minnesota Department of Natural Resources.

Survey Metrics	MAY 2009	JUN 2013	JUL 2019	JUL 2022	JUL 2023
Treated (Y/N)	N	N	N	N	N
Surveyor	RCD and RCPW	RCD and RCPW	MN DNR	MN DNR	MN DNR
Total # Points Sampled	92	119	144	96	63
Max Depth of Growth (95%) in feet	14.3	11.2	11	12	10
# Point in Max Depth Range	77	93	53	64	56
# Points in Littoral (0-15 feet)	78	106	79	72	63
% Points w/ Submersed Native Taxa	69	87	70	79	90
Mean Submersed Native Taxa/ Point	1.0	2.3	2	2.0	2.6
# Submersed Native Taxa	4	10	13	12	12
# Submersed Non-Native Taxa	2	-	2	1	2

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 SUBMERSED PLANTS	Common Name	MAY 2009	JUL 2013	JUL 2019	JUL 2022	JUL 2023
<i>Myriophyllum spicatum</i> *	Eurasian watermilfoil*	2	-	20	13	54
<i>Potamogeton crispus</i> *	Curly-leaf pondweed*	10	-	13	-	3
<i>Ceratophyllum demersum</i>	Coontail	47	63	43	43	48
<i>Macroalgae</i>	Muskgrass and Stonewort	6	1			
<i>Chara</i>	Muskgrass			13	18	29
<i>Nitella</i>	Stonewort			3	-	2
<i>Elodea canadensis</i>	Canadian waterweed	-	-	5	-	-
<i>Heteranthera dubia</i>	Water stargrass	-	-	9	17	51
<i>Myriophyllum sibiricum</i>	Northern watermilfoil	24	5	13	7	6
<i>Najas spp.</i>	Naiad	13	-	16	8	8
<i>Potamogeton foliosus</i>	Leafy pondweed	-	32	5	6	8
<i>Potamogeton gramineus</i>	Variable-leaf pondweed	-	-	8	1	3
<i>Potamogeton illinoensis</i>	Illinois pondweed	-	6	-	-	-
<i>Potamogeton praelongus</i>	White-stem pondweed	10	-	-	1	3
<i>Potamogeton richardsonii</i>	Clasping-leaf pondweed	-	5	8	13	11
<i>Potamogeton strictifolius</i>	Narrowleaf pondweed	-	11	-	3	-
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed	-	4	37	33	44
<i>Vallisneria americana</i>	Water celery	11	54	43	53	43

*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.

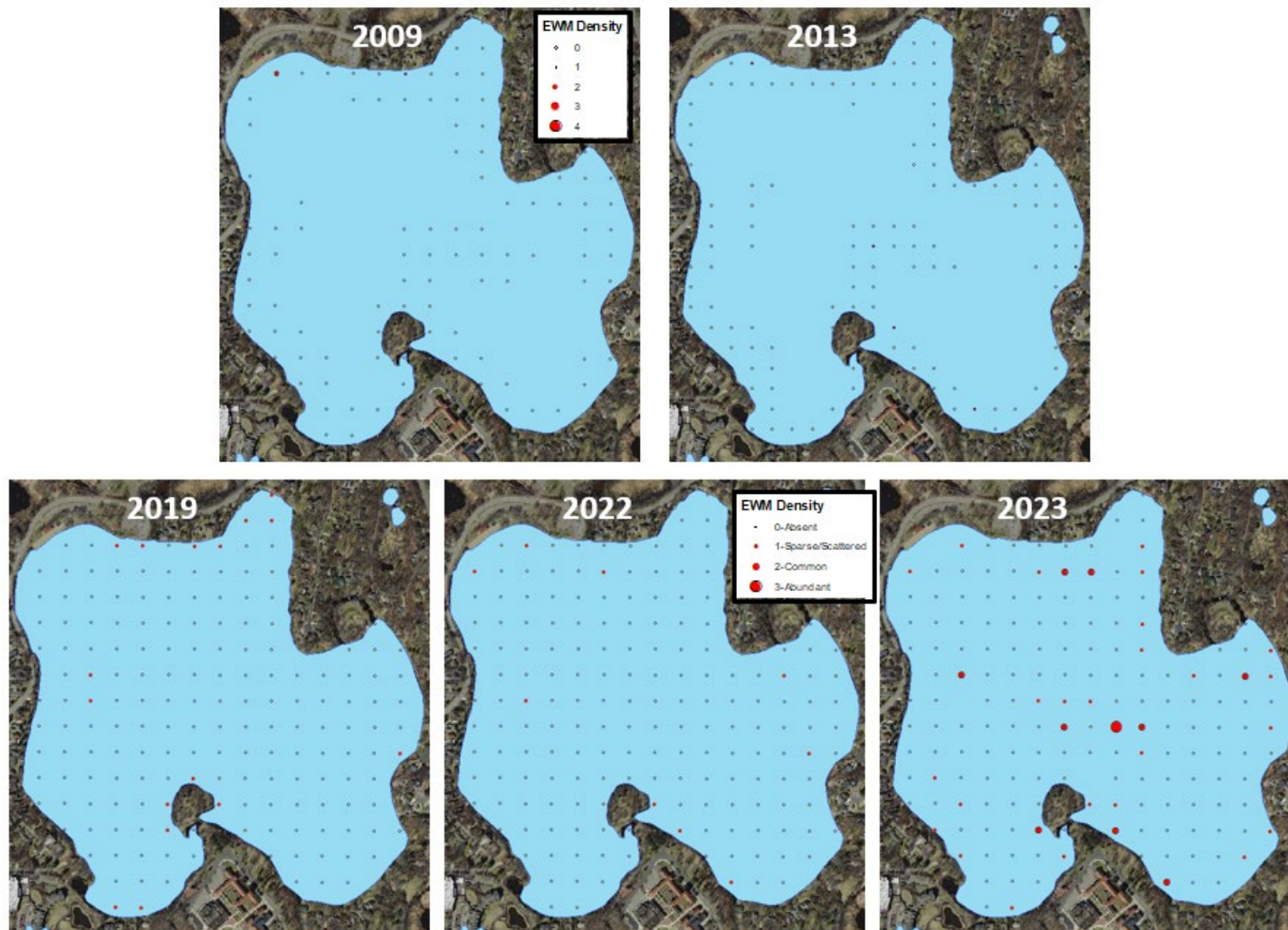


Figure 1 – Eurasian Watermilfoil Density. Spatial distribution and rake density per sample point of Eurasian watermilfoil (EWM). The 2009 and 2013 surveys were conducted by the Ramsey Conservation District and Ramsey County Public Works, while the 2019, 2022, and 2023 surveys were performed by Minnesota Department of Natural Resources. Lake Johanna, Ramsey County, Minnesota (DOW# 6200780).

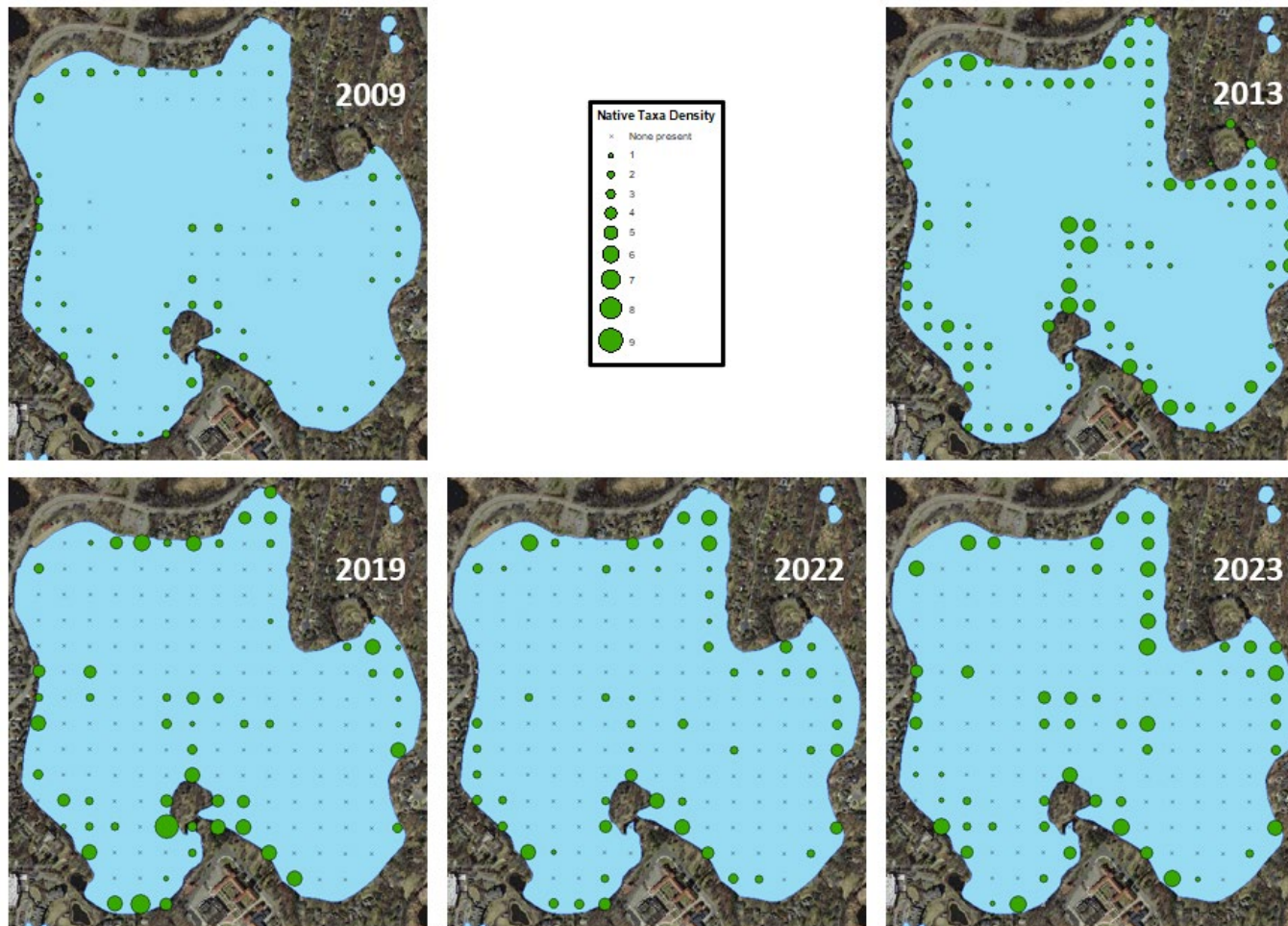


Figure 2 – Native Taxa Density. Spatial distribution and species richness (# of native species per sample point) of all submersed aquatic plants. The 2009 and 2013 surveys were conducted by the Ramsey Conservation District and Ramsey County Public Works, while the 2019, 2022, and 2023 surveys were performed 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.