
COON LAKE, ANOKA COUNTY: 2022 AQUATIC VEGETATION REPORT

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

Lake: Coon (DOW# 2004200)

Lake Surface Area: 1,985 acres

Littoral Area: 1,332 acres

County: Anoka

Survey Type: Point-intercept

Date of Survey (most recent): August 15th, 2022

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2022 Summary:

The most recent aquatic vegetation point-intercept survey of Coon Lake (DOW #02004200) was completed in the East basin only on August 15, 2022. Plants were present throughout the lake to a maximum depth of 10 feet (3.0 meters). Within the littoral zone (area in the lake from the 0 – 15-foot depth range [0 – 4.5 meters]), 96% of the 166 sampled points contained native submersed vegetation. The Coon Lake Improvement District (CLID) has been managing the invasive aquatic plants curly-leaf pondweed (CLP) and Eurasian watermilfoil (EWM) for the past 10+ years at below the 15% littoral limit in both the East and West basin. Due to an increase in nuisance Eurasian watermilfoil observed in the West basin, a variance was issued to allow basin wide use of fluridone in the spring of 2019. Low dose fluridone treatments are effective at controlling Eurasian watermilfoil and provide 3+ years of control.

Summary Table East Basin. Summary of aquatic submersed plants in Coon Lake (East basin), Anoka County, Minnesota (DOW# 2004200) 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
AUG 2010	12	9	64	1.2	7
AUG 2011	16	13	68	1.5	10
AUG/SEPT 2012	14	12	76	1.8	10
SEPT 2013	6	10.5	69	1.7	15
SEPT 2014	16	10	70	1.8	16
AUG 2018	17	8	79	2.6	15
AUG 2022	20	9	92	3.3	15

*EWM is short for Eurasian watermilfoil

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

Taxa refers to groups of submerged aquatic plant species or genera

Lake Description:

Coon Lake is a 1,985-acre eutrophic (nutrient rich) lake located in East Bethel, Minnesota. The lake is composed of three basins, but for management purposes is grouped into Coon East and Coon West, which represent the main recreational bodies for the lake (see maps in Survey Methods section).

Both basins of Coon Lake are infested with two invasive aquatic plants: Eurasian watermilfoil (*Myriophyllum spicatum*, abbreviated as EWM) and curly-leaf pondweed (*Potamogeton crispus*, abbreviated as CLP). The maximum depth of water is in the East basin at 27 feet (8.2 meters). Approximately 67% of the lake is littoral (water depth zone from 0 – 15 feet where aquatic plants are likely to be found). Secchi depth has remained consistent for the last 5 years (see below **Table 1 – Secchi Averages**). Transparency data collected for the Minnesota Pollution Control Agency (MPCA) were from a variety of sample locations in both basins. These data were collected by Citizen Monitoring Groups. Data collected by Anoka Soil and Water Conservation District in 2018 was averaged between the East and West basins. For more information concerning Coon Lake water quality, see:

<https://webapp.pca.state.mn.us/surface-water/impairment/02-0042-00>.

Table 1 – Secchi Averages. Secchi disk observations in meters for Coon Lake, Anoka County, Minnesota (DOW #02004200). Data gathered from the Minnesota Pollution Control Agency (MPCA) and Anoka Conservation District (ACD). Secchi depth averages are averaged across basins (East and West) and across sampling locations.

YEAR	MAY	JUNE	JULY	AUG	SEPT	Secchi Depth Average [May-Sept]
2010	3.1	2.0	1.5	1.2	1.4	1.8
2011	2.3	1.7	1.5	1.3	1.4	1.6
2012	2.6	1.7	1.6	1.2	1.3	1.7
2013	2.5	2.4	1.5	1.6	1.2	1.8
2014	2.5	2.8	2.1	1.8	2.0	2.2
2015	2.1	1.8	1.4	1.4	1.6	1.7
2016	2.5	2.2	1.6	1.3	1.7	1.9
2017	1.9	1.8	1.8	1.5	1.6	1.7
2018*	2.8	3.2	2.1	1.8	2.1	2.4
2019	2.6	2.3	1.9	1.5	1.6	2.0
2020	2.1	1.7	1.5	1.4	1.8	1.7
2021	2.2	1.9	1.6	1.4	1.6	1.7
2022	2.0	2.2	1.7	1.4	1.7	1.8

*Data collected by Anoka Soil and Water Conservation District

Management History:

The most recent herbicide treatment was organized by the Coon Lake Improvement District (CLID) (see below **Table 2 – Invasive Plant Management Summary** for a recent history of herbicide treatments in Coon East). The spot treatment in the East basin targeted curly-leaf pondweed (18.2 acres using diquat) and Eurasian watermilfoil (10.8 acres using a combination treatment of diquat and ProcellaCOR) at two different times based on timing of plant growth. Additional management data for the East and West basins is available upon request. Historically, Coon Lake has managed both invasive plant species under the 15% littoral limit with separate herbicide applications as spot treatments to control nuisance areas (endothall or Diquat for CLP and 2,4-D for EWM). A variance was issued to allow for the use of fluridone in the West basin of Coon Lake in 2019. Fluridone is a selective herbicide that is applied at a low dose (2 – 4 parts per billion) throughout the growing season (>60 days of exposure; whole- bay treatment). Due to this mechanism, a slow knock down of Eurasian watermilfoil is often observed with the plant collapsing in August.

Table 2 – Invasive Plant Management Summary. Characteristics and history of herbicide treatments for Coon Lake, Anoka County, Minnesota (DOW# 02004200, total acres: 1,985, littoral acres: 1332, 15% littoral acres: 199.8). Acres treated includes both basins for each year unless otherwise noted.

Date	Treatment by Basin [W, P, N]	Target Species	Total Acres Treated	Herbicide	Applicator
2019	P	CLP	28.6	Diquat (Tribune)	PLM Lake and Land Management Corp.
2019	W ^w	EWM/CLP	960	Fluridone (Sonar A.S)	PLM Lake and Land Management Corp.
2020	P	CLP	43.5	Diquat (Tribune)	PLM Lake and Land Management Corp.
2020	P	EWM	3.4	Diquat (Tribune)	PLM Lake and Land Management Corp.
2021	P ^E	CLP	9.2	Diquat (Tribune)	PLM Lake and Land Management Corp.
2021	P ^E	EWM	22.8	Diquat (Tribune)	PLM Lake and Land Management Corp.
2022	P ^E	CLP	18.2	Diquat (Tribune)	PLM Lake and Land Management Corp.
2022	P ^E	EWM	10.8	Diquat (Tribune), ProcellaCOR	PLM Lake and Land Management Corp.

Treatment: W (whole lake), P (partial lake), N (no treatment)

*LVMP year, ^E East Basin only, ^w West Basin only

CLP is an abbreviation for curly-leaf pondweed

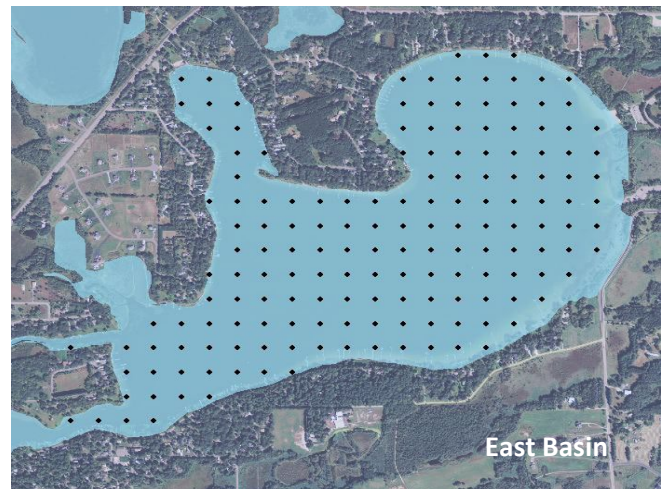
EWM is an abbreviation for Eurasian watermilfoil

Survey Objectives:

Point-intercept surveys were used to assess the distribution of aquatic plants in Coon Lake, East basin. 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 100 meters (East basin) and 150 meters (West basin) apart using a Geographic Information System (GIS). Note: surveys from 2010 were 175 meters apart, respectively. This spacing allowed for the placement of 162 – 170 points, depending on basin and year. 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 species and rake fullness as a surrogate for density (scale of zero [no plants] to 4 [dense plants, matted on the surface] was used in 2012 – 2017, and a zero to 3 scale in 2018 and all years thereafter). Frequencies 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:

During the most recent point intercept survey in 2022, data showed a maximum depth of rooted vegetation was observed at 9 feet, but historically has been observed growing up to 15 feet in depth. Native plant distribution and abundance has been consistent in the last six years with an increase observed in mean native submersed taxa per point in 2018 and 2022 (see below **Figure 1 – Native Species Taxa Density, East Basin**). In addition, three native pondweed species (large-leaf pondweed, clasping-leaf pondweed and flat-stem pondweed), coontail and water celery have steadily increased in the past two years (see below **Table 4 – Plant Frequency of Occurrence East Basin**). A total of fourteen native plant species were observed within the littoral area and consisted of additional species such as Canadian waterweed, naiad, and Illinois pondweed. Eurasian watermilfoil has remained at or under 20% frequency of occurrence in Coon Lake, East basin. As part of a University of Minnesota/Minnesota Aquatic Invasive Species Research Center (MAISRC) study, hybrid milfoil (*Myriophyllum spicatum* [EWM] x *Myriophyllum sibiricum* [Northern watermilfoil]) was confirmed in Coon Lake in 2018. The majority of watermilfoil has been observed on the northeast side near the public water access and on the southwest side near the channel connecting the two basins. No significant observations of CLP were found in these surveys, as would be expected for this late timing. CLP senesces and dies back generally around early July of each year.

Table 3 – Point Intercept Metrics, East Basin. Summary of point intercepts metrics for Coon Lake (East basin), Anoka County, Minnesota (DOW# 02004200). Shaded values were calculated from littoral depth range (0 – 15 feet).

Survey Metrics	AUG 2010	AUG 2011	AUG/SEPT 2012	SEPT 2013	SEPT 2014	AUG 2018	AUG 2022
Treated (Y/N)	Y	Y	Y	Y	Y	Y	Y
Surveyor	MN DNR	MN DNR	MN DNR	MN DNR	MN DNR	MNDNR	MNDNR
Total # Points Sampled	33	163	164	164	162	162	88
Max Depth of Growth (95%) in feet	9	11	9	8	10	8	9
# Point in Max Depth Range	22	78	78	88	82	82	78
# Points in Littoral (0-15 feet)	33	100	98	119	105	107	88
% Points w/ Native Taxa	52	69	77	68	76	79	92
Mean Native Taxa/ Point	1.1	1.5	1.8	1.7	1.8	2.6	3.3
# Native Taxa	6	9	9	13	15	14	14
# Non-Native Taxa	1	1	1	2	1	1	1

Table 4 – Plant Frequency of Occurrence East Basin. Historic percent frequency of occurrence for submersed vegetation within the littoral zone (0 – 15 feet) in Coon Lake (East basin), Anoka County, Minnesota (DOW# 02004200).

Taxonomic Name	Common Name	AUG 2010	AUG 2011	AUG/SEPT 2012	SEPT 2013	SEPT 2014	AUG 2018	AUG 2022
SUBMERSED PLANTS								
<i>Myriophyllum spicatum</i> *	Eurasian watermilfoil*	12	16	14	6	17	17	20
<i>Potamogeton crispus</i> *	Curly-leaf pondweed*	0	0	0	1	0	0	0
<i>Ceratophyllum demersum</i>	Coontail	21	13	21	34	32	50	60
<i>Macroalgae</i>	Muskgrass and Stonewort	24	24	20	7	10	21	30
<i>Elodea canadensis</i>	Canadian waterweed	15	26	27	11	7	12	27
<i>Heteranthera dubia</i>	Water stargrass	0	0	0	4	7	5	3
<i>Myriophyllum sibiricum</i>	Northern watermilfoil	0	2	0	0	3	0	0
<i>Najas sp</i>	Naiad	33	51	59	54	58	50	47
<i>Potamogeton amplifolius</i>	Large-leaf pondweed	0	2	0	3	0	6	20
<i>Potamogeton foliosus</i>	Leafy pondweed	0	0	0	0	0	0	20
<i>Potamogeton gramineus</i>	Variable-leaf pondweed	0	0	3	2	4	14	5
<i>Potamogeton illinoensis</i>	Illinois pondweed	3	2	9	15	14	13	13
<i>Potamogeton praelongus</i>	White-stem pondweed	0	0	0	6	0	1	0
<i>Potamogeton richardsonii</i>	Clasping-leaf pondweed	0	0	1	0	6	12	14
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed	0	0	0	1	1	32	32
<i>Stuckenia pectinata</i>	Sago pondweed	0	2	3	5	2	0	0
<i>Vallisneria americana</i>	Water celery	9	24	32	27	36	42	50

*Denotes an invasive aquatic plant

Floating, free-floating & emergent plants observed: *Lemna spp.* (Duckweeds), *Nuphar advena* (Yellow pond lily), *Nuphar variegata* (Bullhead pond lily), *Nymphaea odorata* (White water lily), *Sagittaria spp.* (Arrowheads), *Scirpus acutus* (Hardstem bulrush), *Scirpus americanus* (Olney's three-square bulrush), *Typha spp.* (Cattail).

Less common (<5% frequency) submersed vegetation observed: *Eleocharis acicularis* (Needle spikerush) in 2013, *Myriophyllum tenellum* (Slender watermilfoil), *Ranunculus aquatilis* (White water crowfoot), *Utricularia macrorhiza* (Common bladderwort) in 2014, *Potamogeton robbinsii* (Robbins' pondweed) in 2022, and *Stuckenia pectinata* (Sago pondweed) in 2022.

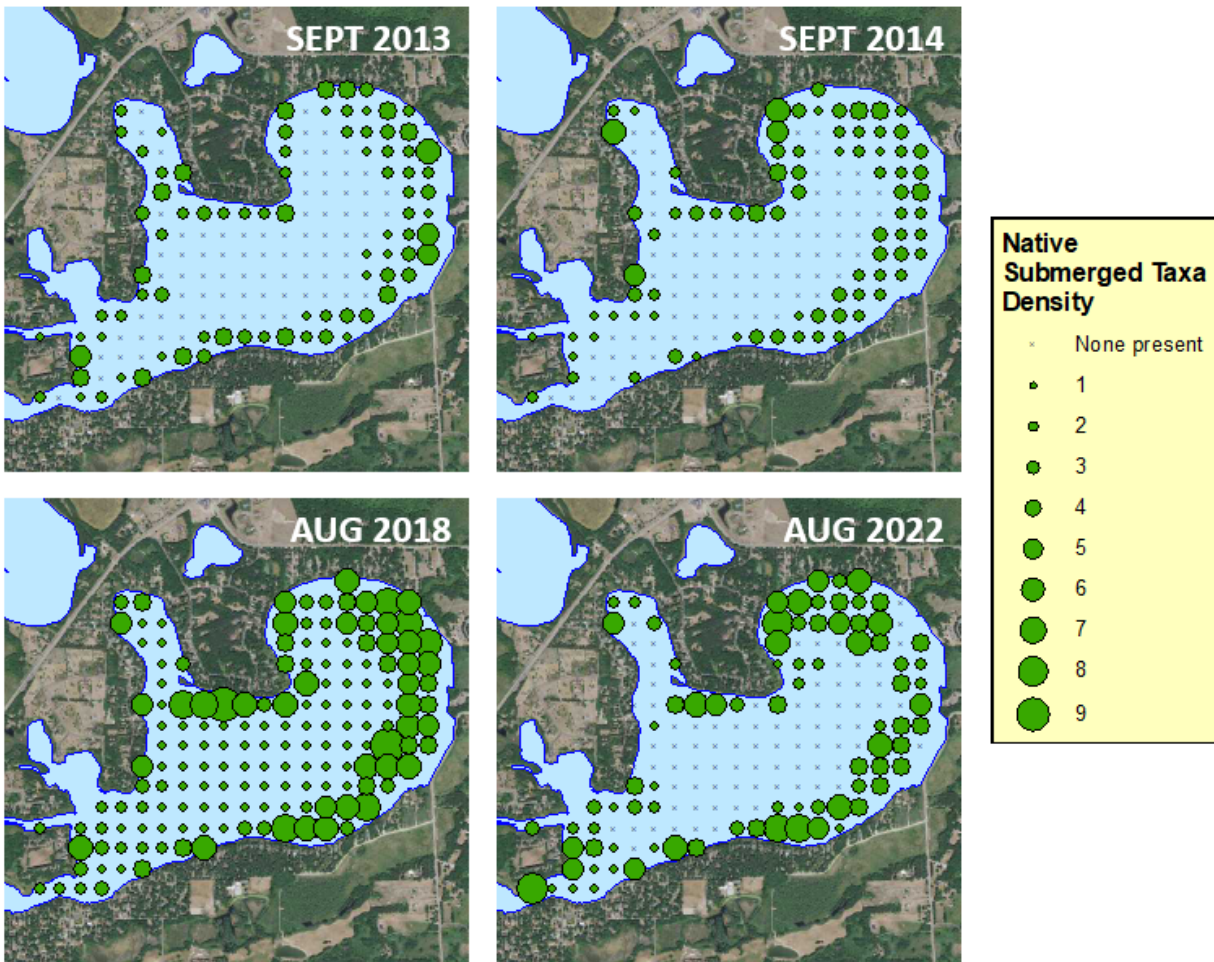


Figure 1 – Native Species Taxa Density, East Basin. Spatial distribution and species richness (# of native species per sample point) in the East basin. Dates correspond to month of point intercept survey. Coon Lake, East Basin, Anoka County, Minnesota (DOW #02004200).

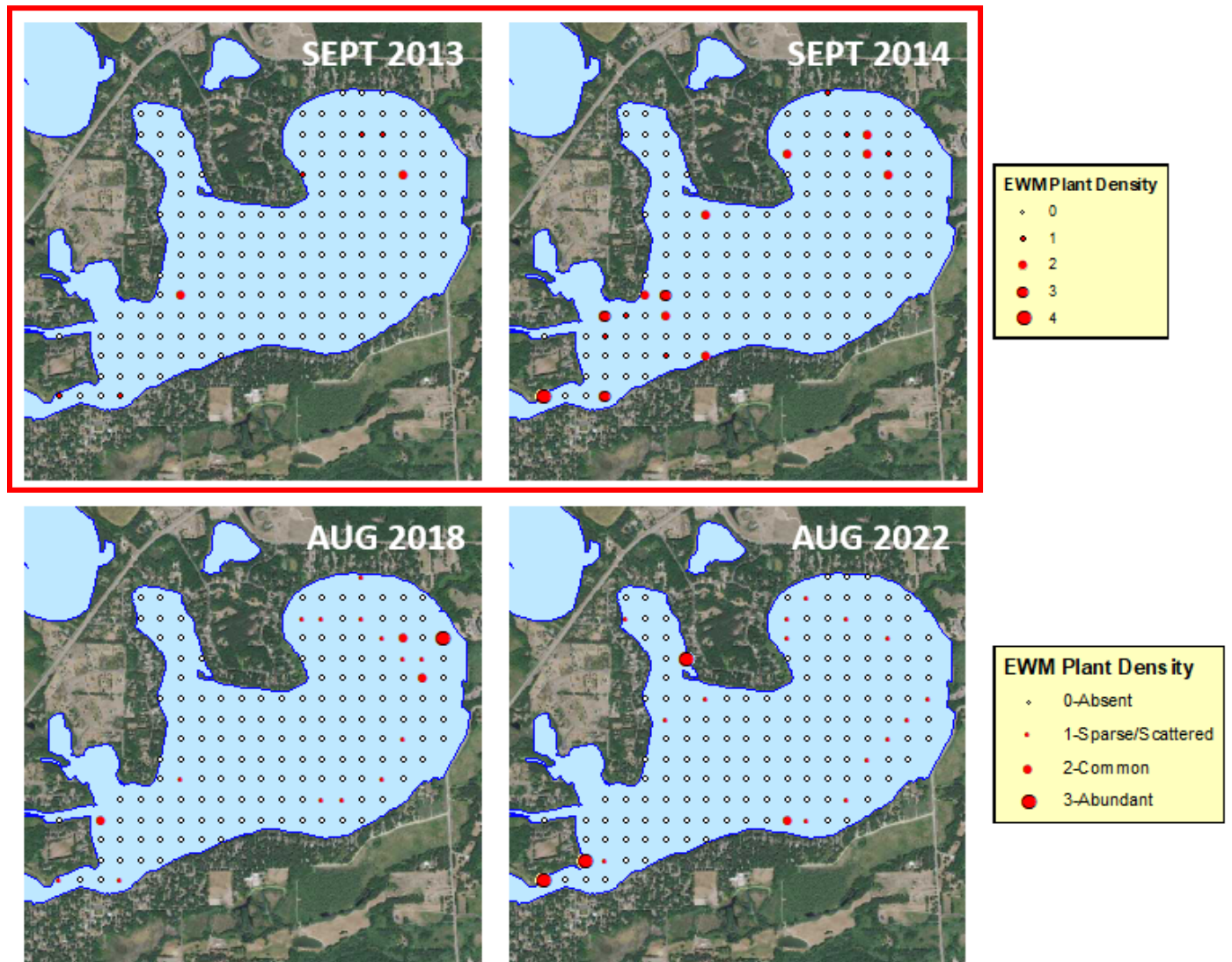


Figure 2 – Eurasian Watermilfoil Density, East Basin. Spatial distribution and rake density per sample point of Eurasian watermilfoil (EWM) from MN DNR point intercept surveys (2013 – 2014 and 2018 – 2022). Years 2013 and 2014 were surveyed on a 1 – 4 rake density rating scale, while years 2018 and 2022 were rated on a 1 – 3 rake density rating scale. Coon Lake, East Basin, Anoka County, Minnesota (DOW #02004200).

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