ELMS LAKE, ISANTI 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
Division of Ecological and Water Resources
Minnesota Department of Natural Resources
April 16, 2021

Project Details

Lake: Elms (30003600)

Lake Surface Area: 52 acres

Littoral Area: 41 acres

County: Isanti County

Survey Type: Point-intercept

Date of Survey (most recent): August 5, 2010

Observer[s]: MN DNR, Invasive Species Program (ISP): Dan Swanson and Matt Pierce (2010), Rich Rezanka and Luke Peluso (2009) and Kelly LaFortune (2007)

Report Updated: April 16, 2021

Author[s]:

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

Report Details

C. Jurek. 2021. Elms Lake, Isanti County: MN DNR Aquatic Vegetation Report. Minnesota Department of Natural Resources, Division of Ecological and Water Resources, Invasive Species Program, 1035 South Benton Drive, Sauk Rapids, MN 56379. 12 pp.

Summary

The most recent aquatic vegetation point-intercept survey of Elms Lake (DOW #30003600) occurred on August 5, 2010. The main purpose of this survey was to document the frequency and distribution of native and invasive aquatic plants. In general, the aquatic plants were present throughout the lake to a maximum depth of 8 feet. Within the littoral zone (zone in lake from the 0-15 foot depth range), 91% of the points had native submersed taxa, while 3% had curly- leaf pondweed. The average number of native submersed taxa per sample point was 1.4. In total, five native submersed taxa, one invasive taxa, two floating-leaf taxa and one free-floating taxa were observed during the 2010 survey.

Lake Description

Elms Lake is a 52- acre lake located 2 miles southeast of Cambridge, MN in Isanti County. The lake has one invasive plant species: curly-leaf pondweed (*Potamogeton crispus*). The maximum depth of water in Elms Lake is 26 feet, and 79% of the lake is classified as littoral (areas of water depth between 0 to 15 feet, where aquatic plants are most likely to grow). According to surveys from the Minnesota Pollution Control Agency (MPCA, 2021), Elms Lake is classified as a higher mesotrophic lake, based on its Trophic State Index (TSI) of approximately 50. Mesotrophic lakes are lakes with an intermediate level of productivity. These lakes are commonly clear water lakes with beds of submerged aquatic plants and medium levels of nutrients. For more information on water quality, go to the MPCA website: Water Quality Data for Elms Lake at https://webapp.pca.state.mn.us/surface-water/impairment/30-0036-00.

Management History

Invasive aquatic plant management in Elms Lake has focused on curly-leaf pondweed using an endothall herbicide in the past. The most recent treatment was for curly-leaf pondweed in 2015 was for 3.0 acres, organized by the Paul and Elin's Lake Association (Table 1).

Table 1 – Invasive Plant Management Summary. Characteristics and history of partial lake invasive plant treatments for Elms Lake, Isanti County (DOW# 30003600). Total acres: 52, Littoral acres: 41, 15% of Littoral acres: 6). Abbreviations are as followed: curly-leaf pondweed (CLP). 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	Management	Licensed Commercial Applicator
2015	**CLP**	**3.0**	**Herbicide (Endothall)**	**Lake Restoration**
2016	--	--	--	--
2017	--	--	--	--
2018	--	--	--	--
2019	--	--	--	--
2020	--	--	--	--
2021 (proposed)	**CLP**	**5.5**	**Endothall**	**Lake Restoration**

Survey Objectives

A point-intercept survey was used to assess the distribution of aquatic plants in Elms Lake in 2007, 2009 and 2010. The primary purpose for this type of survey was to 1) document the frequency and distribution of invasive taxa, 2) develop baseline knowledge of the current plant community in a lake, and over time, 3) compare year to year plant variation (in plant presence and spatial location). Moreover, the surveys will help the DNR and our partners to monitor native plant communities and evaluate possible responses to invasive aquatic plant management via herbicide or mechanical 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.

Survey Methods

In 2010, MN DNR surveyors used a point-intercept survey method developed by John Madsen in “Aquatic Plant Control Technical Note MI-02, 1999”. Sampling points were placed 65 meters apart using a Geographic Information System. A total of 35 points within 15 feet were established on a grid (Figure 1). 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.

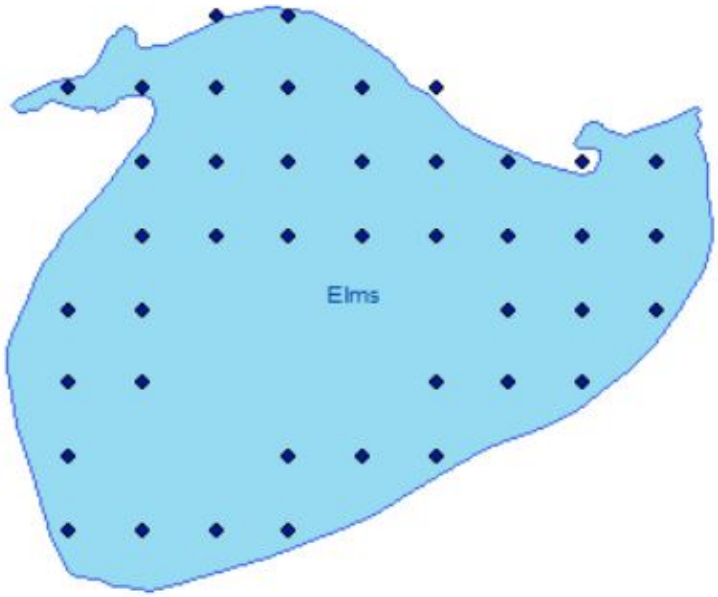

Figure 1 – Point-intercept Survey Grid. Point-intercept survey grid for Elms Lake, Isanti County (DOW#30003600).

Survey Observations

During the most recent aquatic plant survey on Elms Lake in 2010, we found plants ranging in water depth from 1 to 8 feet. Most plants were growing in a depth range between 2 and 8 feet. In the littoral zone, 91% of the surveyed points had submersed native vegetation (Table 2). The average number of native submersed taxa per sample point was 1.4. In total, five submersed taxa, one invasive taxa, two floating-leaf taxa and one free-floating taxa were observed during the 2010 survey (Table 3). Coontail (*Ceratophyllum demersum*) was the most commonly occurring plant, at 89% of all sites in the littoral zone (Figure 3), followed by Canadian waterweed (*Elodea Canadensis*; Figure 4), and white waterlily (*Nymphaea odorata*). Curly-leaf pondweed is the only invasive species and relatively sparse at 3% during the late summer survey (Figure 5).

Table 2 – Point-intercept Metrics. Summary of point-intercept metrics for Elms Lake, Isanti County (DOW# 30003600). Shaded values were calculated from littoral depth range (0-15 feet).

Metric	MAY 2007	AUG 2007	AUG 2009	AUG 2010
Surveyor	MN DNR	MN DNR	MN DNR	MN DNR
Total # Points Sampled	58	58	45	35
Max Depth of Growth	10.0	9.5	8.0	8.0
# Points in Littoral (0-15 feet)	58	58	45	35
% Points w/ Submersed Native Taxa	74	69	70	91
Mean Submersed Native Taxa/ Point	1.0	0.7	1.2	1.4
# Submersed Native Taxa	6	1	8	5
# Submersed Non-Native Taxa	1	0	0	1
% Points w/ Submersed Non- native Taxa	55	0	0	3

Table 3 – Plant Frequency of Occurrence. Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Elms Lake, Isanti County (DOW#30003600).

Taxonomic Name		MAY 2007	AUG 2007	AUG 2009	AUG 2010
SUBMERSED NON-NATIVE					
Potamogeton crispus	Curly-leaf pondweed	55	0	0	3
Bidens beckii	Water marigold	0	0	0	3
Ceratophyllum demersum	Coontail	84	83	60	89
Chara sp.	Muskgrass	11	0	5	0
Elodea canadensis	Canadian waterweed	2	0	8	31
Myriophyllum sibiricum	Northern watermilfoil	2	0	10	11
Najas sp.	Naiad species	0	0	3	3
Potamogeton illinoensis	Illinois pondweed	0	0	3	0
Potamogeton sp.	Narrow-leaved pondweed	0	0	3	0
Potamogeton zosteriformis	Flat-stemmed pondweed	0	0	3	0
Ranunculus sp.	Buttercup	7	0	0	0
EMERGENT					
Carex sp.	Sedge species	0	0	0	0
Typha sp.	Cattail species	32	32	NA	NA
FLOATING-LEAF					
Nymphaea odorata	White waterlily	25	45	23	29
Nuphar variegata	Yellow waterlily	2	0	0	0
Potamogeton natans	Floating pondweed	0	0	0	3
FREE-FLOATING					
Lemna species	Duckweed	0	0	0	11

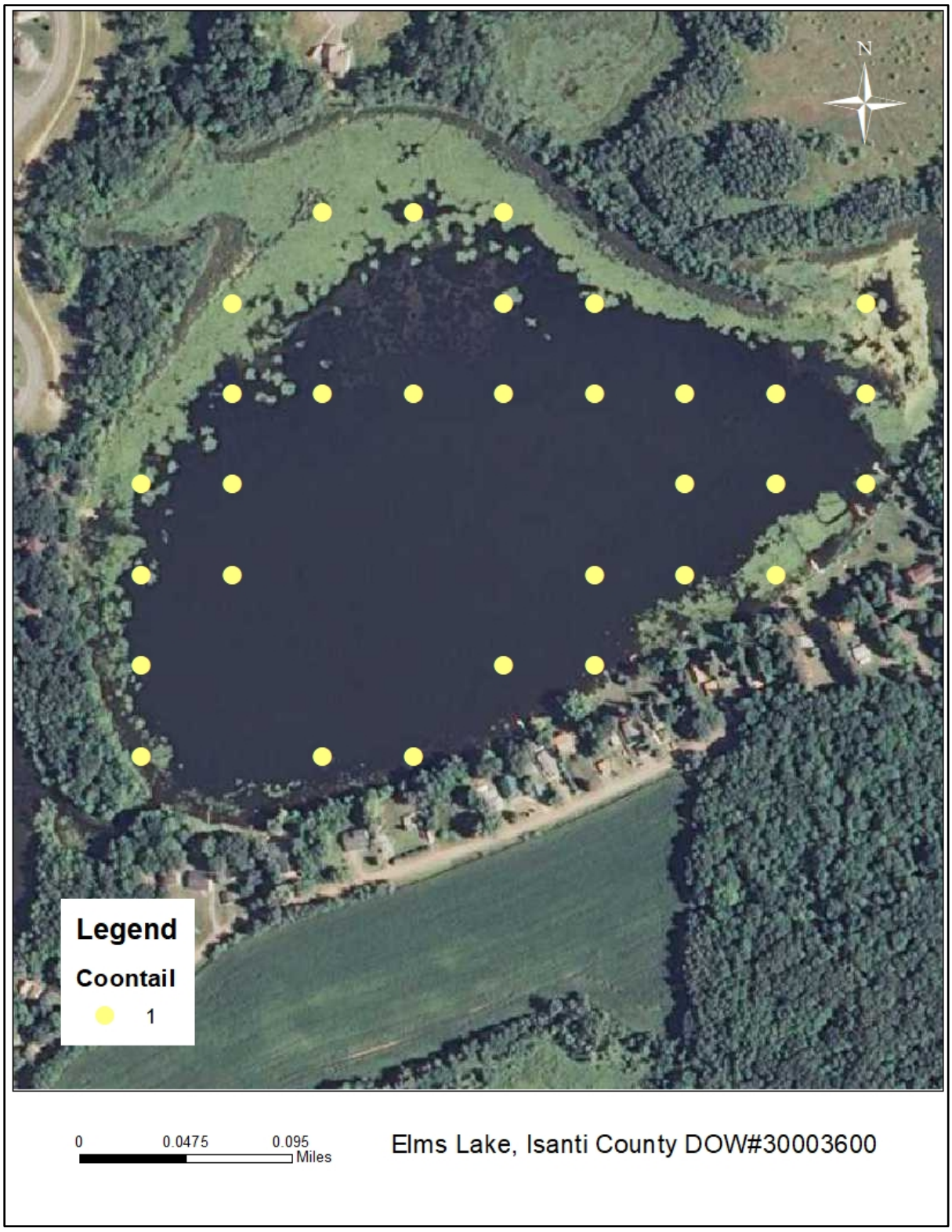

Figure 2 – 2010 Coontail Distribution. Plant distribution from the August 2010 point-intercept survey for Elms Lake, Isanti County (DOW#30003600).

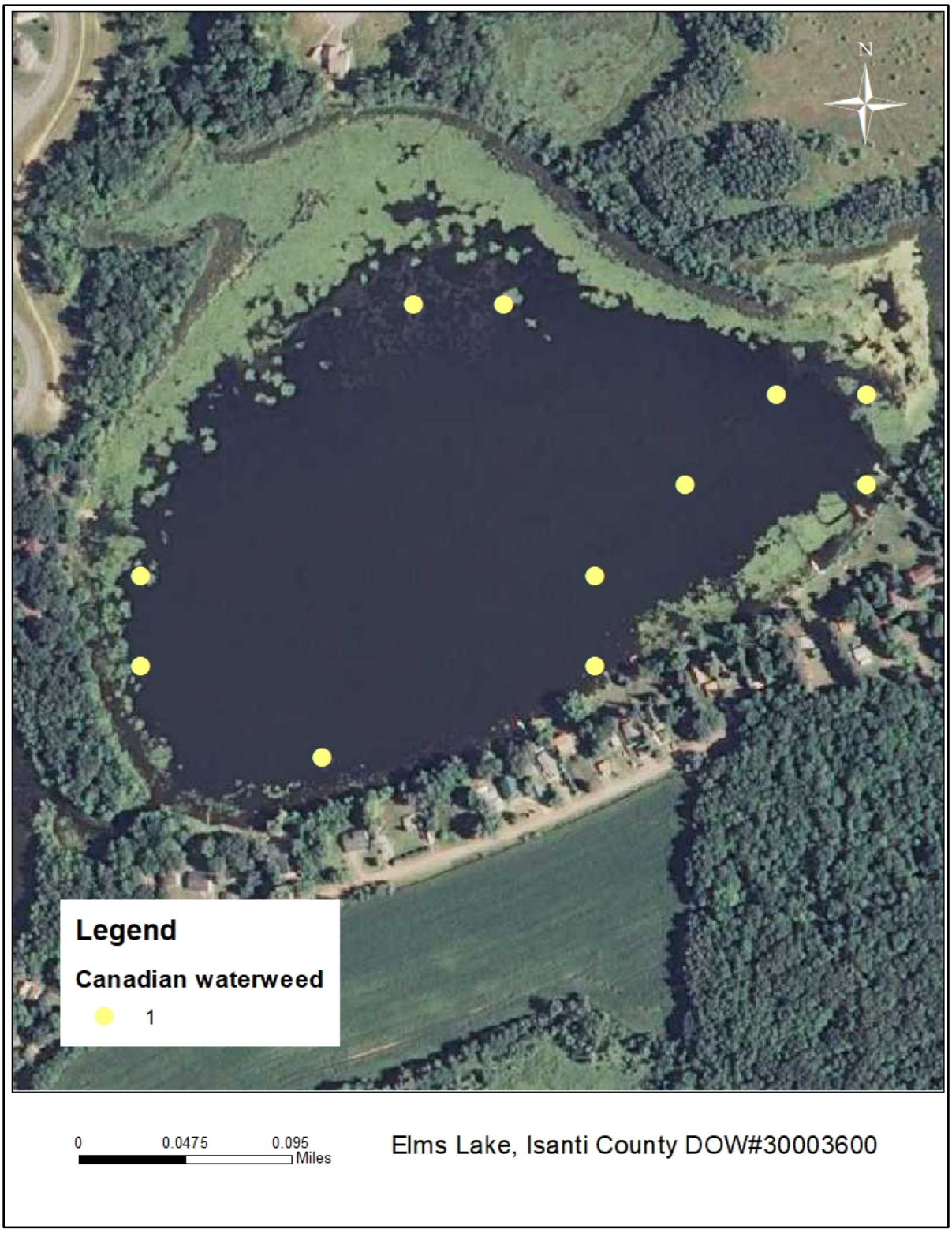

Figure 3 – 2010 Canadian waterweed Distribution. Plant distribution from the August 2010 point-intercept survey for Elms Lake, Isanti County (DOW#30003600).

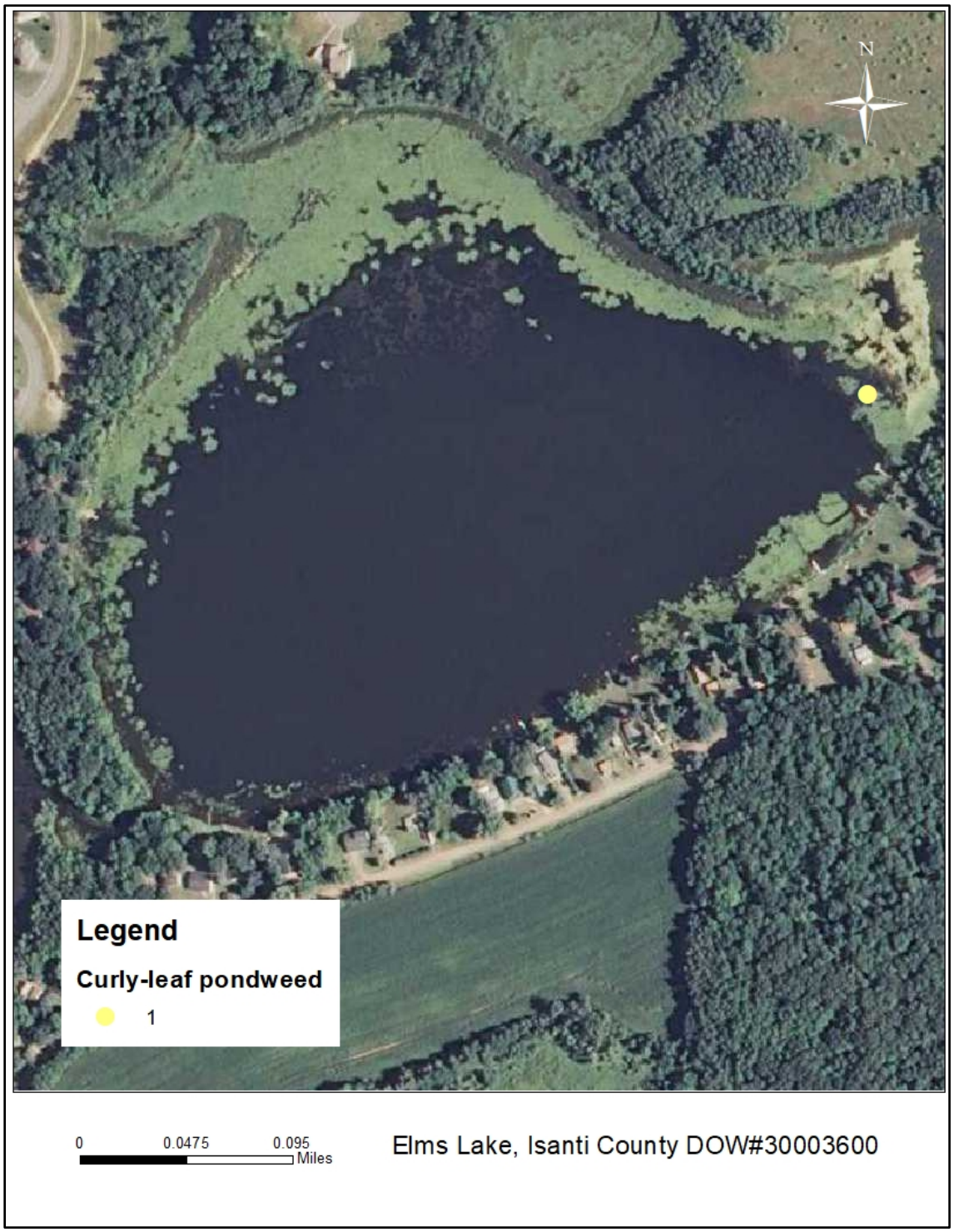

Figure 5 – 2010 Curly-leaf pondweed Distribution. Plant distribution from the August 2010 point-intercept survey for Elms Lake, Isanti County (DOW#30003600).

Comparison to previous years

Among all point-intercept surveys conducted between 2007 and 2010, there were a total of 10 submerged native aquatic plants, one invasive aquatic plant, two emergent aquatic plants, three floating-leaf aquatic plants and one free-floating aquatic plant recorded. When comparing surveys, it is important to compare the spring surveys; when curly-leaf pondweed is at its peak abundance vs the summer surveys; when curly-leaf pondweed has already senesced and native aquatic plants are at peak abundance. The plant community in Elms Lake is dominated by coontail which is commonly seen growing to the surface of the basin, and white water lilies are abundant along the north and northeast shores of the basin. Curly-leaf pondweed is currently present as of a 2020 lake-wide delineation by Isanti Soil and Water Conservation District (Figure 6), although this species is not the dominant plant in the lake.

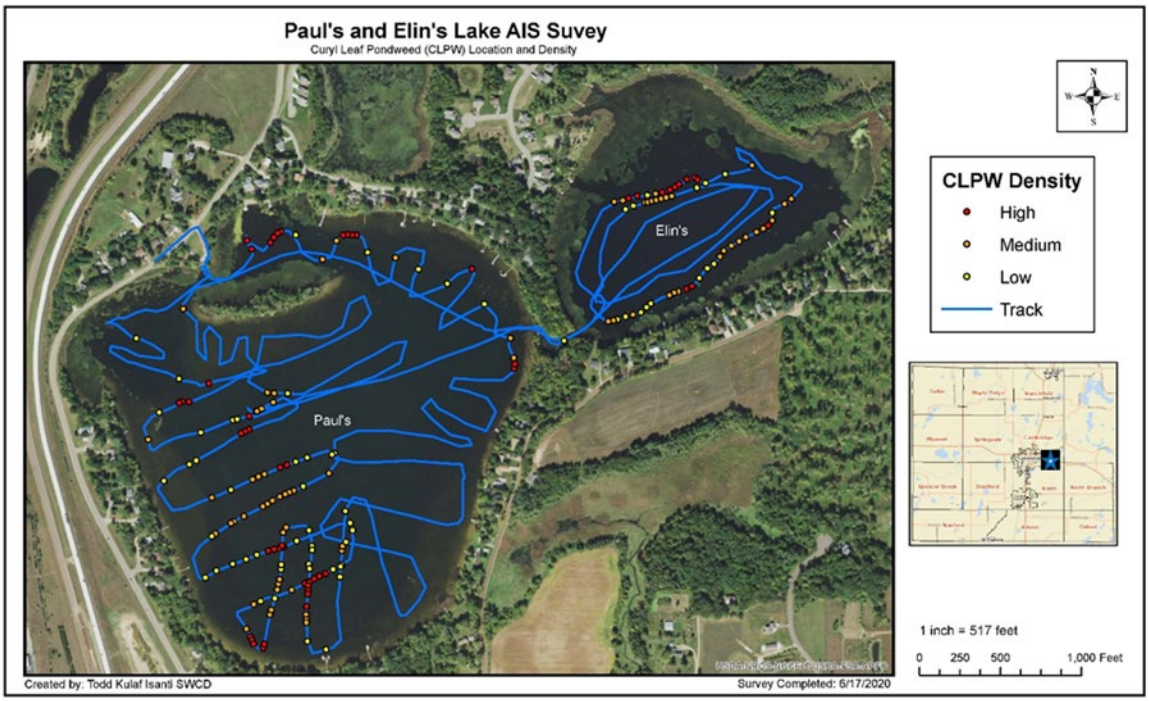

Figure 6 – Curly-leaf pondweed Delineation. June 2020 curly-leaf pondweed delineation by Isanti Soil and Water Conservation District for Elms Lake, Isanti County (DOW# 30003600).

Literature Cited

Crow, G.E. and C.B. Hellquist. (2000). *Aquatic and wetland plants of Northeastern North America*. (Vols. 1 & 2). Madison, WI: The University of Wisconsin Press.

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