

CEDAR LAKE, SCOTT COUNTY: 2013 AQUATIC VEGETATION SURVEY

Surveyed by the Invasive Species Program
MNDNR - Division of Ecological & Water Resources

Lake: Cedar (DOW# 70009100)

Lake Surface Area: 793 acres

County: Scott

Dates of inspection: July 29, 2013

Secchi Depth: 2.0 feet

Survey Type: Point-Intercept (196 points)

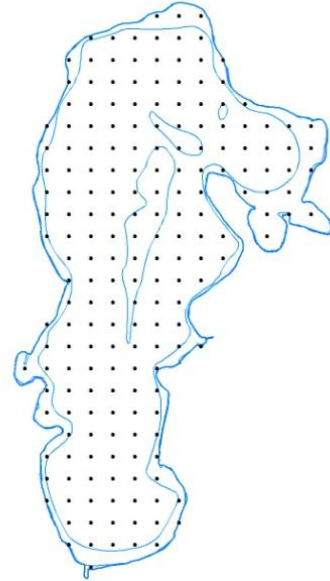
Observer[s]: K. Lund, M. Verhoeven &
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Date of report: 31 Oct 2013

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Summary: An aquatic vegetation survey of Cedar Lake (70009100) was completed on July 29, 2013. Plants were present throughout the lake to a maximum depth of 12.0 feet. In the littoral zone of the lake (defined as the portion of the lake that is less than 15 feet in depth) 36% of points sampled had submersed vegetation present. Also within the littoral zone, 25% percent of sample points were comprised of native submersed vegetation. The average number of taxa per point was 0.68. Seven submersed plant taxa were found: coontail (*Ceratophyllum demersum* - 21.0% occurrence), Canadian waterweed (*Elodea canadensis* - 12.3%), slender naiad (*Najas flexilis* - 5.1%), water stargrass (*Heteranthera dubia* - 2.6%), sago pondweed (*Stuckenia pectinata* - 2.1%), and horned pondweed (*Zannichellia palustris* - .5%). Also present was the non-native invasive submerged plant; curly-leaf pondweed (*Potamogeton crispus* - 23.6%).

Lake Description:

Cedar Lake is a 793 acre lake north east of New Prague, Minnesota. It is a hypereutrophic lake (excessive nutrients) that exceeds the Trophic State Index (TSI) range for lakes in the same ecoregion <http://cf.pca.state.mn.us/water/watershedweb/wdip/details.cfm?wid=70-0091-00>. The lake is currently listed on the Minnesota Pollution Control Agency's (MPCA's) Impaired Waters List as a result of excessive phosphorous. The lake is entirely littoral (water depth from 0 to 15 feet) and historically dominated by curly-leaf pondweed and subsequent algal blooms in the summer months. Rooted plants were found to a depth of 12.0 feet, whereas the maximum depth of Cedar Lake is 13.0 feet.

Survey Objectives:

The purpose of the survey was to identify the general frequency and distribution of native and invasive submerged aquatic plants throughout the lake. This survey will aid in monitoring changes in the submerged aquatic plant community through time. In addition, the survey will help to monitor the submerged aquatic plant community in response to large-scale herbicide treatments begun in 2012 and continued in 2013. These herbicide treatments are part of a larger Lake Vegetation Management Plan, whose goal is to reduce the abundance of the invasive plant, curly-leaf pondweed (*see Page 8 for map*).

Methods:

We utilized a point-intercept survey method (Madsen 1999). Survey points were placed 130 meters apart using GIS. This spacing allowed for placement of 196 points on the lake, all of which were sampled in approximately 7 hours using a double sided rake (*see photos 1 below*). All sample points were used in statistical analysis of the submerged plant community. All plants recovered on the rake were recorded on a plant density scale of 0-4; however, analysis of plant densities in the lake utilized a presence/absence method (Perleberg et. al. 2012).

Results:

Of all points sampled, 49 had submersed native plants present; 71 sample points had a submersed plant of any kind present (includes CLP). CLP was found at 46 points. Table 1 shows the percent occurrence for all plants found in this and previous surveys. Small pondweed was found in the 2012 survey but not in 2013. However, because horned pondweed was found in 2013 and not 2012, submersed species richness did not change (Table 2). The average number of native submersed taxa per sample point was 0.44; this number excludes CLP and free floating natives.



Photo 1: Rake sample following post-treatment inspection from south Cedar Lake treatment area containing abundant Coontail.

Table 1: Plant frequency for Cedar Lake, Scott County [DOW# 70009100] (Frequency = percentage of sites in which species occurred)

Life Forms	Common Name	Scientific Name	2007*	2007	2009*	2012	2013	2014	2015	2016
INVASIVE SPECIES Invasive species are species that are not native to Minnesota and cause economic or environmental harm or harm to human health.	Curly-leaf pondweed	<i>Potamogeton crispus</i>	98	20	96	10	24			
SUBMERGED These plants grow primarily under the water surface. Upper leaves may float near the surface and flowers may extend above the surface. Plants are usually rooted or anchored to the lake bottom.	Canada waterweed	<i>Elodea Canadensis</i>	-	-	-	7	12			
	Coontail	<i>Ceratophyllum demersum</i>	-	1	1	10	21			
	Horned Pondweed	<i>Zannichellia palustris</i>	-	-	-	-	1			
	Sago pondweed	<i>Stuckenia pectinatus</i>	1	1	2	5	2			
	Slender naiad	<i>Najas flexilis</i>	-	-	-	1	5			
	Small Pondweed	<i>Potamogeton pusillus</i>	-	-	-	1	-			
	Water stargrass	<i>Heteranthera dubia</i>	-	-	-	3	3			
FLOATING These plants are rooted in the lake bottom and have floating leaves.	Common Duckweed	<i>Spirodela polyrhiza</i>	-	-	5	-	1			
	Star Duckweed	<i>Lemna trisulca</i>	-	1	-	-	-			

Table 1: Percent frequencies of aquatic plant occurrence in littoral zone (to 15 foot depth) at Cedar Lake [DOW 70009100] Scott County, Minnesota. All numbers in bold represent percent. Rows marked with an asterisk (*) indicate spring surveys; because of the growth pattern of CLP it will be the dominating plant in most spring surveys.

Table 2: Summary of P-I results for Cedar Lake, Scott County [DOW# 70009100] for littoral zone

Year	Month	Day	Trtd or Un-Trtd	Surveyor	Max depth sampled (in feet)	Max depth of submerged plant growth (in feet)*	Number of points used in statistics	Number of points sampled with native submersed plants	Percentage of points sampled with native submersed plants	Percentage of points sampled with submersed plants	Average # of native submersed taxa per sample point	Submersed species richness (number of submersed species)
2007*	May	18	T**	McComas	13.0	13.0	339	1	0.3	333	98.2	0.0003
2007	Aug	24	T**	McComas	13.0	5.0	339	2	0.6	21	6.2	0.006
2009*	June	24	T**	MnDNR	15.0	14.0	104	3	2.9	100	96.2	0.03
2012	Sept	4	T	MnDNR	15.0	11.0	104	12	11.5	12	11.5	0.26
2013	July	29	T	MnDNR	15.2	12.0	195	49	25.1	71	36.4	0.44
2014												
2015												
2016												

Table 2: Summary of P-I results for Cedar Lake, Scott County [DOW 70009100] for littoral zone (to 15' depth). ** indicates near shore APM treatments only.

Table 3: Characteristics of delineations and treatments for Cedar Lake, Scott County [DOW# 70009100]

Year	Date	Treatment or Untreated	Target Species	Type of treatment	Area delineated in acres	Area treated in acres	Permit number	Herbicide	Target concentration	Amount applied	Applicator
2012	14-May	T	CLP	Chemical	100 (NE bay)	102	12W-3014	Aquathol K	.75-1.0 ppm	200	PLM
2013	4-Jun	T	CLP	Chemical	200 (NE & S bay)	200	13W-3A016	Aquathol K	.475 gals/ ac ft	380	PLM
2014											
2015											
2016											

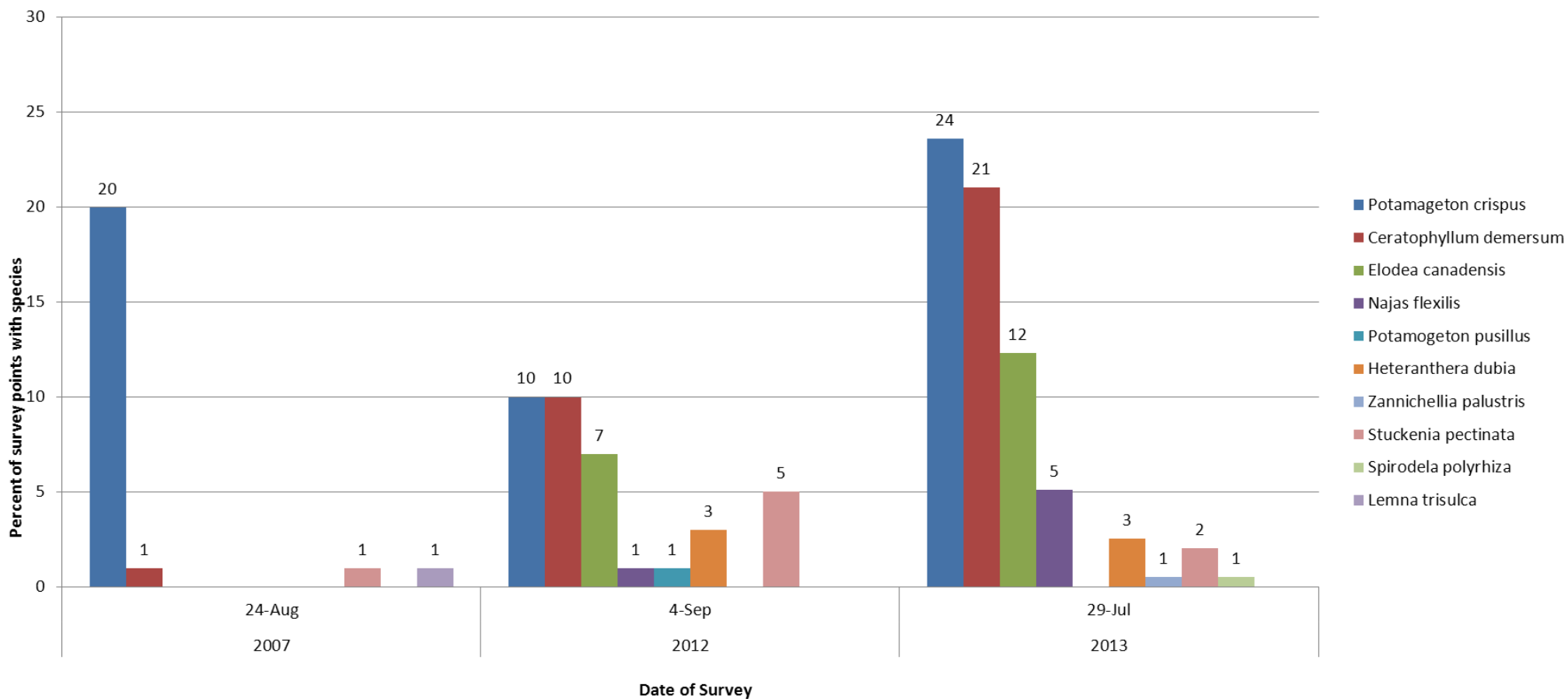
Table 3: Characteristics of delineations and treatments for Cedar Lake, Scott County [DOW 70009100]. PLM is PLM Lake and Land Management Corp.

Table 4: Annual secchi disk observations for Cedar Lake, Scott County [DOW# 70009100]

Year	Treated	April	May	June	July	August	Sept.	Oct.	Sum of numbers of observations for all seven months	Average Secchi disk depth [m]
2006		2.3	2.1	1.2	0.4	0.35	0.8	1.4		1.2
2007		1.2	1.6	0.9	0.4	0.85	0.7	0.95		0.9
2008		1.3	0.9	1.1	0.65	0.7	0.65	0.7		0.9
2009		1.3	1.4	3.1	0.8	0.5	0.7	0.8		1.2
2010			1.2	1	0.55	0.4	0.4	0.65		0.7
2011			1.9	1.4	0.8	0.35	0.5	1.05		1.0
2012										
2013										
2014										
2015										
2016										

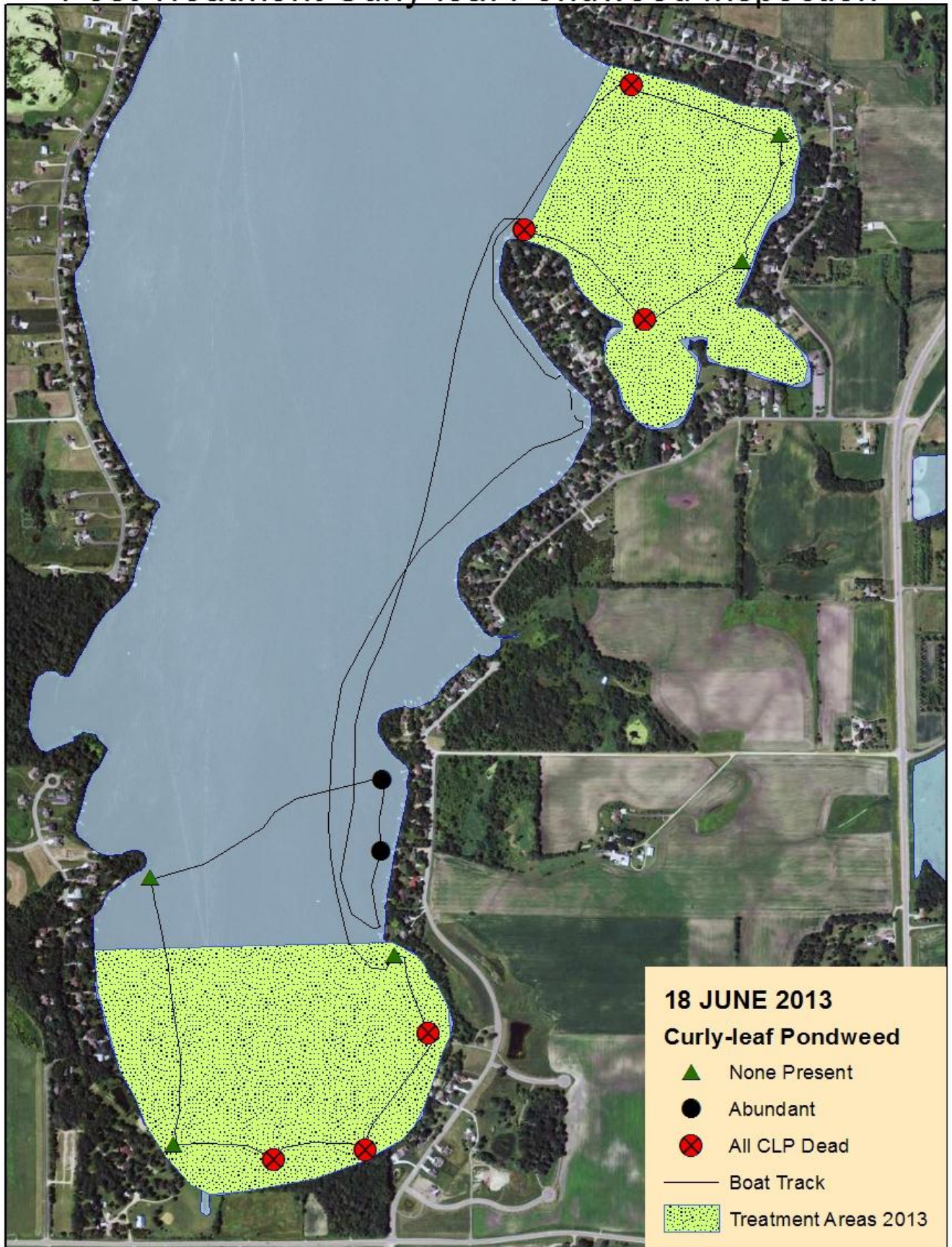
Table 4: 2006-2011 Secchi disk water clarity data for Cedar Lake, Scott County [DOW 70009100]. Provided by MPCA.

Aquatic Plant Occurance in Littoral Zone



Graph 1: Plant percent occurrence comparison for non-spring surveys.

Cedar Lake, Scott Co. 18 June 2013 Post Treatment Curly-leaf Pondweed Inspection



0 0.075 0.15 0.3 Miles



Inspected by K. Lund and M. Verhoeven
MN DNR Invasive Species Program
Region 3 South

References:

Madsen, J. D. (1999). "Point intercept and line intercept methods for aquatic plant management." *APCRP Technical Notes Collection (TN APCRP-M1-02)*. U.S. Army Engineer Research and Development Center, Vicksburg, MS. www.wes.army.mil/el/aqua

Minnesota Department of Natural Resources. 2012. *Minnesota's Sensitive Lakeshore Identification Manual: a conservation strategy for Minnesota lakeshores (version 3)*. Division of Ecological and Water Resources, Minnesota Department of Natural Resources. 87 pp.