# Cedar Lake, Scott County: 2014 AQUATIC VEGETATION SURVEY

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

**Lake:** Cedar Lake (DOW#70009100)

**Lake Surface Area:** 823 acres

**Littoral Area:** 780 acres

**County**: Scott Co.

**Survey Type:** Point-intercept

**Date of Inspection (most recent):** July 31, 2014

**Secchi Depth:** No data from 2014 survey

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**Date of report:** March 3rd, 2015

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***2014 Summary:*** The most recent aquatic vegetation point-intercept survey of Cedar Lake (DOW #70009100) was completed on July 31, 2014. Plants were present throughout the lake to a depth of 9 ft. (2.7 m). Within the littoral zone (zone in lake from the 0-15 foot depth range), 196 points were sampled and 25% contained native submersed vegetation. The average number of native submersed species per sample point was 0.4. Seven submersed plant species were documented during the 2014 survey and includes invasive Curly-leaf pondweed (*Potamogeton crispus*).

**Lake Description:**

Cedar Lake is an 823-acre lake north east of New Prague, Minnesota. The lake is entirely littoral (water depth from 0 to 15 feet) where the maximum depth of water is approximately 4 meters (13 feet). Cedar Lake is historically dominated by curly-leaf pondweed and subsequent algal blooms in the summer months. It is a hypereutrophic lake (meaning high nutrients) based on its Trophic State Index (TSI) assessment of 71 (ranging from 20 [very clear] to 80 [very green]; provided by the Minnesota Pollution Control Agency). This exceeds the range for lakes in the

same ecoregion. Cedar Lake is currently listed on the Minnesota Pollution Control Agency's (MPCA's) Impaired Waters List as a result of excessive phosphorous.

See Table 1 for seasonal Secchi disk observation data. Additional information on Cedar Lake water quality can be found here: http://cf.pca.state.mn.us/water/watershedweb/wdip/details.cfm?wid=70-0091-00.

**Table 1.** Average Secchi disk observations in meters for Cedar Lake (DOW #70009100). Data gathered from the Minnesota Pollution Control Agency (2009-2012) and the Metropolitan Council Environmental Services (2013-2014).

| Year | Treated (Y/N) | May | June | July | August | September | Average Secchi disk depth [May-Sept] |
|---|---|---|---|---|---|---|---|
| **2009** | N | 1.4 | 3.1 | 0.8 | 0.5 | 0.7 | 1.3 |
| **2010** | N | 1.2 | 1.0 | 0.6 | 0.4 | 0.4 | 0.7 |
| **2011** | N | 1.9 | 1.4 | 0.8 | 0.4 | 0.5 | 1.0 |
| **2012** | Y | 1.8 | 1.1 | 0.8 | 0.5 | 0.5 | 0.9 |
| **2013** | Y | 1.5 | 1.6 | 0.7 | 0.6 | 1.0 | 1.1 |
| **2014** | Y | 1.4 | 2.1 | 0.8 | 0.5 | 0.6 | 1.1 |

**Management History:**

In 2013, a Lake Vegetation Management Plan was developed for Cedar Lake to allow treatment of more than 15% of the littoral zone to control curly-leaf pondweed (CLP). The intent was to determine whether invasive plant control in conjunction with other management efforts would improve water quality measurements. The most recent CLP herbicide treatment of 400 acres was organized by the Scott Watershed Management Organization in 2014 (see Table 2). Monitoring of the native plant community and water quality is an on-going condition of the Lake Vegetation Management Plan which remains active until 2018.

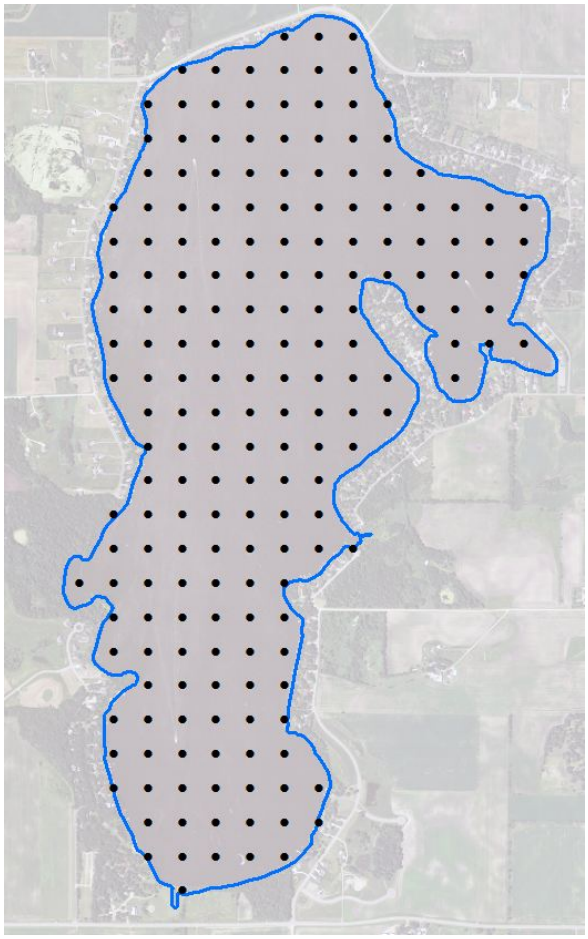
**Table 2.** Characteristics and history of herbicide treatment for Cedar Lake (DOW# 70009100, Total acres: 823, Littoral acres: 780, 15% Littoral acres: 117)

| Date | Treatment (Y/N) | Target Species | Total Acres Treated | Herbicide | Applicator |
|---|---|---|---|---|---|
| **MAY 2012** | Y | CLP | 102 | Aquathol K | PLM Lake and Land Mgmt Corp |
| **JUN 2013*** | Y | CLP | 200 | Aquathol K | PLM Lake and Land Mgmt Corp |
| **MAY 2014*** | Y | CLP | 400 | Aquathol K | PLM Lake and Land Mgmt Corp |

* LVMP year

**Survey Objectives:**

Point-intercept surveys were used to assess the distribution of aquatic plants in Cedar Lake. The primary purpose for this type of survey is to: 1) develop baseline knowledge of the current plant community in a lake, and overtime, 2) compare year to year plant variation (in plant presence, spatial location, and density). Potentially, these data can be used to compare lake-to-lake variation on a regional or statewide scale. Moreover, this survey will help monitor native plant communities and evaluate possible responses to herbicide treatments of invasive aquatic plants. 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 effects of 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 130 meters apart using a Geographic Information System (GIS). This spacing allowed for placement of 196 points. Plant samples were collected by throwing and dragging a double-sided rake along the lake bottom at each point. Plant samples were assessed on the boat to determine species and density (scale of zero [no plants] to 4 [dense, rake covered]). Frequencies of occurrence percentages (i.e. how often a plant species was found in the lake) were calculated based on the littoral zone.

**Survey Observations:**

See Table 3 for a summary of calculations and Table 4 for historic plant frequency observations. Maximum depth of rooted vegetation was observed between 2.7- 3.3 meters (9-11 feet) from 2009 to 2014. See Figure 2 for depth of submersed plant data from the 2014 point-intercept survey. Native submersed plant frequency has increased from 3% to 25% since 2009. The mean

number of native taxa per point has increased from 0.03 to 0.4. See Figure 3a and 3b for spatial distributions of curly-leaf pondweed and native submersed taxa from 2009-2014.

In June 2009, the plant community was primarily dominated by curly-leaf pondweed with a few occurrences of native plants such as coontail and sago pondweed. More recently, species diversity had increased to include species such as Canadian waterweed, water stargrass, naiads, horned pondweed, and white-stem pondweed. Additional point intercept surveys were conducted in May and August of 2007 by Blue Water Science.

**Table 3.** Summary of point intercepts metrics for Cedar Lake, Scott County (DOW# 70009100). Values shaded in grey were calculated from littoral depth range.

| | JUN 2009 | SEPT 2012 | JUL 2013 | JUL 2014 |
|---|---|---|---|---|
| Treated (Y/N) | Y | Y | Y | Y |
| Suveyor | MN DNR | MN DNR | MN DNR | MN DNR |
| Total # Points Sampled | 104 | 104 | 196 | 196 |
| Max Depth of Growth (95%) | 11 ft | 11 ft | 11 ft | 9 ft |
| # Point in Max Depth Range | 98 | 51 | 127 | 99 |
| # Points in Littoral (0-15 feet) | 104 | 104 | 196 | 196 |
| % Points w/ Native Submersed Taxa | 3 | 12 | 24 | 25 |
| Mean Native Submersed Taxa/ Point | 0.03 | 0.3 | 0.40 | 0.40 |
| # Native Submersed Taxa | 2 | 6 | 6 | 6 |
| # Non-Native Taxa | 1 | 1 | 1 | 1 |

**Table 4.** Percent frequency of occurrence for submersed vegetation within the littoral zone (0-15 feet) in Cedar Lake, Scott County (DOW# 70009100).

| Taxonomic Name | Common Name | JUN 2009 | SEPT 2012 | JUL 2013 | JUL 2014 |
|---|---|---|---|---|---|
| **NON-NATIVE** | | | | | |
| *Potamogeton crispus* | Curlyleaf pondweed | 95 | 1 | 22 | 11 |
| **NATIVE** | | | | | |
| *Ceratophyllum demersum* | Coontail | 1 | 10 | 21 | 10 |
| *Elodea canadensis* | Canadian waterweed | 0 | 7 | 12 | 17 |
| *Heteranthera dubia* | Water stargrass | 0 | 3 | 3 | 4 |
| *Najas sp* | Naiad | 0 | 1 | 5 | 9 |
| *Stuckenia pectinata* | Sago pondweed | 2 | 5 | 3 | 1 |
| Floating and emergent plants observed: *Lemna trisulca* (Forked duckweed), Spirodela polyrhiza (Large duckweed) | | | | | |
| Less common submersed vegetation observed: *Potamogeton pusillus* (Small pondweed) in 2012, *Zannichellia palustris* (Horned pondweed) in 2013, *Potamogeton praelongus* (White-stem pondweed) in 2014. | | | | | |

**Figure 1.** Surface matted curly-leaf pondweed (*Potamogeton crispus*) viewed during the 2012 aquatic vegetation point intercept survey alongside a photo of the turion or reproductive propagule of curly-leaf pondweed. Cedar Lake, Scott County (DOW# 70009100)

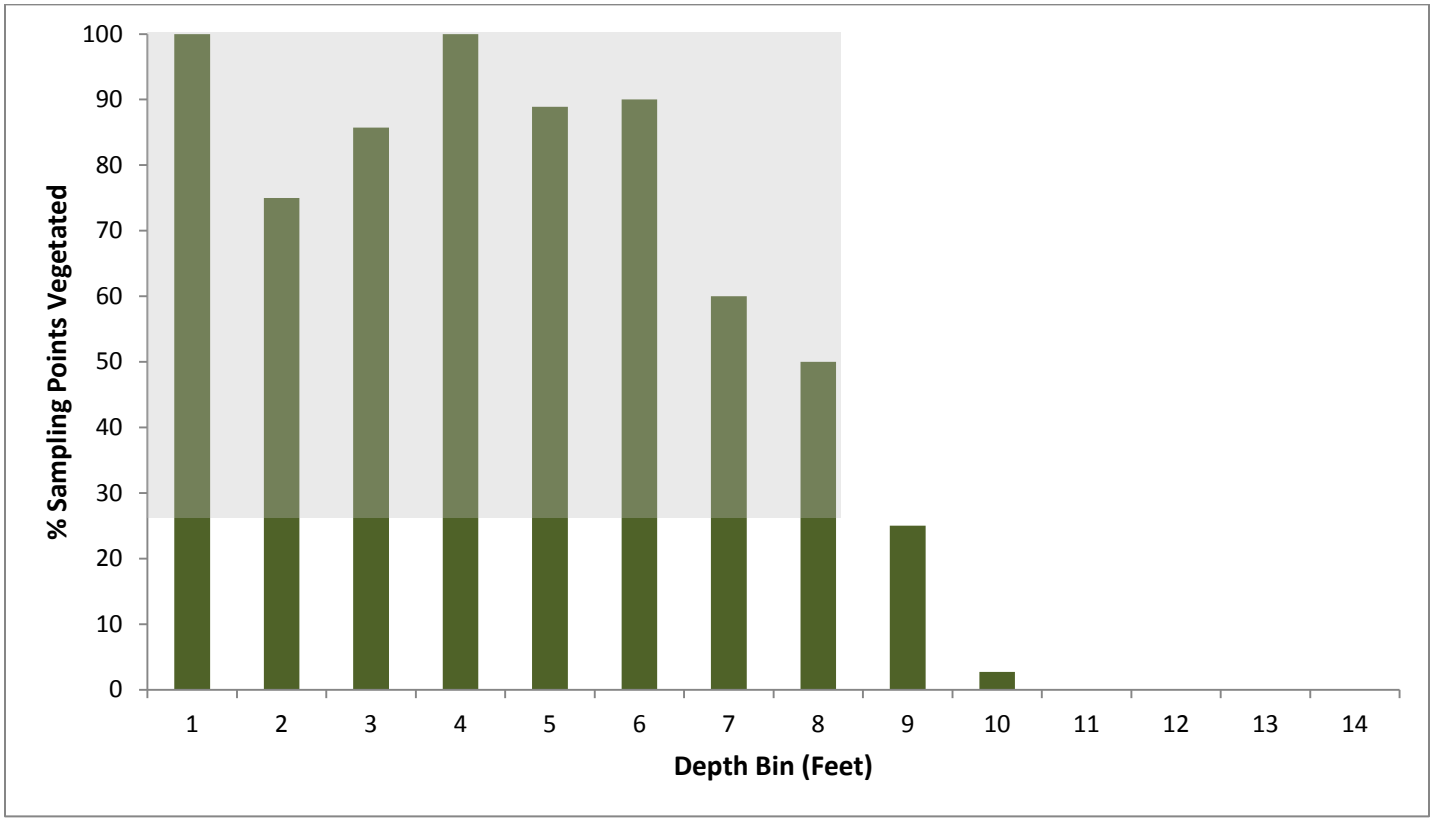



**Figure 2.** Maximum depth of plant colonization in feet during 2014 point intercept survey. Depths were binned in feet. Percent sampling points vegetated is defined as the number of sampling points with submersed vegetation divided by the total number of sampling points for each depth. Shaded area represents depth range of the 95$^{th}$ percentile of all submersed plants observed. Cedar Lake, Scott County (DOW# 70009100)

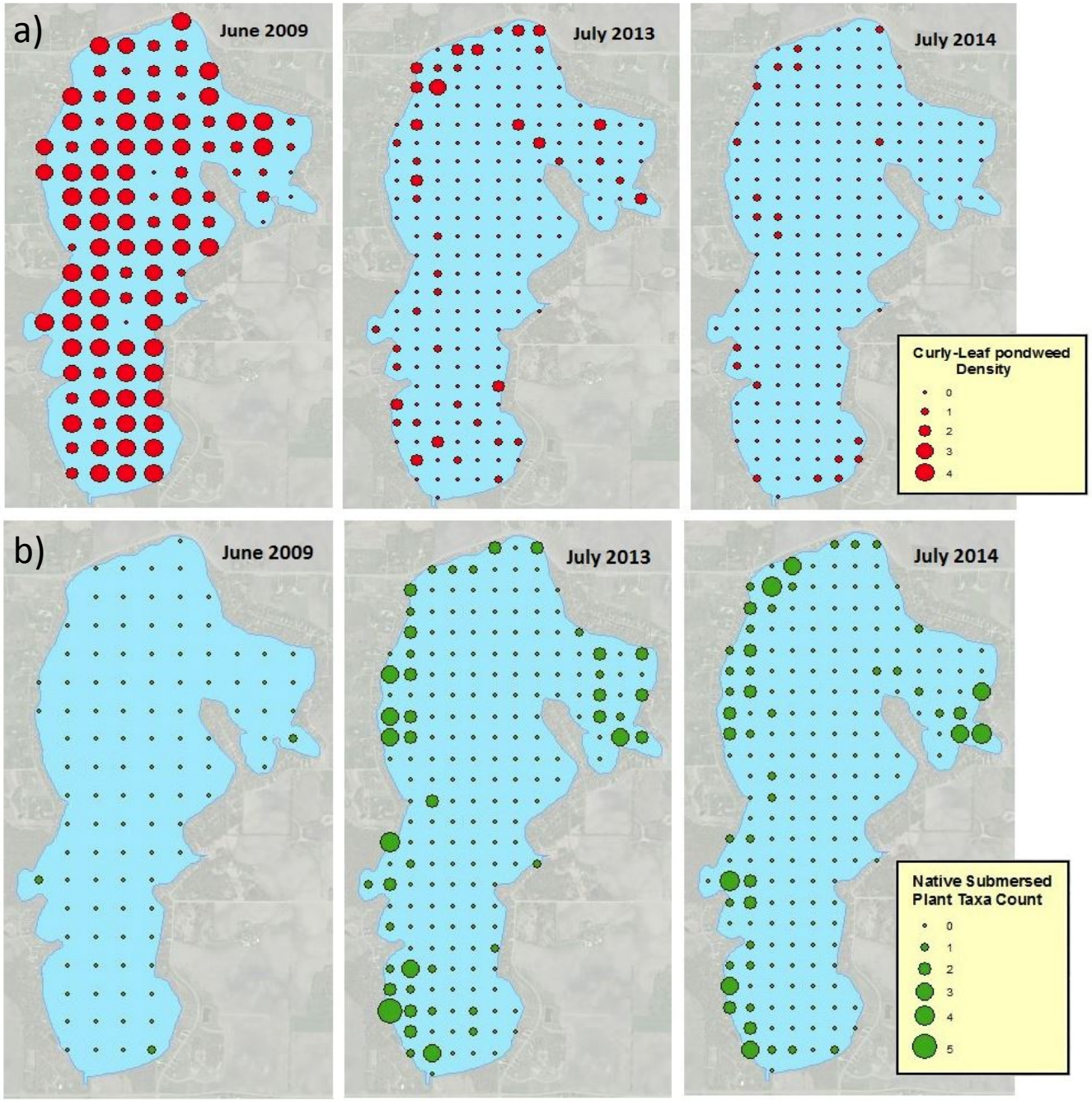



**Figure 3.** a) Spatial distribution and rake density rating of curly-leaf pondweed b) Spatial distribution and species richness (# of native species per sample point) of all native submersed plant species. Maps show distribution of submersed plants prior to LVMP variance (2009) and whole-lake treatments with variance approval (2013-2014). The LVMP will remain active until 2018. Cedar Lake, Scott County (DOW# 70009100)