

Cedar Lake Monitoring - 2013 and 2014

Surface Water Assessment Grant

Water quality of Cedar Lake in Idun Township was monitored in 2013 and 2014 through a MPCA Surface Water Assessment Grant. Monthly samples were taken for Total Phosphorus, Chlorophyll a, and Secchi Disk Transparency.

Cedar Lake is a small, 232 acre lake. It has a maximum depth of 18 feet. Development of the shoreline is minimal. There is no public access.



The main nutrient of concern is phosphorus. Phosphorus enrichment of a water body can result in a variety of negative impacts, such as excessive plant growth, algae blooms, and lowering of oxygen levels. Chlorophyll a (Chl-a) was also measured. Chlorophyll a is the main pigment in algae. The concentration of this pigment is used to estimate the quantity of algae found in the lake. Algae is a normal component of water bodies, however high concentrations can result in low levels of dissolved oxygen and reduced recreation suitability.

Secchi disk readings measure the depth of light penetration into the water. This parameter often has a direct correlation to the levels of phosphorus and chlorophyll a found in the water body.

The average 2013 and 2014 Total Phosphorus (TP), Chlorophyll a (Chl-a), and Secchi Transparency levels for Cedar Lake are shown below, as is the expected Eco-Region Range.

Parameter	TP (ug/L)	Chl-a (ug/L)	Secchi (m)	Secchi (ft.)
2013 Average	27	7	2.1	7
2014 Average	27	6	2.2	7
Overall Average	27	6.5	2.15	7
Eco-Region Range	14-27	<10	2.4 – 4.6	8-15

Collected data was used to calculate Trophic Status Index values. Carlson's Trophic State Index (TSI) is a common method of characterizing a lake's overall health. "Trophic Status" refers to the level of productivity in a lake, as measured by phosphorus and algae content, and the depth of light penetration. In general, the lower the TSI Value, the better the health of the lake. TSI's are calculated for Phosphorus, Chlorophyll a, and Secchi Transparency. These three numbers are then averaged to result in an overall TSI value for each lake.

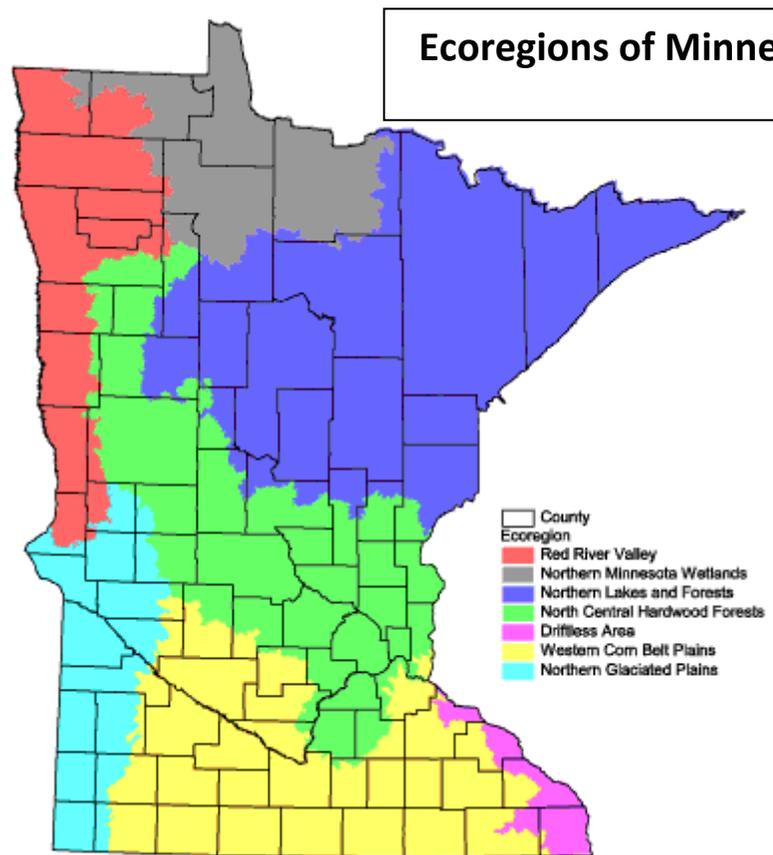
	TSIP Average	TSIC Average	TSIS Average	Overall TSI
Cedar Lake	51.62	49.39	48.85	50

A TSI between 50 and 60 places Cedar Lake at the lower boundary of classical eutrophy. Eutrophic lakes exhibit decreased transparency, aquatic vegetation problems, and support only warm water fisheries.

Discussion:

The lake monitored for this study is located in the Northern Lakes and Forest (NLF) Ecoregion of the state. Ecoregions are grouped together based on soils, landforms, potential natural vegetation, and land use. Comparing a lake's water quality to that of reference lakes in the same ecoregion provides one basis for characterizing the condition of the lake.

The Northern Lakes and Forests Ecoregion is heavily forested and comprised of steep, rolling hills interspersed with pockets of wetlands, bogs, lakes and ponds. Lakes are typically deep and clear, with good gamefish populations. These lakes are very sensitive to damage from atmospheric deposition of pollutants, storm water runoff from logging operations, urban and shoreland development, mining, inadequate wastewater treatment, and failing septic systems. Agriculture is somewhat limited by the hilly terrain and lack of nutrients in the soil, though there are some beef and dairy cattle farms.



Cedar Lake fell within the expected ecoregion range for Total Phosphorus, and Chlorophyll a. The Secchi transparency readings were slightly lower than expected. This is often attributed to the tannic acid / bog stain of the water of many lakes. There was little variability between the readings taken in 2013 and those taken in 2014. Readings were at the lower end of the eco-region range, as would be expected for the southern edge of the region. The results are an indicator of the good health of the lake.

Grant Summary:

Funding for this effort was provided by the Minnesota Pollution Control Agency. Work was completed by the Aitkin County Soil and Water Conservation District, with assistance from local volunteers. A summary of grant expenses is shared below:

Expense Category	Total Funds Expended
Volunteer Coordination & Equipment Preparation	\$ 168.07
Sample Collection & Shipment	\$ 4,085.07
Laboratory Analysis	\$ 360.00
Data Submission & Management	\$ 400.00
Project Tracking & Reporting	\$ 400.00
TOTAL EXPENSES	\$ 5,413.14