



**Minnesota
Pollution
Control
Agency**

**Regional Division
Watershed Section**

Cedar Island, Pike, and Eagle Lakes TMDL: Excess Nutrients

Water Quality/Impaired Waters • August 2009

The state placed Pike Lake on the 2002 impaired waters list, Cedar Island Lake in 2004, and Eagle Lake in 2008 for aquatic recreation because the lakes exceed the water quality standard for nutrients. Excess nutrients, such as phosphorus from stormwater runoff, create poor water quality conditions causing frequent summer algal blooms, which limit recreational activities.

chain is 2,880 acres of fully developed urban and suburban land. A channel through a large wetland connects Pike and Eagle Lakes to each other. Cedar Island Lake has no natural outlet, but a pumped outlet discharges the water into Eagle Lake. The lake system discharges into Eagle Creek, a tributary of Shingle Creek, which ultimately discharges into the Mississippi River.

Cedar Island, Pike and Eagle Lakes

The Eagle Lake Chain of Lakes is a regional water resource located in Hennepin County, Minnesota, in the Shingle Creek watershed, specifically in the cities of Maple Grove and Plymouth. The 291-acre Eagle Lake is a popular recreational water body that provides opportunities for fishing and swimming, as well as aesthetic values.

Pike Lake at 58 acres and Cedar Island Lake at 81 acres, both provide fishing opportunities. The drainage area to the lake

TMDL Background

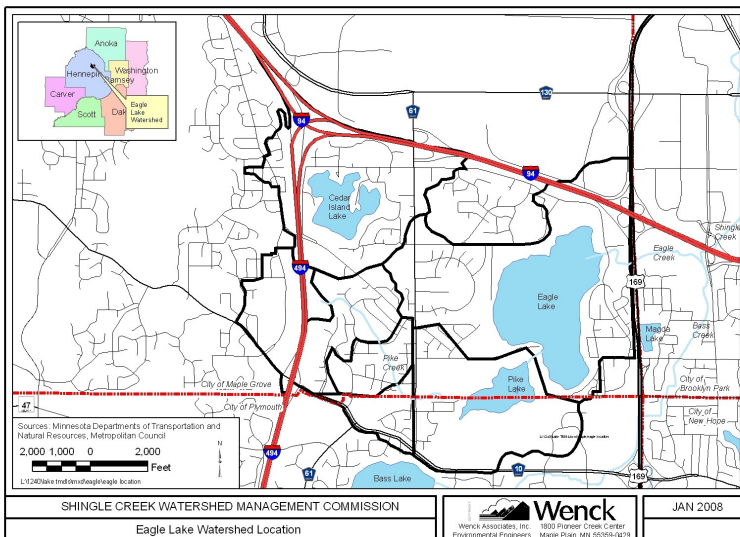
Based on the federal Clean Water Act, waters that do not meet water quality standards are “impaired”. The Clean Water Act requires states to develop a clean up plan for each impairment affecting a water body. The clean up plan and the process used to create it is a Total Maximum Daily Load (TMDL).

A TMDL must identify all sources of the pollutant causing a water body to violate standards. The TMDL also determines the amount by which each source must reduce its contribution to ensure a water body meets applicable water quality standards.

Lake Impairments

The goal of this TMDL is to quantify the pollutant reductions needed for Cedar Island, Pike and Eagle Lakes to meet state water quality standards.

Pike and Cedar Island Lakes are shallow whereas Eagle Lake is a deep lake. Shallow lakes are defined as lakes with a maximum depth of 15 feet or less, or with 80% or more of the lake area shallow enough to support emergent and submerged rooted aquatic plants (littoral zone). The numeric targets for shallow lakes in the North Central



Hardwood Forest Eco-region are summer averages of ≤ 60 micrograms per liter ($\mu\text{g/L}$) total phosphorus concentration, ≤ 20 $\mu\text{g/L}$ chlorophyll-a concentration, and ≥ 1.0 meter of Secchi depth. The numeric targets for deep lakes in the North Central Hardwood Forest Eco-region are summer averages of ≤ 40 $\mu\text{g/L}$ total phosphorus concentration, ≤ 14 $\mu\text{g/L}$ chlorophyll-a concentration, and ≥ 1.4 meters of Secchi depth.

Water quality in Cedar Island and Pike Lakes is considered poor with frequent algal blooms, while Eagle Lake has more moderately degraded water quality. Historic summer average total phosphorus concentrations in Cedar Island, Pike, and Eagle Lakes range from 33 $\mu\text{g/L}$ to 121 $\mu\text{g/L}$, with the highest concentration occurring in Cedar Island Lake and the lowest concentration occurring in Eagle Lake. Chlorophyll-a and Secchi depth reflect similar trends.

Pollution Sources

Stormwater from urban runoff represents one of the major phosphorus sources to the three Lakes. Impervious surfaces in the watershed improve the efficiency of water moving to streams and lakes resulting in increased transport of phosphorus into local water bodies. Phosphorus in stormwater is a result of transporting organic material such as leaves and grass clippings, fertilizers, and sediments to the water body. The internal loading of phosphorus in the lakes is another source caused by a combination of curly-leaf pondweed dieback and the sediment release of nutrients.

Pollution Reductions Needed

A 67 percent decrease in phosphorus load would be required for Cedar Island Lake to consistently meet water quality standards. Pike Lake would require a 49 percent decrease and Eagle Lake a 40 percent decrease. Pike Lake contributes a substantial load downstream to Eagle Lake, thus improvements to that lake should result in improvements to Eagle.

Implementation Strategies

Internal load management, fish and aquatic plant management, and the reduction of nonpoint sources of phosphorus in the watershed by retrofitting Best Management Practices (BMP) would have the most impact on reducing phosphorus loads and improving water quality in the Eagle Lake Chain of Lakes. New development and redevelopment in the watershed that

meets certain thresholds will be required to provide pretreatment of stormwater prior to discharge into water resources. The primary option for the control of internal phosphorus load is likely to be integrated management of the aquatic vegetation, fish, and zooplankton communities to reduce nutrient loads and maintain a level of water clarity that is desirable both aesthetically and for maintenance of a fishery.

Examples of BMPs are:

- Increase infiltration and filtration in the watershed through the use of rain gardens, native plantings, and reforestation
- Identify key areas for more frequent street sweeping
- Retrofit stormwater detention ponds and other infiltration BMPs, particularly during street reconstruction projects
- Encourage shoreline restoration
- Educate property owners about proper fertilizer use and low-impact lawn care practices
- Manage in-lake phosphorus levels through plant and fisheries manipulation, alum treatment (Eagle Lake), and drawdown

For More Information

Wenck Associates, Inc. prepared the *Cedar Island, Pike, and Eagle Lakes Nutrient TMDL Report* for the Shingle Creek Watershed Management Commission and Minnesota Pollution Control Agency.

For more information about the Cedar Island, Pike, and Eagle Lakes Nutrient TMDL Report, view the web pages at <http://www.pca.state.mn.us/water/tmdl/project-cedarpikeeagle-nutrients.html> or contact:

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For general TMDL information, browse MPCA's Impaired Waters web pages at www.pca.state.mn.us/water/tmdl/.

For more information about water bodies in the Shingle Creek Watershed, go to www.shinglecreek.org.