



**Minnesota
Pollution
Control
Agency**

**Watershed
Section**

Meadow Lake

Draft TMDL: Excess nutrients (phosphorus)

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Meadow Lake is a very shallow 11 acre lake located in the City of New Hope, in Hennepin County, within the Shingle Creek watershed. It is a neighborhood lake that primarily provides aesthetic values and some canoe and paddle boating opportunities. The average depth is just 1.5 feet.

The drainage area to the lake is 103 acres of fully developed urban and suburban land. Meadow Lake's outlet flows by storm sewer to Bass Creek. Bass Creek is a tributary to Shingle Creek, which ultimately discharges into the Mississippi River.

Water quality concerns

The State placed Meadow Lake on the 2002 impaired waters list for aquatic recreation because it exceeds 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.

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).



Meadow Lake has frequent summer algal blooms.

Meadow Lake Impairment

The goal of this TMDL is to quantify the pollutant reductions needed for Meadow Lake to meet state water quality standards. The numeric targets for shallow lakes in the North Central Hardwood Forest Ecoregion are summer averages of ≤ 60 $\mu\text{g/L}$ total phosphorus concentration, ≤ 20 $\mu\text{g/L}$ chlorophyll-a concentration, and ≥ 1 meter of Secchi depth.

Summer average concentrations measured in Meadow Lake between 1999 and 2006 were:

- Total phosphorus concentrations ranged from 191 to 266 $\mu\text{g/L}$
- Chlorophyll-a ranged from 91 to 192 $\mu\text{g/L}$
- Water clarity, as measured by Secchi depth, was typically around 0.3 meters

Pollution sources

Phosphorus transported by stormwater represents the majority of the total phosphorus load to Meadow Lake. 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. In addition, Meadow Lake itself is a source as it is a shallow basin with a significant potential to internally load phosphorus from lake sediments and the invasive aquatic plant curly-leaf pondweed.

Pollution reductions needed

A reduction of 82% in phosphorus loading to Meadow Lake would be required to consistently meet water quality standards under average precipitation conditions. In-lake phosphorus load management and the reduction of phosphorus from urban runoff in the watershed by retrofitting best management practices (BMP) would have the most impact on reducing phosphorus loads and improving water quality in Meadow Lake.

Implementation strategies

Meadow Lake is a small lake in a fully developed suburban residential watershed, with a park and municipal golf course abutting the lake on the east. There are six storm sewer outfalls into the lake. Small, incremental reductions of phosphorus from the watershed are possible through retrofit as redevelopment occurs and through the implementation of Best Management Practices (BMPs) throughout the subwatershed.

Examples of BMPs:

- Increase infiltration and filtration in the Meadow Lake watershed through the use of rain gardens, native plantings, and reforestation
- Activities to improve the water quality from the municipal golf course to Meadow Lake

- Identify key areas for more frequent street sweeping
- Retrofit or install detention ponds, sump manholes, swirl separators, and trash collectors to remove debris, litter, and other pollutants from stormwater
- Encourage shoreline restoration
- Educate property owners about proper fertilizer use and low-impact lawn care practices
- Monitor and manage plant and fish populations to promote native communities
- Drawdown of the lake to allow the native seed bank to reestablish a more beneficial aquatic vegetation community

For more Information

The Meadow Lake Nutrient TMDL Report was prepared for the Shingle Creek Watershed Management Commission and Minnesota Pollution Control Agency by Wenck Associates, Inc.

For more information about the Meadow Lake Nutrient TMDL Report, view the Web pages at <http://www.pca.state.mn.us/water/tmdl/project-meadowlake-nutrients.html> or contact:

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For general TMDL information, browse MPCA's Impaired Waters Web pages at <http://www.pca.state.mn.us/water/tmdl/>.

For more information about waterbodies in the Shingle Creek Watershed, go to <http://www.shinglecreek.org/>.