



Minnesota
Pollution
Control
Agency

Burandt Lake Draft TMDL: Excess nutrients (phosphorus)

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Location and watershed description

Burandt Lake is a deep, 92-acre lake located 0.5 mile west of Waconia in Carver County, Minnesota (about 25 miles southwest of Minneapolis). The lake has a 7,823-acre watershed that can be divided into three subwatersheds. First, the area of land draining directly to Burandt Lake, the direct subwatershed, consists of 246 acres (excluding Burandt Lake) primarily developed into residential and commercial areas. Next, flowing in from the northeast is the largest subwatershed, the Lake Waconia (3,080 acres surface area) subwatershed, which is 7,147 acres of agricultural and residential land (including Lake Waconia). Finally, the Scheuble Lake (16 acres surface area) subwatershed flowing in from the west is 430 acres (including Scheuble Lake) of primarily agricultural lands. Part of the City of Waconia is within the watershed.



Water quality concerns

Burandt Lake has been identified for impairment of aquatic recreation (swimming) due to excess nutrients. As a result, it has been placed on Minnesota's list of impaired waters. Because of the exceedance, Carver County conducted a

Excess Nutrients in Burandt Lake: the Problem at a Glance

Impaired by: Excess nutrients (phosphorus)

Total Phosphorus (2005 summer mean): 56 µg/l (16 samples)

Phosphorus standard: 40µg/l

Lake area: 92 acres

Mean/maximum depth: 10 ft./24 ft.

Total drainage area: 7,823 acres (excluding lake)

External sources of phosphorus: Stormwater runoff from developed and agricultural areas, failing or direct-discharge septic systems, degraded wetlands

Internal sources of phosphorus: Anoxic sediments, seasonal turnover, mixing by wind and boat propellers, aquatic plant senescence

Total Maximum Daily Load (TMDL) study. A TMDL is defined as the maximum quantity of a pollutant that a water body can receive and continue to meet water quality standards for designated beneficial uses.

The problem

Water quality data collected from 1999 through 2005 revealed that Burandt Lake has average total phosphorus concentrations of 56 to 98 micrograms per liter (µg/l). Phosphorus levels have decreased over time (the lowest were in 2005, when the summer mean was 56 µg/l). A reduction in phosphorus to 40 µg/l or less is set for Burandt Lake because that is the level needed to meet the standard. Phosphorus is the limiting nutrient for aquatic plant and algal growth; while phosphorus is an essential nutrient, it is considered a pollutant when it stimulates excessive growth of aquatic plants or algae.

The process

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

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

The sources of phosphorus

The phosphorus load to Burandt Lake over the 2005 season (42.18 inches of precipitation) was determined to be 687 kilograms per year (kg/yr.). Of this total, external sources have been determined to contribute approximately 457 kg annually, which includes runoff from precipitation and precipitation itself. The remaining 230 kg of phosphorus is from nutrient recycling within the lake.

Goals of the TMDL

The water quality goal is 40 µg/l for the mean total phosphorus concentration during the summer growing

season (June 1-September 30). Forty µg/l is the state phosphorus standard for deep lakes in the North Central Hardwood Forest Eco-region.

The TMDL is based on an average precipitation year. The selected average precipitation year was 2001.

Results indicate that phosphorus loading into and within Burandt Lake must be reduced by 32 to 66%, depending on yearly precipitation, to achieve the water quality goal of 40µg/l.

Implementation strategies

To reach the reduction goals, Carver County will rely largely on its current Water Management Plan. Implementation goals not covered in the Water Management Plan will be identified and amended. A final implementation plan that allocates watershed loads will be developed within a year of the final approval by the U.S. Environmental Protection Agency (EPA).

The City of Waconia is a permitted Municipal Separate Storm Sewer System (MS4) under the EPA’s stormwater program. MS4s are regulated through state-issued permits and must create and implement stormwater pollution-prevention programs (SWPPPs). The SWPPP for Waconia will need to include the measures for controlling nutrient loading to Burandt Lake.

Because of the uncertainties involved in the development of the TMDL and the success of management strategies used to reduce pollution, it is necessary to use an “adaptive management” approach to implementation. This approach involves continual evaluation and monitoring of implementation actions taken to reduce pollution over a period of several years.

For more information, review the Burandt Lake Excess Nutrients TMDL Draft report on the Carver County Land and Water Services Web site at www.co.carver.mn.us/tmdls (phone 952-361-1822) or the MPCA Web site at www.pca.state.mn.us/water/tmdl/tmdl-draft.html. General information on TMDLs can be found on the MPCA Web site at www.pca.state.mn.us/water/tmdl. Direct questions, comments and requests for more information to the MPCA project manager, Roger Ramthun (e-mail Roger.Ramthun@pca.state.mn.us).

Load-reduction Formula: TMDL = WLA + LA + MOS + RC

Average Conditions: 321 kg/yr (TMDL) = 48 (WLA) + 273 (LA) + Implicit (MOS) + 0