



Minnesota
Pollution
Control
Agency

Lake Margaret Nutrient Total Maximum Daily Load Project

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Lake Margaret (Minnesota Department of Natural Resources lake #11-0222), located in Cass County near the city of Lake Shore in central Minnesota's Upper Mississippi Basin, was placed on the 2006 State of Minnesota's 303(d) list of impaired waters. Impaired waters are those that do not meet state water quality standards as set forth in Minn. R. ch. 7050. Impaired water bodies fail to meet criteria required to support aquatic life, or allow the designated use of a water body, such as swimming or fishing. Lake Margaret was identified as impaired for aquatic recreation (e.g., swimming) due to nutrient concentrations that do not meet state standards. Lake Margaret is classified as a class 2B water. The class 2B designation specifies aquatic life and recreation as the protected beneficial use of the water body. Lake Margaret, on the Gull Lake chain, is a popular destination for water skiers, boaters and fishermen because of its easy accessibility and wind protected nature of the lake.

The Federal Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify impaired water bodies and develop a total maximum daily load (TMDL) for each parameter for which the water body does not meet standards. The TMDL is the total amount of a pollutant a water body can take on while meeting the established water quality standard(s). Lake Margaret is located in the Northern Lakes and Forests ecoregion of Minnesota. Based on the current state standard for nutrients, the TMDL establishes a numeric target of 30 parts per billion (ppb) total phosphorus concentration for deep lakes in this ecoregion.



TMDL progress in the Lake Margaret Watershed

Lake Margaret has been periodically monitored over the past 15 years with the most intensive monitoring occurring between 1996 and 1998 as a part of a Clean Water Partnership grant. During the three-year monitoring period, the average summer mean values (June 1 through September 30) for total phosphorus were 45, 55, and 48 ppb respectively. During this period chlorophyll-a concentrations ranged from 15 to 35 with Secchi depth transparencies of around one meter. All three parameters exceeded the State standards for lakes in this ecoregion. The Lake Margaret TMDL calculates load and wasteload allocations and estimated load reductions assuming an endpoint of 30 ppb phosphorous. Although the TMDL is set for the total phosphorus standard, one of the two other lake eutrophication standards chlorophyll-a and/or Secchi depth must also be met. All three of these parameters were assessed in this TMDL to assure that the project will result in compliance with state standards.

The numeric standards for chlorophyll-a and Secchi depth are 10 ppb and 1.4 meters, for Lake Margaret respectively.

Wasteload and Load Allocations to meet state standards indicate that average nutrient load reductions of 44 percent would be required to consistently meet standards under average precipitation conditions. Nutrient loading to Lake Margaret is dominated by two main sources; watershed loading and internal loading, making up approximately 75 percent and 20 percent respectively.



What you can do

Many opportunities exist for the public to participate in helping reduce phosphorous loading to Lake Margaret. The following categories represent priority phosphorous reduction strategies in the watershed where best management practices can be implemented to help restore the water quality in Lake Margaret.

- pastures and animal agriculture management
- riparian streambank exclusions
- sources associated with development
- forested areas and wetlands management
- septic systems management
- in-lake nutrient sequestration

The complete TMDL study report can be found on the MPCA Web site at: <http://www.pca.state.mn.us/water/tmdl/project-lakemargaret-nutrients.html>.

For more information

For more information about this study and how it relates to MPCA's Impaired Waters programs, contact the MPCA at 651-296-6300 or 800-657-3864 and ask for the Upper Mississippi Basin TMDL staff or the Public Information Officer in our Brainerd office.

