



# Lake Sarah

## Total Maximum Daily Load: Excess Nutrients

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**L**ake Sarah was placed on the Minnesota Pollution Control Agency's (MPCA) 303(d) list of impaired waters because of excess nutrients (phosphorus) in 2006. As a result of the excessive phosphorus loading, the lake experiences nuisance algae blooms in the summer, severely restricting recreational use.

### Description

Lake Sarah is a 552-acre lake located approximately 18 miles west of Minneapolis in west central Hennepin County. The lake has a maximum depth of 60 feet, a mean depth of 18.2 feet, and is used extensively for fishing, boating and aesthetic viewing. The majority of the lake's west end is within Lake Sarah Regional Park, operated by Three Rivers Park District. Lake Sarah receives runoff from a 4,608-acre predominantly agricultural watershed which contains portions of five municipalities — Greenfield, Independence, Corcoran, Loretto and Medina. Portions of the watershed are undergoing rapid urbanization, although the majority of the new residential lots are large.

### TMDL background

The U.S. Environmental Protection Agency requires states to develop Total Maximum Daily Load (TMDL) studies for waters that do not meet water quality standards and are listed as "impaired." This TMDL document will determine the



magnitude of the impairment, identify pollutant sources, and allocate pollutant loading among the permitted and non-permitted sources in the lake's drainage basin.

### Lake Sarah impairment

The goal of this TMDL is to quantify the pollutant reductions needed for Lake Sarah to meet the MPCA water quality standards to fully support recreational use. The numeric targets for deep lakes in the North Central Hardwood Forest Ecoregion are summer averages of <40 µg/L (micrograms per liter) total phosphorus concentration, <14 µg/L chlorophyll-a concentration, and >1.4 meters of Secchi depth.

The in-lake water quality data has been compiled and analyzed from 1996 through 2007 for Lake Sarah. The annual average total phosphorus concentrations ranged from 74 µg/L to 139 µg/L.

Due to high concentrations of phosphorus, Lake Sarah has significant algae blooms that reduce water clarity. The annual average chlorophyll-a concentration ranged from 29 µg/l to 62 µg/l. The chlorophyll-a concentration is typically the highest during the summer when water temperatures are warmer. The Secchi depth transparency during the summer is frequently below 1.0 meter in depth.

### **Pollution sources**

Lake Sarah receives excess nutrient loading from the 4,608-acre contributing watershed and from internal recycling mechanisms. The internal loading factor is especially critical in Lake Sarah because an abundant amount of curly-leaf pondweed provides a phosphorus pulse to the lake when it dies off in late June each year.

As a result of the excessive phosphorus loading, the lake experiences nuisance algae blooms throughout much of the growing season. Recreational use of the lake is severely restricted during these bloom episodes.

In addition, the high phosphorus levels and consequent high turbidity levels are affecting the lake fish population, which is beginning to be dominated by rough fish.

### **Tentative project timeline**

Work began on the project in February 2008 and it is estimated that the Lake Sarah TMDL Report and Implementation Plan will be developed by 2010.

### **For more information**

Three Rivers Park District is preparing the Lake Sarah Excess Nutrients TMDL Project for the Pioneer-Sarah Creek Watershed Management Commission in partnership with Hennepin County Department of Environmental Services and the Lake Sarah Improvement Association.

For more information about this TMDL and Lake Sarah:

- <http://www.pca.state.mn.us/water/tmdl/project-lakesarah-nutrients.html>
- [www.pioneersarahcreek.org/](http://www.pioneersarahcreek.org/)
- [www.threeriversparkdistrict.org/](http://www.threeriversparkdistrict.org/)
- [www.co.hennepin.mn.us/](http://www.co.hennepin.mn.us/)
- [www.lakesarah.com/](http://www.lakesarah.com/)

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