Minnesota Pollution Control Agency

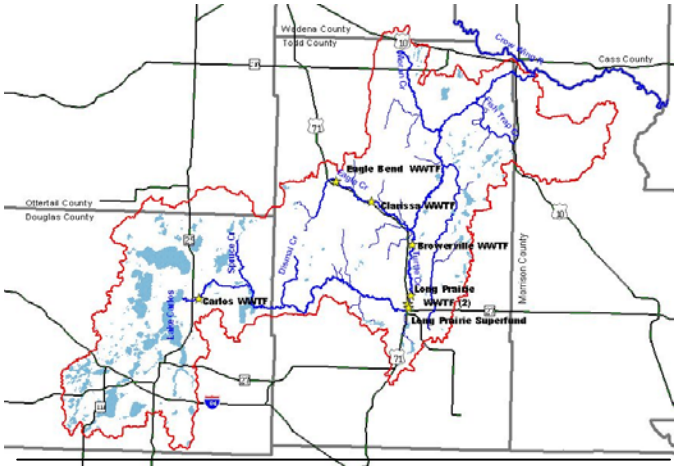
Regional Environmental Management

Impaired Waters Program

Dissolved oxygen problem in the Long Prairie River

Water Quality/Impaired Waters #8.01a July 2004

The Minnesota Pollution Control Agency seeks public input on improving water quality by reducing pollution in the Long Prairie River resulting from excess ammonia. Study results indicate that it is possible to reach the water quality standard for dissolved oxygen, by reducing ammonia levels. This will improve conditions for swimming, fishing and aquatic life.



Long Prairie River Watershed

Introduction

The scenic Long Prairie River flows approximately 100 miles from its Lake Carlos headwaters to its outfall near Motley into the Crow Wing River, and eventually, to the upper Mississippi River. The Todd County Soil and Water Conservation District and a private citizens' group requested and obtained a Clean Water Partnership diagnostic grant in 1997. The study defined areas of prime fish habitat that undergo repeated and severe oxygen depletion due to nutrient loading from urban and agricultural runoff. Because of the oxygen depletion, the river did not meet water quality standards in several areas. The federal Clean Water Act requires states to adopt water quality standards to protect the nation's waters. These standards define how much of a pollutant can be in surface or ground water while still allowing it to meet its designated uses, such as drinking water, fishing, or swimming, among others. The Long Prairie River is among many of the state's water resources that currently do not meet their designated uses.

TMDL study required

For each pollutant that causes a water body to fail state water quality standards, the Clean Water Act requires states to conduct a Total Maximum Daily Load (TMDL) study. The study identifies all the sources of each pollutant in an affected water body. Water quality sampling and computer modeling, together with public input, determine how much each pollutant source must be reduced to assure the standard is met in that water body.

Long Prairie River impairments

Low dissolved oxygen (DO) due to high levels of ammonia impair water quality in the Long Prairie River. The low dissolved oxygen problem occurs primarily during low-flow conditions. Low-flow conditions occur when the volume and current of the water in the river are less than average.

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The dissolved oxygen problem

The pollutants of concern for low DO are carbonaceous and nitrogenous biochemical oxygen demand (CBOD and NBOD). BOD occurs when organic material decays and consumes dissolved oxygen in the process. CBOD is a general measure of organic materials such as sewage solids, animal wastes, animal and other food processing wastes and plant litter. NBOD is a general measure of how much oxygen is used to break down nitrogen-based pollutants – in this case ammonia. This process leaves less oxygen available for aquatic life, which can cause fish kills.

The pollutants of concern originate from both point and non-point sources in the watershed. Point source refer to a specific discharge point such as a pipe. Non-point refers to overland runoff. Point sources requiring permits under the National Pollutant Discharge Elimination System (NPDES) include five municipalities with wastewater treatment facilities. Non-point sources include runoff from agricultural land. The main crops are potatoes, corn, soybeans, and alfalfa.

Subwatersheds that exhibit high pollutant export have been identified in this study through modeling based on agricultural practices, topography, soil characteristics, climatology, and other factors. The point (wastewater facilities) and nonpoint (agricultural) sources are not equal contributors at any one time or place in the watershed. This is why monitoring and modeling are important in the development of a TMDL.

Model helps identify ammonia reductions

The MPCA hired a consultant (Wenck Associates, Inc.) to complete a modeling study of the Long Prairie River. The model helps to identify the most efficient and practical methods of attaining the ammonia (and resulting BOD) reductions. It also helps to quantify pollutant contributions by tributary, land use, and pollutant source. As a result, targets in each of the modeled watersheds will be established to reduce ammonia loading to the Long Prairie River.

An overall reduction in ammonia from all sources is desirable. However, the ammonia loads during low-flow conditions are of primary importance because it is during low-flow conditions that the dissolved oxygen standard is violated. To solve this problem, wastewater plants and other direct discharges will need greater reductions because they contribute more ammonia during this time.

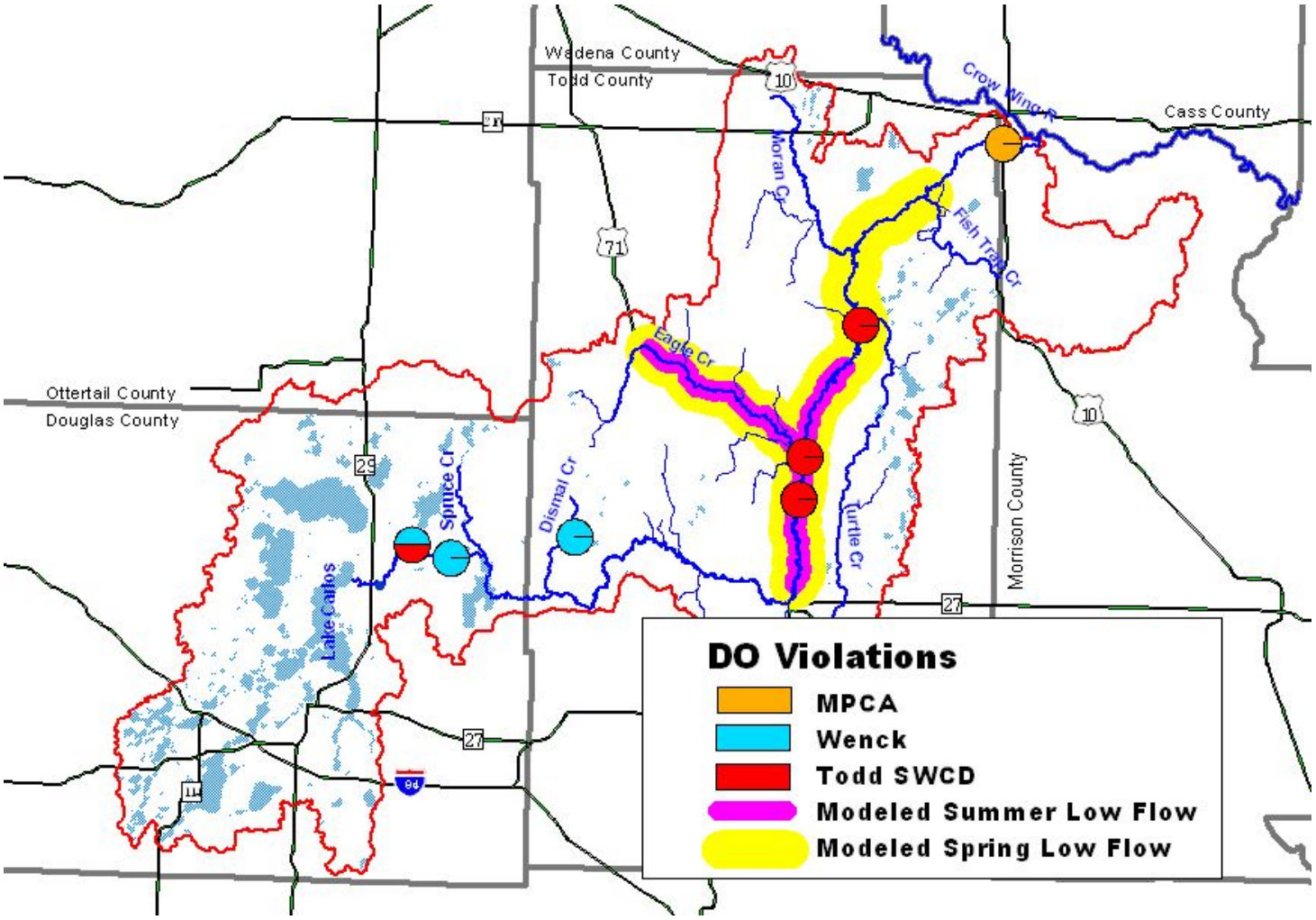
Other sources such as agricultural runoff contributions are limited **during low flow conditions** due to decreased runoff. It is important to note that runoff sources will also play a role in solving this problem, even at low flow, as no source alone can resolve the problem. During high flow conditions, the agricultural sources play a larger role in the dissolved oxygen problem, consequently these sources need to be addressed too.

Solving the problem

Results from the study indicate that, with ammonia reductions, it is possible to meet the dissolved oxygen standard in the Long Prairie River during low flow conditions. The MPCA would like input from stakeholders in the Long Prairie River on how to achieve these reductions. From July 22, 2004, until August 23, 2004, people will have the opportunity to comment on the report that has been developed to present the results of monitoring and modeling, as well as proposed solutions. Following the public comment period, a report will be submitted to the U.S. Environmental Protection Agency, (EPA) on September 1, 2004, for approval. The report is a requirement of EPA, under the Clean Water Act.

For more information

For more information, contact Pat Shelito, (218)828-2493, or Hafiz Munir, (651)296-9286. Toll free: (800)657 3864. On the Web, visit http://www.pca.state.mn.us/water/tmdl


Wadena County
Todd County
Crow Wing R
Cass County
Moran Cr
Fish Trap Cr
Eagle Cr
Ottertail County
Douglas County
Spruce Cr
Dismal Cr
Turtle Cr
Morrison County
Lake Carlos
DO Violations
MPCA
Wenck
Todd SWCD
Modeled Summer Low Flow
Modeled Spring Low Flow