The list of impaired waters developed by the Minnesota Pollution Control Agency includes portions of the Cottonwood River and several tributaries in southwestern Minnesota, which fail to meet the water quality standard for turbidity. The Redwood-Cottonwood Rivers Control Area (RCRCA) and cooperating agencies are developing a Total Maximum Daily Load (TMDL) report documenting the impairments.

**TMDL background**

Under the federal Clean Water Act, states are required to submit a list of impaired waters to the U.S. Environmental Protection Agency every two years. In addition to submitting the list, states must evaluate impaired waters to determine pollutant sources and make reasonable progress toward cleaning up or restoring listed waters. A Total Maximum Daily Load (TMDL) study must be conducted for each pollutant affecting an impaired water. The study identifies all pollutant sources and determines the amount of reduction needed by each source to restore water quality. State agencies, local organizations and other stakeholders work together using water sampling data, computer modeling and public input to develop TMDLs.

**Description of Water Body**

The 1,313-square-mile Cottonwood River Watershed drains sections of Lyon, Murray, Cottonwood, Redwood, and Brown counties. Land use is primarily agricultural, accounting for approximately 88% of the available acres. Artificial drainage to remove ponded water from flat and depressional areas is extensive. The lower section of the Cottonwood downstream from Sleepy Eye is winding with steep banks below high bluffs. Destabilization and failing of these high banks has the potential to contribute significant amounts of sediment to the river in the lower reaches. Seasonal patterns often influence flow discharge patterns in the Cottonwood River; the general trend is for flows to increase in spring, peak in late spring to early summer, and decline through late summer.

**What is turbidity?**

Turbidity in water is caused by suspended and dissolved matter such as clay, silt, organic matter, algae and color. Turbidity limits light penetration and inhibits healthy plant growth on the river bottom. Aquatic organisms may have trouble finding food, gill function may be affected, and elevated amounts of sediment associated with turbidity can cause spawning areas and other habitat to be covered. It is recognized as an indicator of water quality – the greater the turbidity, the greater the pollution.
Measuring turbidity

Turbidity can be measured by instruments that record how much light is scattered and absorbed in a water sample. This is recorded in Nephelometric Turbidity Units. Light can be scattered by suspended particles and soluble colored compounds. The water quality standard for turbidity in class 2B waters is 25 NTUs. Water clarity, which is different than turbidity, can be measured with a Secchi disk or transparency tube. The latter is used in rivers and streams to obtain a stationary sample not affected by the current.

Total suspended solids

Total suspended solids (TSS) is a quantitative measure of suspended matter in water that is closely associated with turbidity. TSS is the concentration of suspended material in the water as measured by the dry weight of the solids filtered out of a known volume of water. TSS is usually expressed as milligrams per liter. TSS can include sand, silt, clay, plant fibers, algae, and other organic matter.

Pollution Sources

Sources of increased turbidity levels include erosion from fields or construction sites, urban runoff from precipitation, eroding streambanks, bottom feeders such as carp and excessive algal growth. High concentrations and loads of suspended sediments and nutrients are often linked to artificial drainage patterns (ditches, tile, etc.) and wetland reductions.

Turbidity solutions

Land use practices that reduce the amount of sediment and nutrients entering lakes and streams are necessary to reduce turbidity. Riparian (streambank, lakeshore) buffers, streambank stabilization, water storage, surface tile intake buffers or replacements, and crop residue management, all help reduce sediment transport. On farmland conservation tillage and increased crop diversity including pasture can reduce sediment loss considerably. Crop nutrient management plans help keep nitrogen and phosphorus out of waters, as do improvements in private and public wastewater treatment systems. In cities and developing areas, stormwater management and construction erosion control help prevent sediment runoff.

Project Partners, Process

All the available data will be organized into a database with assistance of Minnesota State University Mankato’s Water Resource Center. A TMDL implementation plan will be developed. The plan will provide a strategy for implementation of practical management measures needed for the Cottonwood River to meet the water quality standards. Citizen involvement, education and outreach, and pollution prevention are key components of all TMDL implementation plans.

More Information

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The draft TMDL report will be available on the Web at: www.pca.state.mn.us/water/tmdl/index.html#/drafttmdl. General information on TMDLs can be found on the Web at: www.pca.state.mn.us/water/tmdl/ and www.epa.gov/owow/tmdl/