



Chippewa River Fecal Coliform Total Maximum Daily Load Project

Water Quality/Basins • September 2006

Data at several Chippewa sub-watershed sites show a strong positive correlation between precipitation and fecal coliform bacteria concentrations.

The summer period from June through August is the critical period when fecal coliform levels exceeded the level of impairment. The summer impairment was driven by storm events.

The 2006 list of impaired waters developed by the Minnesota Pollution Control Agency includes nine reaches, or segments, of the Chippewa River in western Minnesota that fail to meet the standard for human contact due to excessive amounts of fecal coliform bacteria. The MPCA has prepared a Total Maximum Daily Load (TMDL) report documenting the impairments. The report also includes an additional segment with data showing impairment. A TMDL study calculates the maximum amount of a pollutant a water body can receive (known as the “loading capacity”) without violating water quality standards. The TMDL process identifies all sources of pollutants causing impairments and allocates reductions necessary to meet the water quality standard.

Improper manure application to crop land contributes the largest fecal coliform loads to the Chippewa River, according to the report. Other sources include pastures and feedlots, wildlife, unsewered communities, stormwater, and failing individual sewage systems. The water quality standard for fecal coliform bacteria is an average of 200 colony forming units (CFU) per 100 milliliters (mL) of water. Above this level there is greater risk of disease caused by bacteria. This causes the water to be less suitable for swimming or as a source of drinking water.

Watershed Description

The Chippewa River originates in northeast Douglas County and flows about 130 miles southwest to Montevideo where it enters the Minnesota River. The Chippewa River

watershed covers more than 1.3 million acres and is one of the largest watersheds in the Minnesota River Basin. It covers most of Pope and Swift Counties, and portions of Chippewa, Kandiyohi, Stevens, Douglas, Grant and Otter Tail counties. There are seven sub-watersheds in the watershed. Monitoring data from each was used to develop the TMDL.

Land-use is dominated by agricultural cropping and animal production. Beef production and dairy represent more than half of the approximately 160,000 animal units (1 animal unit=1,000 lb. animal) in the watershed. Cropland comprises 73.5 percent of the watershed, and urban land nearly 2.0 percent. Runoff from livestock feedlots, pastures, and land application areas has the potential to be a significant source of fecal coliform bacteria and other pollutants. Natural background loads for fecal coliform bacteria can be attributed to wildlife (primarily deer and geese).

The population is estimated at 37,500 – 17,500 rural and 20,000 urban. The majority of the urban population is served by centralized sewage treatment. About 3 percent of the urban population lives in unsewered communities. It is estimated that 50 percent of the rural households have out-of-compliance septic systems. Of these 25 percent, or 875 households, have septic systems that discharge to tile.

Monitoring and Assessment

The MPCA and Chippewa River Watershed Project (CRWP) monitored the

Chippewa River and its tributaries for fecal coliform at several locations. All sub-watersheds exceeded the chronic and acute standards at least once during the five years of sampling used in this report. Data at several Chippewa sub-watershed sites show a strong positive correlation between precipitation and fecal coliform bacteria concentrations. When storms occur, weather-driven sources, e.g. feedlot runoff, overgrazed pasture runoff, manured fields, and urban stormwater overshadow continuous sources.

In drought or low-flow conditions continuous sources, e.g. cattle in streams, failing individual sewage treatment systems, unsewered communities, and wastewater treatment facilities dominate. Besides precipitation and flow, factors such as temperature, livestock management practices, wildlife activities, age of fecal deposits, and channel and bank storage also affect bacterial concentrations in runoff. Readily available fecal coliform sources are storm-event driven, and runoff from rain events is the primary delivery mechanism in wet periods.

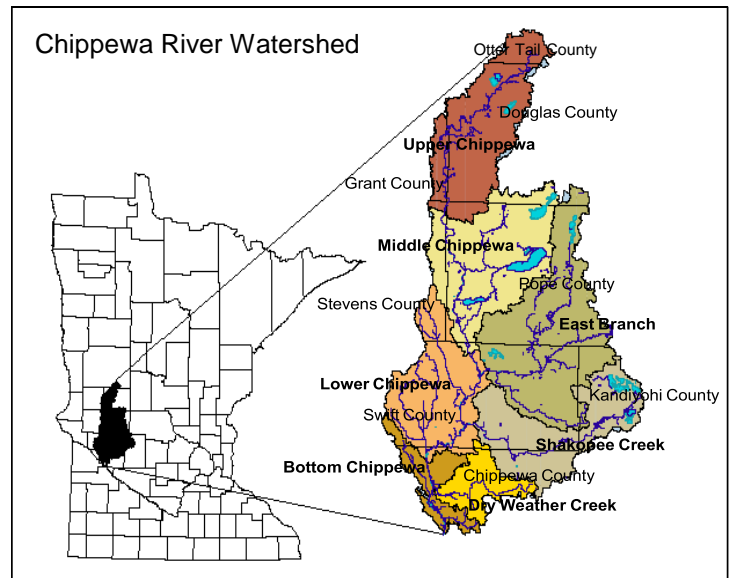
Seasonal Flow Variations

The flow duration approach used in this report captures the full range of flow conditions over the April-October period when the fecal coliform water quality standard applies. Seasonal variation in flow is a key part of TMDL development. Daily loads are directly proportional to flows (i.e. load equals flow times concentration times a conversion factor).

Fecal coliform samples and flow measurements were conducted over the spring, summer, and fall months (April-October). The results indicated a wide range of flows and fecal coliform concentrations. The large flows associated with snow melt events in the spring did not exceed the impaired levels. Generally, land application of manure occurs in late spring through early summer. The summer period from June through August is the critical period when fecal coliform levels exceeded the level of impairment. The summer impairment was driven by storm events.

Best Management Practices

Once the sources of the impairment have been identified and load allocations assigned, best management practices will be implemented to achieve the Total Maximum Daily Load goal. These are being developed by the watershed citizens, CRWP, and Minnesota Pollution Control Agency.



The CRWP embraces a watershed-wide approach to achieving water quality standards for fecal coliform bacteria within ten years. The final implementation plan will be developed within a year of the final approval of the report by the EPA. The main potential sources (municipal wastewater, septic systems, grazing livestock, urban stormwater, feedlots, and field-applied manure) are associated with the likely flow zones in which they would be effective. A project team will rank them from most significant to least significant as well as point towards some implementation strategies.

For more information

For more information on the Chippewa River Fecal Coliform Bacteria TMDL project, contact the MPCA at 651-296-6300 or 800-657-3864 and ask for the TMDL Coordinator. The draft TMDL report will be available on the Web at:

www.pca.state.mn.us/water/tmdl/index.html#drafttmdl.

The Chippewa River Watershed Project website is located at: www.chippewariver.com/.

General information on TMDLs can be found on the Web at: www.pca.state.mn.us/water/tmdl/ and www.epa.gov/owow/tmdl/