

Watershed Pollutant Load Monitoring Network

Overview

The passage of the Clean Water, Land and Legacy Amendment and subsequent appropriations by the Legislature from the Clean Water Fund are enhancing monitoring of Minnesota waters and our understanding of the relative contributions of pollutants to and from these waters. One such example is the Minnesota Pollution Control Agency's Watershed Pollutant Load Monitoring Network (WPLMN), which was designed to measure and compare pollutant load data from Minnesota's rivers and streams and track water quality trends. WPLMN data will be used to assist with: assessing impaired waters, watershed



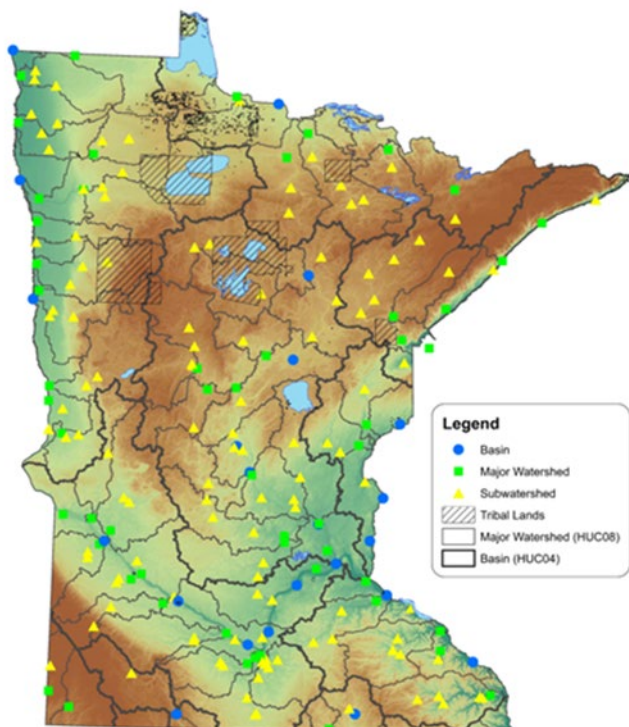
Pollutant load

The mass, or amount, of a pollutant that passed a monitoring station over the course of the monitoring period.

modeling, determining pollutant source contributions, developing watershed and water quality reports, and measuring the effectiveness of water quality restoration efforts.

This long-term program utilizes state and federal agencies, Metropolitan Council Environmental Services, state universities, and local partners to collect water quality and flow data to calculate pollutant loads.

Figure 1: WPLMN monitoring sites



Monitoring sites span three ranges of scale:

Basin – major river main stem sites along the Mississippi, Minnesota, Rainy, Red, St. Croix, Des Moines, and Cedar rivers average drainage area of 1,350 square miles (8-digit HUC scale)

Major Watershed – tributaries draining to major rivers with an average drainage area of 1,350 square miles (8-digit HUC scale)

Subwatershed – branches or nodes within major watersheds with average drainage areas of approximately 300-500 square miles

Basin and major watershed monitoring sites were established between 2007 and 2010. Subwatershed monitoring sites were established between 2011 and 2015. There are currently 22 basin, 54 major watershed, and 121 subwatershed sites within the WPLMN (Figure 1). Major watersheds contained mostly outside of Minnesota were not included in the network.



Monitoring and analysis

Intensive water quality sampling occurs at all WPLMN sites. Up to 35 samples are collected annually at basin and major watershed sites, and up to 25 samples are collected seasonally (ice-out through October 31) at subwatershed sites. Sampling frequency is greatest during all major snowmelt and rain events. Low flow periods are sampled less frequently as pollutant concentrations are generally more stable when compared to periods of elevated flow. Despite discharge related differences in sample collection frequency, this staggered approach results in samples being well distributed over the entire range of flows.

Annual water quality and daily average discharge data are coupled in the pollutant load model to estimate pollutant concentrations and loads on days when samples were not collected. Annual and daily average pollutant loads and flow weighted mean concentrations are calculated for:

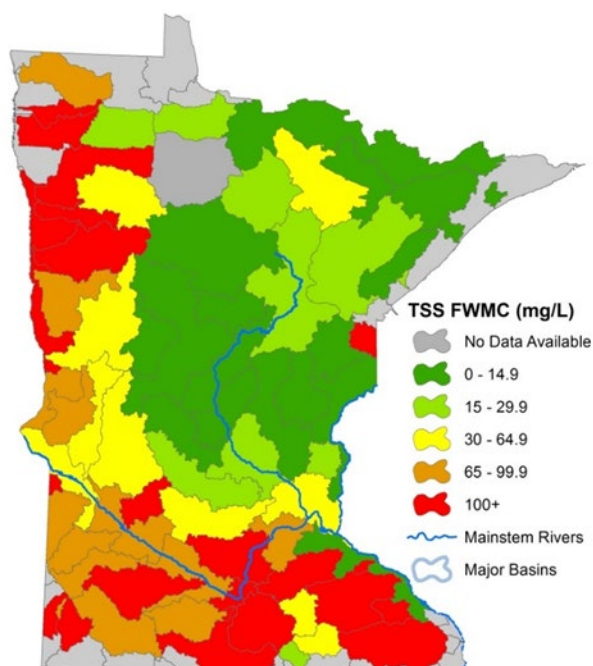
- Total suspended solids (TSS)
- Dissolved orthophosphate (DOP)
- Total phosphorus (TP)
- Nitrate-nitrite nitrogen ($\text{NO}_3 + \text{NO}_2\text{-N}$)
- Total Kjeldahl nitrogen (TKN)

Products and information

Annual and average pollutant load data, water quality maps (Figure 2), trend information, and more information about the WPLMN are available at: <https://www.pca.state.mn.us/water/watershed-pollutant-load-monitoring-network>

Site specific stream flow can be found at: <http://www.dnr.state.mn.us/waters/csg/index.html>.

Figure 2: TSS flow weighted mean concentrations by major watershed



Flow weighted mean concentration

The average concentration of a pollutant in each liter of water that passed a monitoring station over the course of the monitoring period.

Partners

Minnesota Department of Natural Resources
United States Geological Survey
Environment and Climate Change Canada
Fillmore SWCD
Hawk Creek Watershed Project
International Water Institute
Itasca SWCD
Koochiching SWCD
Lake of the Woods SWCD
Metropolitan Council Environmental Services
Middle Fork Crow River Watershed District
Mille Lacs SWCD
Minnesota North College-Vermilion
Minnesota State University-Mankato, Water Resources Center
North Fork Crow River Watershed District
Olmsted SWCD
Redwood Cottonwood Rivers Control Area
Sherburne SWCD
Sibley SWCD
University of MN-Natural Resources Research Institute