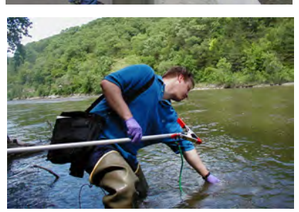
Water Quality Monitoring

The Minnesota River flows more than 335 miles from its source near the Minnesota-South Dakota border to its confluence with the Mississippi River at Minneapolis/St. Paul. The Minnesota River is the state's largest tributary to the Mississippi River. The Minnesota River Basin, the land that drains into the Minnesota River, encompasses roughly 15,000 square miles and contains all or parts of 37 Minnesota counties. The river drains nearly 20 percent of Minnesota and winds through a predominantly agricultural landscape.

Researchers collect water quality samples from across the Minnesota River Basin. A multi-agency team reviews and evaluates water quality data every other year and prepares a State of the Minnesota River monitoring report which can be found online on the Minnesota River Basin Data Center website: http://mrbdc.mnsu.edu

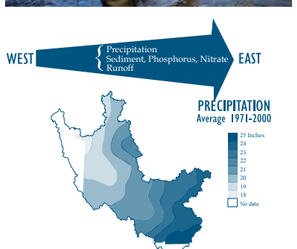
This overview summarizes water quality monitoring at four Minnesota River mainstem locations and fourteen outlets of major tributary streams. The information represents results from more than 4,000 water-quality samples collected from 2000 to 2008. Team partners include state and county agencies and many watershed projects throughout the Basin.



Minnesota River Basin monitoring data from 2000 to 2008 indicate three major categories of water quality concerns: excessive sediment, nutrient enrichment and environmental health.

Water quality data have been collected throughout the Minnesota River Basin during the past thirty years and studies have shown excessive nutrient and sediment concentrations. Large portions of the basin do not meet state water quality standards for bacteria, turbidity, dissolved oxygen, ammonia, and biota. You can learn more about these waters that do not meet state water quality standards (impaired waters) by visiting the Minnesota Pollution Control Agency's website: www.pca.state.mn.us/water/tmdl/index.html

Researchers have analyzed almost thirty years worth of water quality data from the Minnesota River at Jordan and Fort Snelling. Trend analyses indicate increasing nitrate-N concentrations in the last ten years. Decreasing trends in total suspended solids and total phosphorus were found over the entire period.

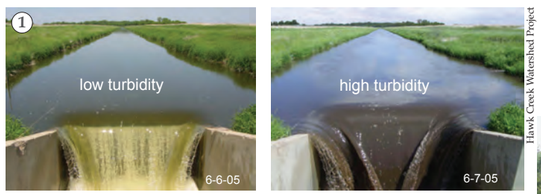


Precipitation, runoff and pollutants generally increase in a west-to-east pattern.

Excessive Sediment

Excessive amounts of sediment degrade the ecological health and aesthetics of the Minnesota River and its tributaries. Turbidity refers to water clarity. The greater the amount of total suspended solids in the water, the murkier it appears and the higher the measured turbidity. This results in reduced light penetration that harms beneficial aquatic species and favors undesirable algae. An overabundance of algae further increases turbidity and compounds the problem.

Fine-grained sediments that settle on stream beds cover desirable rock and gravel that form essential habitats for invertebrates and fish. During periods of high turbidity, streams take on a murky appearance, greatly reducing their appeal to people who enjoy boating, fishing, or swimming.

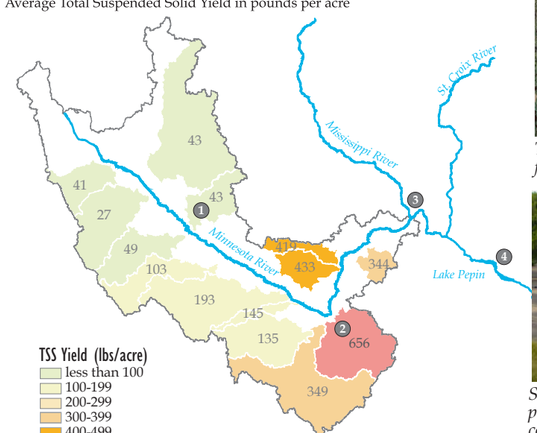


The photos above show the dramatic increase in turbidity that often occurs when heavy rains fall on unprotected soils. Upon impact, raindrops dislodge soil particles while runoff waters easily transport fine particles of silt and clay across fields or through drainage systems to ditches and tributary streams throughout the Minnesota River Basin. Photo: Chetomba Creek, Hawk Creek Watershed. Note photos were taken only one day apart.

Streambanks and gullies also contribute sediment to the streams and rivers. Photo: Le Sueur River streambank

Total Suspended Solids

Average Total Suspended Solid Yield in pounds per acre



The sediment laden Minnesota River flows into the Mississippi River.

Sediment settles in Lake Pepin. Over 90 percent of Lake Pepin's sediment load is coming from the Minnesota River. The lake is filling in at 10 times its natural rate.

Nutrient Enrichment

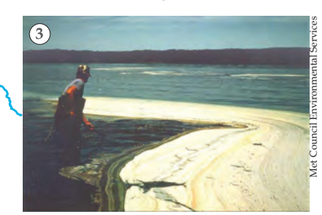
Phosphorus

Phosphorus-enriched streams are commonplace in the Minnesota River Basin. Elevated phosphorus levels stimulate algal growth and often lead to undesirable conditions. An overabundance of algae and sediment contributes to increased turbidity and reduced light penetration. Water clarity is greatly reduced under these conditions. When the algal cells die, their decomposition consumes large amounts of dissolved oxygen. Lower dissolved oxygen can impair the stream's ability to support aquatic life. Some outbreaks of highly elevated algal growth, termed algal blooms, release toxins into the water. Instances of this have occurred within the Minnesota River Basin and resulted in the death of animals (including pets) that ingested these toxins.

Phosphorus concentrations show substantial variation across the Basin. During 2000 to 2008, the average phosphorus concentration in the Minnesota River mainstem reach from Judson to Fort Snelling was 0.31 mg/L. Studies indicate that a reduction in undesirable algal growth cannot be expected unless mainstem phosphorus concentrations are brought below a threshold value of 0.26 mg/L. Several Minnesota River tributaries have phosphorus concentrations substantially greater than the threshold value (see map). These highly-enriched tributary streams deliver phosphorus loads that enrich the mainstem and slow the recovery of the Minnesota River. Phosphorus arises from both point (e.g. municipal and industrial discharges) and non-point sources (e.g. runoff from agricultural lands and urban areas).

Watonwan River algal bloom.

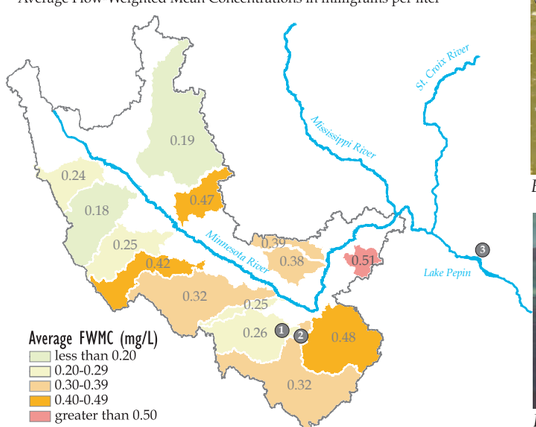
Blue Earth River algal bloom.



Lake Pepin algal bloom. The lake is accumulating phosphorus at 15 times the natural rate.

Total Phosphorus

Average Flow-Weighted Mean Concentrations in milligrams per liter



EPA desired goal: 0.1 mg/L
Target to reduce algal growth: 0.26 mg/L