Our Minnesota River

Evaluating the health of the river

- From Big Stone Lake to where it meets the Mississippi River

Many challenges and some signs of progress

This land drains its water to the Minnesota River.

The river continues to suffer

Overall, the Minnesota River is unhealthy. Sediment clouds the water, phosphorus causes algae, nitrogen poses risks to humans and fish, and bacteria make the water unsafe for swimming. Too much water flowing into the river plays a big part in all these problems. There's more rain, more artificial drainage, and not enough places to store this water. Worse yet, the landscape is naturally vulnerable to erosion.

More water: More rain combined with more drain tile and ditching are bringing in more pollutants from the landscape, such as sediment, bacteria, and nutrients.

Bright spots

Cities: Improved waste-water treatment.

Farms: Growing interest in cover crops, soil health, conservation farming.

So. Dakota

Wisconsin

Big Stone Lake

Granite Falls

Redwood Falls

New Ulm

St. Peter

Mankato

Chaska

Twin Cities Metro

Confluence with Mississippi River

Cottonwood River

Le Sueur River

Blue Earth River

Sediment: Rapid rises in flows from tributaries scour sediment from ravines and streambanks.

Tributary trouble: Blue Earth, Cottonwood, and Le Sueur rivers bring in most of the pollutants.

Nitrate in water

Mankato draws drinking water from shallow wells that are strongly influenced by the Minnesota and Blue Earth rivers. Although the city's water is still safe, high river nitrate levels in recent years are a major concern.

The big picture

Scientific monitoring identifies these as the major trends in the Minnesota River.

Increasing water flow is big problem

Increasing flows are a major factor in the Minnesota River basin, accelerating erosion of river banks, reducing water quality and threatening infrastructure. In the last 80 years, flows have doubled in the Minnesota River. It isn't just an increase in precipitation causing increased flow; the river actually carries more water now per inch of rain than historically. Increased artificial drainage, reduced storage on the land (wetlands) and lack of perennial vegetation all contribute to higher flows.

Too much sediment from unstable stream banks and farm fields

Sediment levels are high in the Minnesota River. This results in poor habitat for river life, such as mussels and aquatic insects. Farm fields contribute 35% of the sediment in the Minnesota River. The remainder – 65% – comes from unstable stream banks, ravines, and collapsing bluffs, as a result of increased flows. Farmers lose productive soil, and the sediment clogs the navigation channels that are vital to farm commodity transportation.

Too many nutrients: phosphorus and nitrate

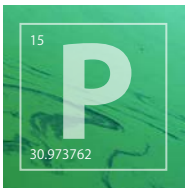
The Minnesota River has high levels of phosphorus, capable of growing excess amounts of algae. Algae blooms make water unsuitable for recreation and use up oxygen needed by fish and other river life. Sources are cropland, streambanks, and ravines. Wastewater treatment plants are also a source, but they have dramatically reduced their contribution in last 20 years. Nitrate levels are increasing, posing threats to river life and drinking water.

Too much bacteria increase risk of human illness

Bacteria levels in much of the river are high enough to be a concern. While these levels don't prevent recreation, they do increase the risk of illness. Sources include manure runoff and failing septic systems. Bacteria levels in the river are lower from Granite Falls to the Blue Earth River confluence, and from Jordan into the Twin Cities.

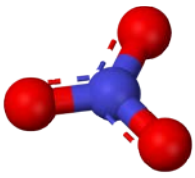
Major pollutants in the Minnesota River

Sediment is soil from runoff and erosion that clouds the water and can harm river life. Higher flows from human activities like artificial drainage create unstable streambanks, the main source of the soil.



Phosphorus, from wastewater, manure, and fertilizer, is a nutrient that causes algal blooms and impacts river life and recreation. The river produces excess algae in the summer months, especially when hot, dry weather persists.

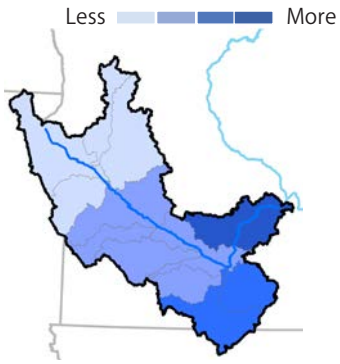
Bacteria from untreated human and animal waste, carried by field runoff and sewage pipes, can make water unsafe for swimming and other recreation.



Nitrate is from runoff of agricultural fertilizer and manure, and can make water unsafe for drinking. It can also be toxic to fish and other river life.

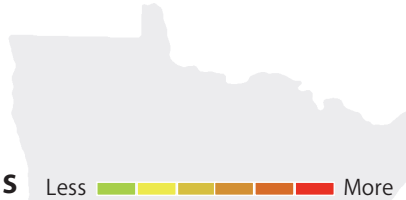
Evidence

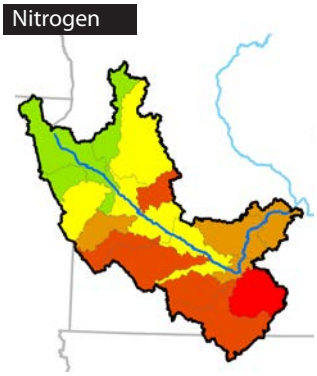
Runoff levels



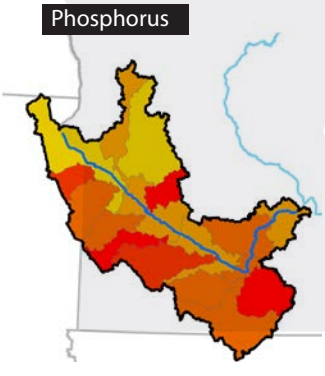
Increasing runoff, increasing flow
Flow is increasing across the Minnesota River basin because of dramatic changes the landscape through drainage for cropland. People drained wetlands and ponds while installing extensive tiling and ditch systems. And a changing climate means more heavy rains.

Current pollution levels

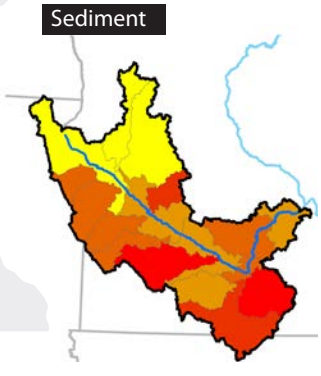




Ups and downs with nitrogen
While nitrogen was steadily decreasing in the Minnesota River basin in the late 1990s, monitoring since then has shown variability. Future decreases will depend on the difficult challenge of better controlling nitrogen runoff and leaching from crops and lawns.



Progress with phosphorus
Phosphorus has significantly decreased throughout the Minnesota River basin for many reasons. The main reductions are from wastewater treatment facilities. But phosphorus needs to decrease more for a healthier river. The primary sources today are livestock operations, farming activities, and erosion of land.



Still muddy but getting clearer The good news: the amount of sediment in the river is decreasing. The bad news: it's still really high. Widespread adoption of practices like cover cropping, retention ponds, and saturated buffers would make the river less muddy.

More water is bringing in more pollutants from the landscape.

* There's less pollution in every gallon of Minnesota River water, BUT there's more water flowing, which means total pollution hasn't decreased.

A river where aquatic life struggles

Throughout its length the Minnesota River does not support healthy river life. Too much sediment and nutrients are pollutants that harm fish, insects, and mussels. At monitoring stations with sufficient data, the numbers and types of aquatic insects and other organisms found indicate a river that is unable to support healthy populations. Throughout the river more than 25% of the mussel species that once called the river home are no longer present, and in the lower reaches of the Minnesota River this number exceeds 50%.

Drainage and land use practices within the Minnesota River basin have dramatically affected the channel stability and flow rates within the river. These unstable conditions make it difficult for more immobile organisms such as aquatic insects and mussels to survive and thrive.

Many insects like this dragonfly begin their lives in water. The sensitivity of aquatic insects to changes in water quality make them reliable indicators of stream health.

How progress gets made

More than 80% of the land in the Minnesota River basin is used for agriculture. Since that's the majority land use, that's where most of the work needs to be done. Many of the practices that benefit water quality also enhance soil health and keep it in the crop field.

Leaders in protecting water

The Mogensen family are farmers on 2,100 acres in Nicollet County. Ravines cut into much of their farmland, carrying water down to Seven Mile Creek below. They've installed erosion controls at the top of nearly every ravine on the land, and have150 acres in Conservation Reserve Program, including border strips around fields next to ravines. This means that 30-100 feet of prairie grasses slow down and filter stormwater runoff. The Mogensens have long used no-till and strip-till for planting, and are now incorporating cover crops and conservation drainage into their farming.

Investments paying off for river

Wastewater treatment facilities have made tremendous progress reducing the amount of phosphorus they discharge to the Minnesota River and its tributaries. From 2000 to 2016, the 274 facilities discharging to the Minnesota River basin have cut their phosphorus loads by 65%. While additional reductions are needed in phosphorus from wastewater, cropland and other sources, this investment is paying off in higher dissolved oxygen for fish and other river life.

Networking for river health

In 2011, a group of farmers, homeowners, recreationists, and elected officials decided to ramp up efforts to improve water quality in the Le Sueur River. They formed the Le Sueur River Watershed Network. They host meetings and events to learn, share, network, and start projects. The network promotes seven practices for greater river health: manage stormwater more; increase temporary water storage; strategically place buffers, terraces and waterways; communicate more; cut red tape; remove snags in the river; and stabilize more stream banks and ravines.

Continual living cover

A focus of the Chippewa River Watershed Project is to increase the acreage of land in continual living cover by 10%, or an additional 133,000 acres.

Cover crops with sugar beets

The Hawk Creek Watershed Project and Renville SWCD provide technical and financial assistance for cover crops. Sugar beet growers here use cover crops on more than 100,000 acres to reduce soil erosion, increase water infiltration, and build soil health.

ACTIONS TO TAKE

Invest in water storage

Methods that filter and store rainwater lead to cleaner water in the rivers.

- Increase temporary storage areas
- Manage drainage with outlet controls, grass waterways, ditch buffers, saturated buffers
- Install more stormwater treatment basins

Build soil health

Actions that increase soil health also help the land absorb more water during heavy rains.

- Expand use of cover crops and keep roots in the soil for more of the year
- Increase soil organic matter for better water infiltration
- Reduce tillage to keep valuable soil in farmers' fields

Signs of progress

Fish like this lake sturgeon are rare in the river. But there is hope that such species could make a return in a healthier river.

Some good news on the fish

Fish populations are generally considered healthy throughout the river and some types of fish that were once in decline appear to be rebounding. Species of special concern (very uncommon and deserving of careful monitoring status) like the blue sucker and lake sturgeon are beginning to show up more regularly in sampling and/or angling surveys. For example, there are only eight verified records of lake sturgeon collected in the entire Minnesota River basin since 1950, but four of these have been very recent occurrences. Because fish are more mobile than water insects, they are doing better.

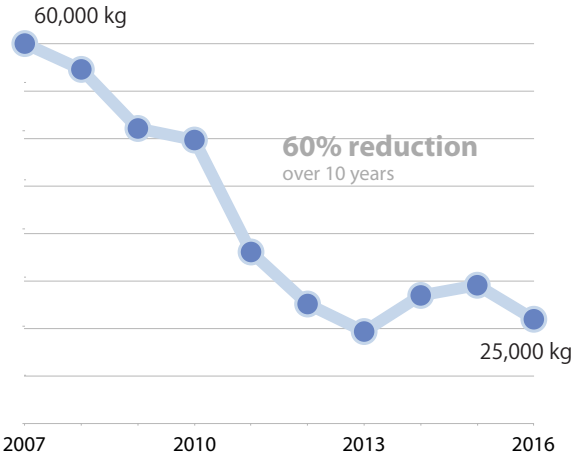
Monitoring supports locally-driven watershed planning

Water monitoring is one step towards improving the health of Minnesota's major watersheds. The next step is identifying stressors and then creating strategies to restore unhealthy waters and protect healthy ones. The MPCA works with other agencies, local groups and citizens to develop these strategies, which are assembled with all the science into guidelines called Watershed Restoration and Protection Strategies (WRAPS).

This work supports **One Watershed, One Plan**, a 2011 law that strengthens local efforts to do comprehensive planning, while allowing flexibility related to how the plans are created.

Big reductions

Phosphorus in wastewater flowing into the Minnesota River



The MPCA regulates the amount of phosphorus discharged from wastewater treatment facilities. Over the last 10 years, **significant reductions** have been made by the 40 largest facilities, driven in large part by tighter permit limits and good compliance from community wastewater treatment plants.

Removing dams helps fish

Removal of the old Minnesota Falls dam southeast of Granite Falls restores natural flow and allows fish to migrate farther upstream. A dam remaining in the city blocks further movement. In Minnesota River surveys done in 2014, the Minnesota Pollution Control Agency collected 67 different types of fish downstream of the dam, versus only 43 above the dam. The city is studying a plan to create a fish passage around the dam, along with a whitewater paddling channel.

About this study

The Minnesota Pollution Control Agency (MPCA) studied pollutant levels and river life of the Minnesota River from its origin at Big Stone Lake to the confluence with the Mississippi River in St. Paul. While the agency has studied smaller watersheds that drain to the Minnesota, this is a comprehensive look at the entire 338 miles of the river as a whole.

Monitoring

The MPCA and its partners study and monitor lakes and streams for:

- Levels of nutrients, sediment, bacteria, toxics, dissolved oxygen, chloride, pH, ammonia
- Communities of fish and macroinvertebrates such as aquatic insects
- Flow of rivers and streams
- Contaminants in fish

Assessment – The MPCA takes a look at what the data show, and whether the condition of water bodies meets water quality standards. Water quality standards are the thresholds used to determine the suitability of waters for swimming and boating, and their overall biological health. Water quality standards are not "one size fits all." In many cases they are regionalized for different parts of the state, and tailored to different types of water bodies.

Data – The study gathered or used data from nearly 139 monitoring sites along the river. This includes data spanning 10 years, gathered by local partners and other state agencies. In previous assessments only 53% of the river was assessed for biology and 33% for recreation. In this study 100% of the river was assessed.

Additional resources – The statements included in this summary document about pollution trends, land use practices, and restoration and protection strategies, come from a variety of sources including work on the major watersheds. The information about pollutant contributions from tributaries, and phosphorus and nitrate levels changing over time, comes from a long-term monitoring network run by the MPCA and local partners. Researchers from the University of Minnesota, the Minnesota Climatology Working Group, St. Croix Watershed Research Station, and other organizations have described the impacts of artificial drainage and more intense rainfall events. The solutions described come from the major watersheds WRAPS, and statewide studies such as the *Sediment Reduction Strategy for the Minnesota and Mississippi Rivers*, and the *Minnesota Nutrient Reduction Strategy*.

Questions

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More information is available here:
www.pca.state.mn.us/mn-river-study

Monitoring is not only done in the Minnesota River itself, but also within the watersheds and tributaries that drain to the bigger river. In all, 10 million acres drain to the Minnesota River.

Many people are doing work to improve the water

Many people are working to improve water quality in the Minnesota River basin. Restoring the waters here will continue to depend on individual and group actions, as well as changes in government policies and programs.

Individuals include farmers using conservation practices, city residents planting rain gardens, and interested citizens advocating for changes.

There are many citizen organizations and water-related associations who work tirelessly to increase awareness, educate people, initiate projects and manage programs.

Government partners include cities, counties, soil and water conservation districts, watershed districts and partnerships, state and federal agencies who monitor water quality, analyze data, engage citizens, develop plans, provide funding, enforce laws, and oversee programs to protect river life.

Decision-makers like city councilors, county commissioners and legislators also play a significant role.

In addition, Native American communities are important partners in the Minnesota River basin.

Without all these efforts, the river's water quality would be much worse with no progress to report. Many key pieces are now in place with hopes for a much healthier Minnesota River.