



The Met Council: 40 Years of River Monitoring, 1976–2015

The Great Lakes Network did not contribute any monitoring data to this report. We prepared this brief for Mississippi River park staff in an effort to summarize reports and materials from other agencies that are pertinent to National Park Service management in the Twin Cities area.

The Mississippi River is a source of food, water, and recreation for nearly 3 million people in the Minneapolis/St. Paul Metro area. From here, the river winds nearly 2,000 miles through the heart of the continent before flowing into the Gulf of Mexico. How we care for the river here, in our backyards, affects not only Twin Cities residents, but human and natural communities downstream as well.

The [Mississippi National River and Recreation Area \(MNRRA\)](#) was established in 1988 as a unit of the National Park Service. Functioning through a network of partners, MNRRA helps provide recreational access and educational opportunities along 72 miles of river and adjacent parks and natural areas to residents of the Twin Cities Metro area.

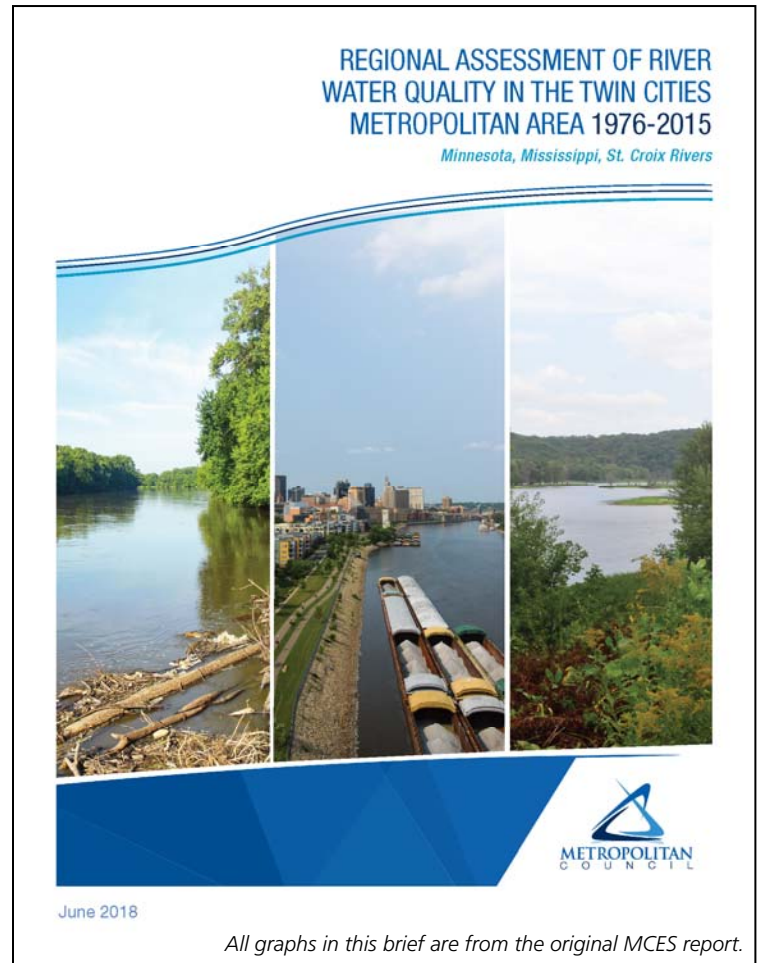
A Regional Assessment of River Water Quality

One of the MNRRA's partners is the [Metropolitan Council](#), a local organization that provides vital mass transit, housing and environmental services to the Twin Cities Metropolitan area. The [Met Council's Environmental Services \(MCES\)](#) branch is responsible by law for managing water use in the metro area, including the operations of eight wastewater treatment plants. As part of these responsibilities, MCES has monitored water quality of the Mississippi, Minnesota, and St. Croix Rivers within the metro area since 1976. In 2018, MCES released a report summarizing all the data collected from 1976 through 2015. The report is an important, comprehensive view of how residents both rely on and can affect the rivers. The report tells us that, [in general, river water quality has improved in the metro area since 1976, with some exceptions.](#)

Water Sampling: Where and What?

Ten sample sites were distributed across the metro area's three major rivers: the Mississippi (6 sites), the Minnesota (2), and the St. Croix (2) (*Figure 1*). Each of these rivers flows through different types of land, and therefore has its own character. The Mississippi River above the metro area is a mix of farmland, forest, and prairie. The Minnesota River originates in eastern South Dakota and flows mostly through farmland. The St. Croix River is less developed, rising from the forests of northwestern Wisconsin.

MCES identified [five main parameters of concern](#): Total suspended solids (TSS), total phosphorus (TP), nitrate



All graphs in this brief are from the original MCES report.

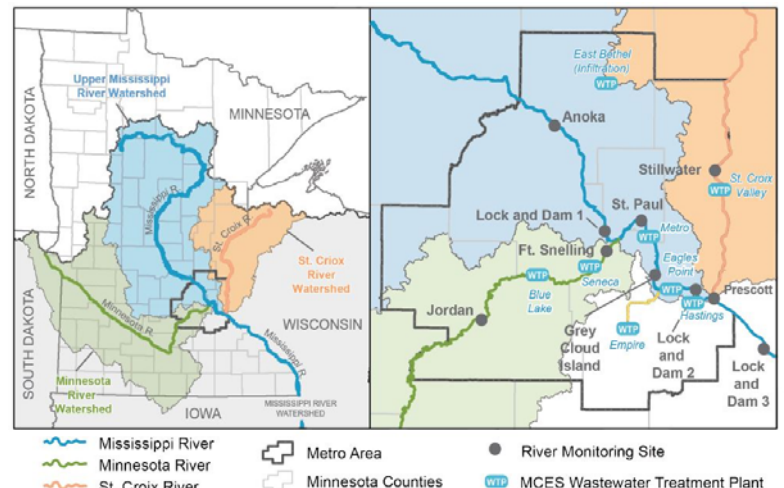


Figure 1. The three metro area rivers are influenced by watersheds that extend beyond the cities (left). Where they converge in the metro area (right) is where the MCES set up 10 water quality sampling stations.

(NO₃), fecal coliform (FC), and chloride (Cl).

Total suspended solids (TSS) describes the concentration of particles suspended in water, such as eroded soil (sediment), algae, or bits of decaying vegetation. Some TSS is natural in rivers, but human-caused erosion and other activities can worsen it. Too much TSS can lead to cloudy, dirty water, which can limit sunlight for aquatic plants, damage fish gills, and smother aquatic habitats.

Total phosphorus (TP) is an important nutrient in aquatic ecosystems and is needed for the growth of plants. Some TP is naturally occurring in rivers, but TP levels can become excessive when polluted water runs off fertilized farmlands and lawns. Too much TP can lead to noxious algae blooms, which in turn can lead to low oxygen levels, which can suffocate fish and other aquatic life. Some algae blooms caused by excessive TP can generate neurotoxins, leading to health problems or death for humans, pets, and livestock. In fact, if the algae-laden water enters the drinking water supply, no treatment can make it safe to drink (and may even concentrate the toxin) until the algae bloom abates!

Fecal Coliform (FC) by itself is a harmless bacterium that originates in the digestive tracts of mammals (including humans) and birds, but it is found with other disease-causing bacteria in water that is polluted with human and animal waste. FC is used as an indicator of fecal contamination because it is easier to test for in water samples than the bacteria that actually cause disease.

Nitrate (NO₃) occurs naturally in low concentrations in lakes and rivers, but higher concentrations are often indicators of polluted runoff from farmlands or discharge from wastewater treatment plants or septic systems. Nitrate is also produced during combustion of fossil fuels, carried through the atmosphere and deposited on the land with rain or snow. High levels of nitrate can lead to excessive algae growth. When all that algae dies, there is an extreme decrease in dissolved oxygen as it is consumed by the bacteria breaking down the algae. Nitrate and other nitrogen pollutants are one of the main causes of the Gulf of Mexico dead zone at the mouth of the Mississippi.

Chloride (Cl) is naturally occurring in lakes and rivers, usually in small concentrations. The biggest source of excessive Cl pollution is something that we have all come to rely on for winter transportation: road salt. The use of road salt has increased in the past 40 years. Salt is applied to roads, parking lots, and sidewalks and runs off into water bodies. Chloride can be very toxic to life that depends on fresh water. Once in the water, the chloride doesn’t simply go away, it accumulates. Chloride can also contaminate soil and groundwater supplies.

What’s In the River?

Of the five parameters of concern, **only nitrate and chloride have increased since sampling began in 1976**. Oddly,

the increase in NO₃ is the result of treating a more toxic problem, and fortunately, none of the chloride levels were high enough to affect aquatic life.

The Minnesota River was the single highest source of nitrate pollution to the Mississippi, indicating runoff from croplands, feedlots, and from fertilized lawns. Concentrations were also relatively high below wastewater treatment plants, but this is where the blessing and curse come in. Nitrate is created from the breakdown of ammonia in the biofiltration component of advanced wastewater treatment. Ammonia levels dropped by 82% at Grey Cloud Island near the St. Paul Wastewater Treatment plant, which means the nitrate increase detected there (up 302% since 1976) is caused in part by the plant’s ability to break down ammonia. Ammonia is more toxic than nitrate, so the increase in nitrate is a sort of trade-off for the reduction of ammonia. Nitrate levels are currently well below State of Minnesota standards for drinking water, but there is no state standard for protecting aquatic life from nitrate.

Chloride concentrations increased at most of the sample sites. The highest concentrations were on the Minnesota River, but they increased the least since 1976. Conversely, chloride levels on the St. Croix River increased the most, with a 143% increase at Prescott.

These are just two bits of “bad news”. There are three successes to celebrate.

TSS Takes a Step Back

Since 1976, TSS has dropped at all MCES sites on the rivers, leading to increased water quality and clarity. The decrease in TSS pollution was helped by improved water protections

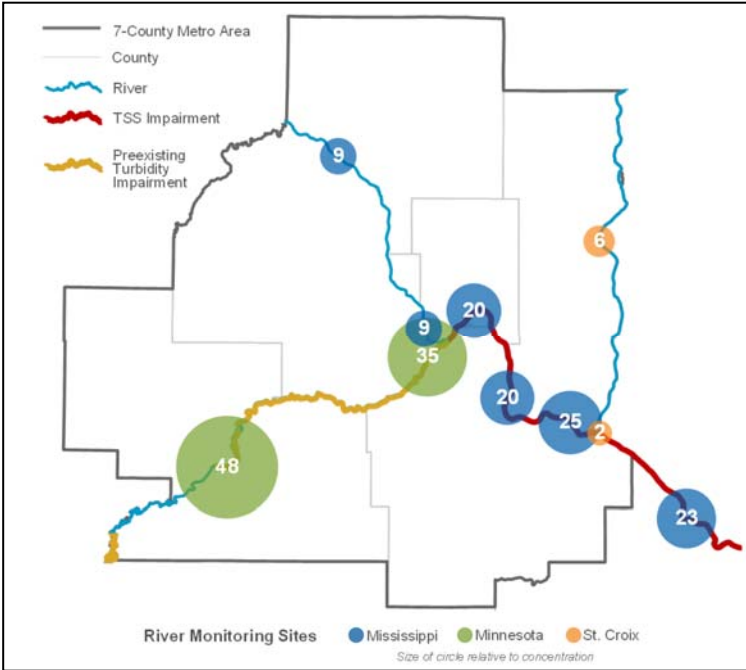


Figure 2. Median concentrations of TSS in water samples from 10 sites on the Mississippi, Minnesota, and St. Croix Rivers, 1976–2015. Red sections of rivers are considered “impaired” due to TSS levels by the Minnesota Pollution Control Agency.

that decreased erosion. Improvements in sewage and wastewater treatment technology and infrastructure has also helped to lower these inputs.

Despite these reductions, the Minnesota Pollution Control Agency (MPCA) still lists waters of the Mississippi downstream from the mouth of the Minnesota River as “impaired,” which means the TSS levels are too high and still need to improve.

The Minnesota River appears to be a major source of TSS within the MNRRA. TSS levels double in the Mississippi below the Minnesota River (Figure 2). Another major source of TSS is storm water runoff from urban areas. As a result, to reduce TSS concentrations further, a priority is to improve management of storm water runoff on both farmlands and in the city.

Phosphorous Falls

TP pollution declined overall, with levels dropping by as much as 59% since 1976. Of the phosphorous that was found, levels flowing into the MNRRA were highest from the Minnesota River. Elevated levels were also found at Grey Cloud Island, Ft. Snelling, and Lock and Dam #2, all of which are below wastewater treatment plants. Water protections have banned TP from detergents and soaps in recent years, and again, investments in wastewater infrastructure by MCES have improved the quality of water flowing into and through the MNRRA (Figure 3).

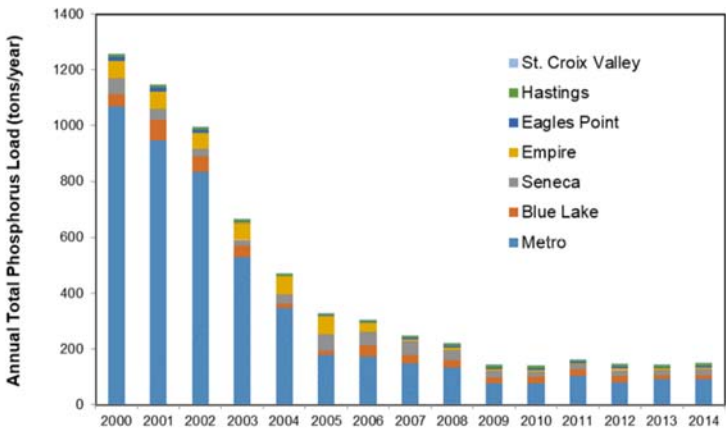


Figure 3. Annual total phosphorus (TP) loads, in tons per year, from seven MCES wastewater treatment plants, 2000–2014. See Figure 1 for locations of the plants.

Fecal Coliform Still High But Getting Better

The State of Minnesota classifies the Mississippi River throughout much of the metro area as not meeting water quality standards for fecal coliform. This means that the concentration of FC is too high and may affect human health.

At MNRRA, concentrations of fecal coliform were highest in the urban areas of the rivers (Figure 4). Urban areas are a source of FC due to the presence of animal waste running

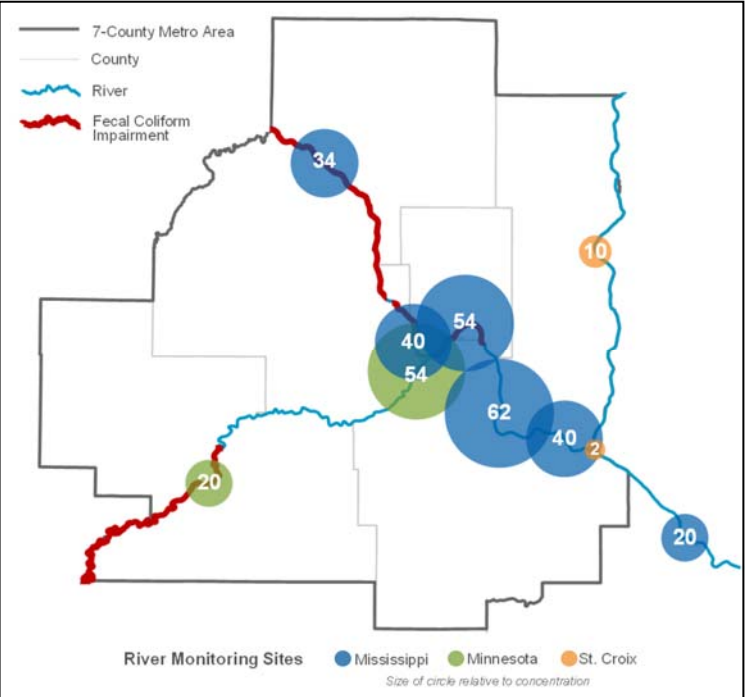


Figure 4. Median fecal coliform concentrations (per 100mL of water) in water samples from 10 sites on the Mississippi, Minnesota, and St. Croix Rivers, 2006–2015. Red sections of rivers are considered “impaired” due to FC levels by the Minnesota Pollution Control Agency.

off the land through storm water drains. Wastewater treatment plants can also be a source of FC contamination, especially in the winter months when wastewater treatment plants are not required to take the extra step of disinfecting treated wastewater before discharging it to the river.

This does not seem like “good news” for river water quality, but there is this silver lining: since 1976, FC concentrations have declined by 59% (on parts of the St. Croix) and by as much as 96% within the MNRRA and its tributaries. The greatest decreases occurred in the Mississippi River reach between Saint Paul and Grey Cloud Island. This is outstanding evidence that investing in wastewater infrastructure and implementing water protections has greatly improved the health of the river.

Taken together, these are all signs of improvement for the rivers and the people and wildlife who live near and depend on them. Of course, there is always more to be done, but that does not diminish the great things that have been accomplished up to now. We are all in this together, so keep reading to find out what you can do to help.



You Can Help Improve Water Quality on the River!

Through the actions of citizens, investments in infrastructure by MCES, and water protections enacted by governments, water quality has improved on the Mississippi River and its major tributaries in the Twin Cities Metro area. But challenges remain. Here are some specific actions you can take to help lower chloride and nitrate levels:

- 💧 Practice responsible snow and ice removal. A little salt goes a long way. The [Mississippi Watershed Management Organization](#) has some helpful tips.
- 💧 Have your septic tank and drain field inspected and pumped as needed. See the [Environmental Protection Agency's guide](#) for more information.
- 💧 Clean up after your pet (even at area dog parks). Pet waste washed into storm drains can be a significant source of excess nutrients to rivers and lakes. It can also introduce disease-causing bacteria.
- 💧 Refrain from using lawn fertilizers, especially in areas adjacent to ponds, lakes, and streams.
- 💧 Install rain gardens or use rain barrels to slow the flow of runoff from your property.

For More Information

[MCES Regional Assessment of River Water Quality in the Twin Cities Metropolitan Area 1976–2015](#) (full report)

An excellent [two-page summary fact sheet](#) and a longer (14-page) [technical summary](#) of the MCES report are also available.

Fact sheets summarizing results for each river: [Mississippi River](#), [Minnesota River](#), [St. Croix River](#).

