SUMMARY FACT SHEET

Water Quality of the Mississippi River

in the Twin Cities Metropolitan Area 1976-2015

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ENVIRONMENTAL SERVICES

The Mississippi River flows through a mix of areas – natural, agricultural, and urban – that affect its water quality before it reaches the metro area. Here, the Mississippi is influenced further by the region's urban areas and the two major rivers that join it – the Minnesota and the Saint Croix.

Over the last four decades (1976-2015), the Mississippi has experienced major improvements for some water quality pollutants, but issues remain.

Pollutants considered in assessing river water quality

Sediment is sand, soil, silt, or clay particles, measured as "total suspended solids," from sources such as eroded fields, banks and gullies and poorly managed construction sites. Sediment can decrease the light available in rivers, harm aquatic life, and carry nutrients to receiving waters.

Nutrients, like phosphorus (measured as total phosphorus) and nitrogen (measured as nitrate), are substances used for growth and to support life. However, excessive nutrient levels (eutrophication) caused by materials like fertilizers, animal manure, pet waste, or grass clippings can cause excessive algae growth, which harms aquatic wildlife, insects, and fish.

Bacteria are microscopic living organisms, measured as "fecal coliform." Harmful types of bacteria – from sources such as animal waste, untreated wastewater, and malfunctioning septic systems – can cause illness in humans.

Chloride is a component of salt. Common sources of chloride in urban areas include de-icing salts and home water softeners. Too much chloride can harm aquatic life.

How the Mississippi's water quality has changed, 1976 to 2015

Sediment decreased. Improvements in wastewater treatment technology, farming practices, land management, and stormwater management, as well as erosion control in tributary streams, likely contributed to lower sediment concentrations.

Phosphorus decreased. Improvements in wastewater treatment technology, such as enhanced biological phosphorus removal, and bans on phosphorus in laundry detergent and lawn fertilizers, have likely helped reduce phosphorus.

Nitrogen increased. However, the increase has slowed since the 1980s. Increased nitrogen can be caused by many factors, including changes to the landscape, increased use of fertilizers, expansion of livestock production, and increased pollution from a growing population and industrial activities.

Bacteria decreased. Better wastewater treatment and urban stormwater management practices have contributed to the decrease in bacteria, as well as efforts to reduce pollution through the Upper Mississippi River Bacteria TMDL project. In addition, the cities of Minneapolis and Saint Paul separated their sanitary and storm sewer systems from 1985 to 1995, which helped prevent untreated wastewater from overflowing into the river during large storm events.

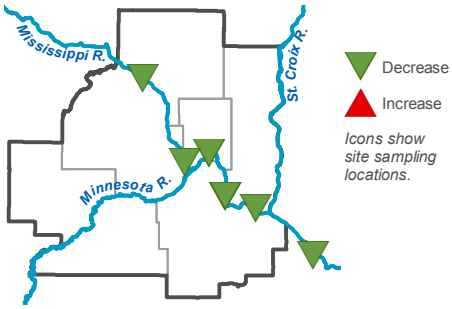
Chloride increased. This is related to the increase of salt used for winter de-icing as the population and development in the region has grown. Many tributary streams that flow into the Mississippi River in the metro area (Bass, Bassett, Elm, Minnehaha, and Shingle creeks) are impaired for excessive chloride. Salt used for water softening may also be a factor.

IS THE MISSISSIPPI RIVER IMPROVING?

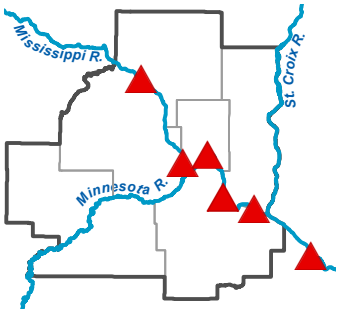
Generally, concentrations of sediment, bacteria, and phosphorus decreased (conditions improved) from 1976 to 2015.

Nitrogen and chloride, on the other hand, increased (conditions declined). "Concentration" is the pollutant amount measured in a specific volume of water.

Sediment, Phosphorus, and Bacteria



Nitrogen and Chloride



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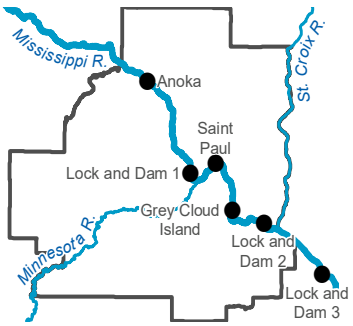
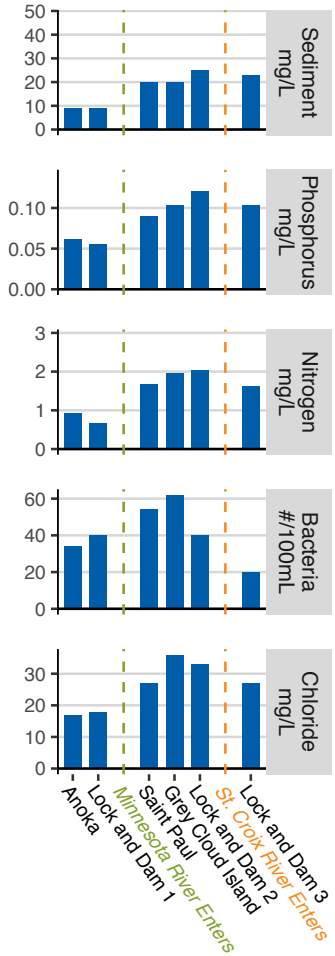
Site Locations



Typical (Median) Concentration, 2006–2015



Despite improvements, the Minnesota Pollution Control Agency has designated certain reaches of the river as impaired for sediment (total suspended solids or turbidity), nutrients/eutrophication (related to phosphorus), and bacteria (as fecal coliform). The impairments mean the levels of these pollutants in the river are higher than water quality standards. However, many groups are working to protect and restore the water quality of the Mississippi River.

Water quality within the metro area

Median pollutant concentrations from 2006 to 2015 show the typical recent water quality of the Mississippi River flowing through the metro area.

- Concentrations of bacteria and chloride in the river were highest just downstream from the center of the urban core (at Grey Cloud Island). Higher levels of bacteria and chloride are generally associated with developed areas.
- The concentration of all five pollutants were higher downstream of where the Minnesota River flows into the Mississippi River (Saint Paul) compared to upstream (Lock & Dam 1). In general, the Minnesota River had higher concentrations compared to Mississippi River at the point where the Minnesota River water enters the Mississippi, likely due in part to agricultural land use and natural streambank erosion along the Minnesota River and its tributaries.
- The concentration of all five pollutants were lower downstream of where the St. Croix River flows into the Mississippi River (Lock & Dam 3) compared to upstream (Lock & Dam 2). Because the land around the St. Croix River has a higher percentage of natural area such as forests and wetlands, the river's water quality is relatively good. As a result, when the river flows into the Mississippi River, it helps lower the concentration of pollutants already in the Mississippi.

More information

The following documents are available on the Metro Council website: metrocouncil.org/river-assessment.

Complete Report: Regional Assessment of River Water Quality in the Twin Cities Metropolitan Area 1976-2015: Minnesota, Mississippi, St. Croix Rivers

Summary Report

Related Fact Sheets

- Regional Rivers Overview
- Minnesota River
- St. Croix River

About the study

This work supports the policies of the Metropolitan Council's regional plans (Thrive MSP 2040, Water Resources Policy Plan, and Master Water Supply Plan) to promote the long-term sustainability and health of the region's water resources, including surface water, wastewater, and water supply.

The Metropolitan Council collected the water samples, analyzed the data, and used computer modeling to determine whether water quality has been improving or declining over the 40-year period (1976-2015).

For questions

Erik Herberg
erik.herberg@metc.state.mn.us
651.602.1473

Hong Wang
hong.wang@metc.state.mn.us
651.602.1079

Metropolitan Council
390 Robert Street North
Saint Paul, MN 55101
Main: 651.602.1000
TTY: 651.291.0904
Public Information: 651.602.1500
public.info@metc.state.mn.us