

# Summary

Identifying conditions stressing fish and macroinvertebrates

## Mississippi River - Winona Watershed



### Why is it important?

The Mississippi River - Winona watershed in southeast Minnesota is popular for trout fishing, swimming, paddling, camping, hiking and bird-watching. This picturesque watershed includes the Whitewater River and its namesake state park.

In Minnesota, this drainage area covers 419,200 acres in Wabasha, Winona, and Olmsted counties. A majority of the watershed is cropland, with forest and grassland covering large portions as well. Only a small percentage of the watershed is developed. The largest city is Winona, with a population of 27,000, on the Mississippi River.

The river discharges into the Mississippi River at Weaver Bottoms, an important backwater and waterfowl staging area.

One unique aspect of this watershed is its karst landscape, meaning only a thin layer of soil covers the porous bedrock underneath. Water eats away at the limestone bedrock, creating a honeycomb of caves, tunnels and sinkholes. This karst landscape is also riddled with springs. These cold-water springs feed streams and rivers, supporting the trout populations.

Rivers disappear underground here, where they mix with springs and groundwater, and then reappear on the surface a few feet or miles away. Water and anything else on the land surface can quickly funnel into groundwater used for drinking. The karst is vulnerable to pollution from chemical spills, development, and poor farming practices.

Protecting the river system requires an understanding of its water quality problems. Biological monitoring looks at fish and macroinvertebrate (bug) communities to assess the health of water. Quite simply, a healthy water system will sustain a variety of life. Biological monitoring often detects problems that other methods may miss or underestimate. By examining a stream's biological health, scientists and local partners can determine the impact of human changes on aquatic resources.

### Key issues

Overall, the Mississippi River-Winona watershed supports healthy populations of fish and macroinvertebrates, which are creatures without backbones, such as insects, crayfish, snails and small clams. These creatures are commonly called bugs.

Twelve stream sections do show signs of stress to fish and other aquatic life at times: North, Middle and South Branches of the Whitewater River; Crow Spring; Beaver Creek; Bear Creek; Gorman Creek; an unnamed creek; and Big Trout Creek. Some of the creeks have more than one section with stressed biology. While some have multiple stressors, others have only one.

The interrelated stressors include:

- Lack of habitat to support breathing, reproduction, feeding and other aquatic life functions.
- Low or fluctuating levels of dissolved oxygen to sustain fish and other aquatic life.
- Nitrate levels high enough to negatively affect oxygen in fish and other aquatic life.
- Levels of total suspended solids – soil and other particles that cloud the water – high enough to degrade habitat and harm fish.

## Key issues continued

- Water temperatures higher than optimum for coldwater species such as trout.
- Lack of connectivity, meaning structures such as culverts block the migration of fish or lead to accumulated sediment that affects habitat.

To improve water quality in the Mississippi River - Winona watershed, the MPCA recommends:

- Additional studies to further identify sources of pollutants.
- Better management of nitrogen fertilizer and manure applications to fields to reduce the amount of nitrate finding its way to streams.
- Adequate stream buffers of deep-rooted native plants to help reduce the amount of soil and other particles eroding to the waters.
- Reducing flooding and streambank erosion by restoring meanders to streams, restoring floodplains attached to streams, and establishing more native trees, grasses and shrubs along streams. Trees in particular would shade the water and help keep temperatures cooler in coldwater streams.
- Preventing cattle from grazing in or near streams.
- Continuing efforts to improve habitat for fish and other aquatic life.
- Holding back stormwater to prevent further erosion from gullies.

The MPCA and local partners will include more detailed recommendations in the Watershed Restoration and Protection Strategies, the document that culminates this first cycle of intensely studying the watershed.

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## About this study

### Watershed Approach

**Phase 1:** Monitor and assess health of waters

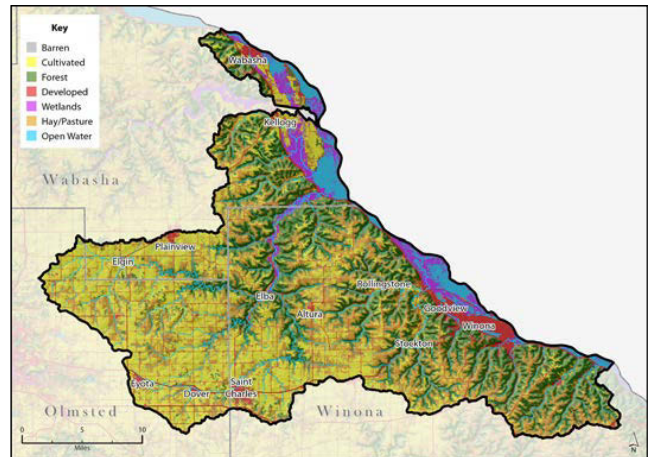
**Phase 2:** Identify conditions stressing biological life

**Phase 3:** Determine maximum pollutant loads

**Phase 4:** Determine Watershed Restoration and Protection Strategies

Start process over every 10 years

This stressor identification follows an intensive water monitoring effort in the Mississippi River-Winona Watershed dating back to 2010. In partnership with the Whitewater Watershed Project, the MPCA examined several parameters in several streams. In addition to water chemistry sampling, almost 50 stream stations were sampled for biology.



The MPCA and several partners familiar with the watershed examined the data to identify stressors to healthy water conditions. The next step in the process will be to develop strategies to restore water quality in impaired streams and protect those meeting state standards.

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## Full report

To view the full report, go to [www.pca.state.mn.us/index.php/view-document.html?gid=22589](http://www.pca.state.mn.us/index.php/view-document.html?gid=22589) or search for "Mississippi River-Winona" on the MPCA website at [www.pca.state.mn.us](http://www.pca.state.mn.us).

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