

Minnesota River Headwaters Watershed



Introduction

The Minnesota Pollution Control Agency (MPCA) uses biological monitoring and assessment as one way to determine the condition of the state's rivers and streams. Examining fish and aquatic macroinvertebrate (bug) life and related habitat provides a measure of overall community health. If fish and bug communities are unhealthy, stressors or factors causing harm to aquatic life must be identified. Stressor identification is a key component of the major watershed restoration and protection projects being carried out under Minnesota's Clean Water Legacy Act.

Description

The Minnesota River-Headwaters Watershed begins in North and South Dakota and is the farthest upstream major watershed in the Minnesota River Basin. Of the total watershed area of 2,132 square miles, 784 square miles falls in Minnesota. It is dominated by small, shallow basins with the exceptions of Big Stone and Lac qui Parle lakes.

Key issues

The five major elements of a healthy stream system are stream connections, hydrology, stream channel assessment, water chemistry and stream biology. If one or more of the elements are unbalanced, the stream ecosystem may fail to function properly and is listed as an impaired water body. Hydrologic alteration has been determined to be a stressor in all but one stream reach.

Hydrologic alteration in the watershed includes activities such as ditching wetlands and streams, tiling and artificial drainage. This can affect channel stability, bank erosion, excess sediment, destruction or reduced habitat, and the reduction of base flow conditions during periods of low precipitation.

There are times where base flows within upland tributaries drastically drop and dry up later in the summer. Habitat availability can be scarce when flows are interrupted, low for a prolonged duration, or extremely low.

Highlights of report

There were 18 stream reaches identified with biological impairments. Of these 18 impairments, 10 are impaired for fish only and two are impaired for macroinvertebrates only. The remaining six reaches are impaired for both fish and macroinvertebrates. The following factors contribute to the majority of the conditions causing the impairments.

Hydrologic alteration – Hydrologic alteration describes any imposed change to the way water moves within a watershed, including channel alteration, re-routing and ditching of streams, water withdrawals, land-cover alteration, subsurface tile drainage, and impoundments or dams.

Connectivity – Many road crossings and undersized or culverts or culverts placed at the wrong elevation create fish barriers.

Habitat – Habitat and many of the upstream tributaries have been altered and ditched and have very little habitat. Downstream reaches have embedded coarse substrate (streambed), reducing critical habitat for some fish species to reproduce and invertebrate species that need diverse and coarse substrate to live.

Highlights (cont.)

Dissolved Oxygen (DO) – Sections with low DO often correlated with eutrophic conditions within the headwater regions.

Eutrophication – Eutrophic conditions were identified in the headwater areas, where phosphorus loading is high due to agriculture. These eutrophic streams had large fluctuations of dissolved oxygen concentrations and often would get very low during the night or early morning.

Summary and recommendations

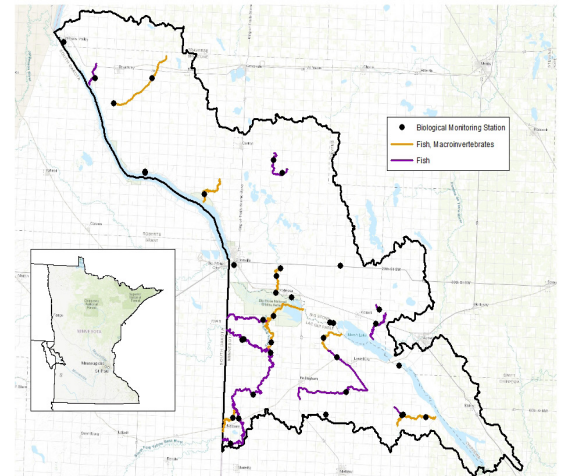
The most common stressor in the watershed was hydrologic alteration, followed by dissolved oxygen, eutrophication and habitat. Other identified stressors include connectivity, nitrate and suspended solids.

Overall, the stressors will need to be addressed in various ways. These can include:

- Hydrologic alteration/connectivity: Increase storage and infiltration of water in locations with hydrologic alteration stressors and solicit the Dept. of Natural Resources recommendations for streams with existing connectivity stressors and/or determine if restoration is appropriate.
- Dissolved oxygen, eutrophication, and nitrate: Nutrient-reducing Best Management Practices (BMP) including but not limited to: Cover crops, nutrient management, saturated buffers, etc.
- Habitat: Re-establish quality riparian corridor to increase stream stability and stream shading. Protect streambanks, reduce erosion and sedimentation.
- Suspended sediment: Focus on reducing sediment input from riparian corridor and immediate stream channel.

About this study

Stressor identification is a formal and rigorous process that identifies stressors causing biological impairment of aquatic ecosystems and provides a structure for organizing the scientific evidence supporting the conclusions. Water quality and biological monitoring in the Minnesota River Headwaters watershed has been ongoing for many years, with intensive watershed monitoring since 2015. A total of 26 stream sections were assessed for aquatic life use, aquatic recreational use or both.



Full report

To view the full report, go to <https://www.pca.state.mn.us/sites/default/files/wq-ws5-07020001a.pdf> or search for “Minnesota River Headwaters Watershed” on the MPCA website.

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