

Summary of Clearwater River Watershed Stressor Identification Report



Why is it important?

The Clearwater River Watershed encompasses an area of 886,600 acres in northwestern Minnesota. About one third of the watershed lies within a flat area with fertile soils formed by Glacial Lake Agassiz. As a result, a substantial amount of land (33%) within the watershed is used for intensive row crop farming. Another 21% is used for pasture and hay.

Forests and wetlands are interspersed with cropland throughout the watershed but are more prevalent within the eastern portion.

Extensive ditching and other stream alterations have been made throughout the watershed. Ditches and drain tile carry water from farm lands to rivers and streams. The alterations, combined with the loss of wetlands and conversion of native prairie to farmland, contribute to frequent floods. These alterations also affect fish communities and the aquatic insects they depend upon.

A stressor-identification report showed a total of eight stream/river stretches in the watershed do not support healthy populations of aquatic life (fish and macroinvertebrates/aquatic insects), including segments of County Ditch 23, Beau Gerlot Creek, Poplar River, Tributary to the Poplar River Diversion Ditch, Hill River, Lost River and Silver Creek. The report identified five candidate causes or “stressors” that are likely causing these impairments.

Key issues

Of those investigated, the five stressors that are the likely cause of water quality impairments affecting fish and aquatic insect communities are:

- Loss of connectivity (fish passage impaired by improperly constructed road crossings, ditches, dams, etc.)
- Altered stream flow pattern (“flashy” conditions, unnaturally high flows after spring runoff and rain events, coupled with very low, sometimes no flow.)
- Lack of instream habitat (lack of cover, excess sediment in spawning areas, etc.)
- Excess suspended sediments can damage gills, cause fish to avoid certain areas, reduce visibility, and contribute to low oxygen conditions
- Low dissolved oxygen (worse in late summer due to low flows, higher temps).

Highlights of report

Results of computer modeling indicate that low flow periods are a source of stress to the biologically impaired reaches in the watershed, those affecting fish and aquatic insect communities. Many reaches experienced periods of very low to no flow between the years 1999-2009.

In addition, modeling showed that very high flows have occurred in these reaches which can also negatively affect fish and aquatic insects by carrying them downstream.

Historical changes in land cover (e.g., native vegetation to cropland) and drainage patterns (e.g., ditching and channelization) are the primary factors contributing to this flow regime instability.

Additional runoff detention/retention is needed throughout the watershed to reduce peak flows and raise base flows, which would help stabilize this “flashy” flow regime.

The habitat quality of several reaches have been degraded because of these flow pattern alterations, which is why “lack of physical habitat” and “flow alteration” are the most common stressors found in the watershed.

Low dissolved oxygen is a stressor in three of the impaired reaches. The severity of low oxygen conditions varies among reaches, with the lowest concentrations generally coinciding with low-flow conditions in late summer.

Finding ways to increase/maintain flows during traditionally low-flow periods appears to be the best way of reducing the three primary stressors identified in the Clearwater River Watershed: lack of physical habitat, flow alteration, and low dissolved oxygen.

About this report

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

Minnesota has adopted a watershed approach to address the state’s 80 major watersheds. This approach incorporates water quality assessment, watershed analysis, civic engagement, planning, implementation, and measuring results into a 10-year cycle that addresses both restoration and protection, something we call the Watershed Restoration and Protection Strategy or WRAPS. The 10-year cycle for the Clearwater River Watershed began in 2014 with intensive monitoring and assessment.



Waters not meeting state standards are still listed as impaired and Total Maximum Daily Load studies are performed as they have been in the past, but in addition WRAPS includes a more cost-effective and comprehensive assessment of the watershed’s overall health. The second step in the WRAPS process, stressor identification, finds and evaluates factors, natural and human, which are likely responsible for the impaired condition of fish and macroinvertebrate (aquatic insect) communities. This is phase two of a four phase process outlined at left.

Full report

To view the full report visit the Clearwater River Watershed page on our website. Google “MPCA Clearwater River Watershed.”

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