WRAPS report summary

Water Restoration and Protection Strategies

Minnesota River Headwaters

Watershed approach

Minnesota has adopted a watershed approach to address the state's 80 major watersheds. This approach looks at the drainage area as a whole instead of focusing on lakes and stream sections one at a time, thus increasing effectiveness and efficiency. This watershed approach incorporates the following activities into a cycle repeated on a regular basis:

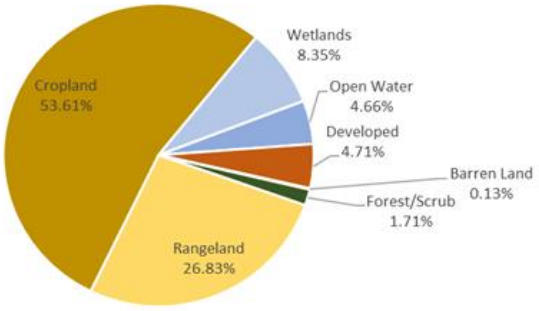
1. Monitoring water bodies and collecting data over two years on water chemistry and biology.
2. Assessing the data to determine which waters are impaired, which conditions are stressing water quality, and which factors are fostering healthy waters.
3. Developing strategies to restore and protect the watershed's waterbodies, and report them in a document called Watershed Restoration and Protection Strategies (WRAPS).
4. Coordinating with local One Watershed-One Plan efforts for implementation of restoration and protection projects.

The Minnesota Pollution Control Agency (MPCA) leads the technical work and coordinates and supports strategy development with local and state partners. Watershed partners, including watershed districts, county staff, and Soil and Water Conservation Districts, are leaders in incorporating these strategies into local water plans and implementing strategies to restore and protect water resources. Their past and current work provides promising opportunities for watershed improvement and will continue to be a critical component to overall water quality. The main purpose of the WRAPS report is to summarize all the technical information so that local partners can use it for planning and implement the best strategies in prioritized locations.

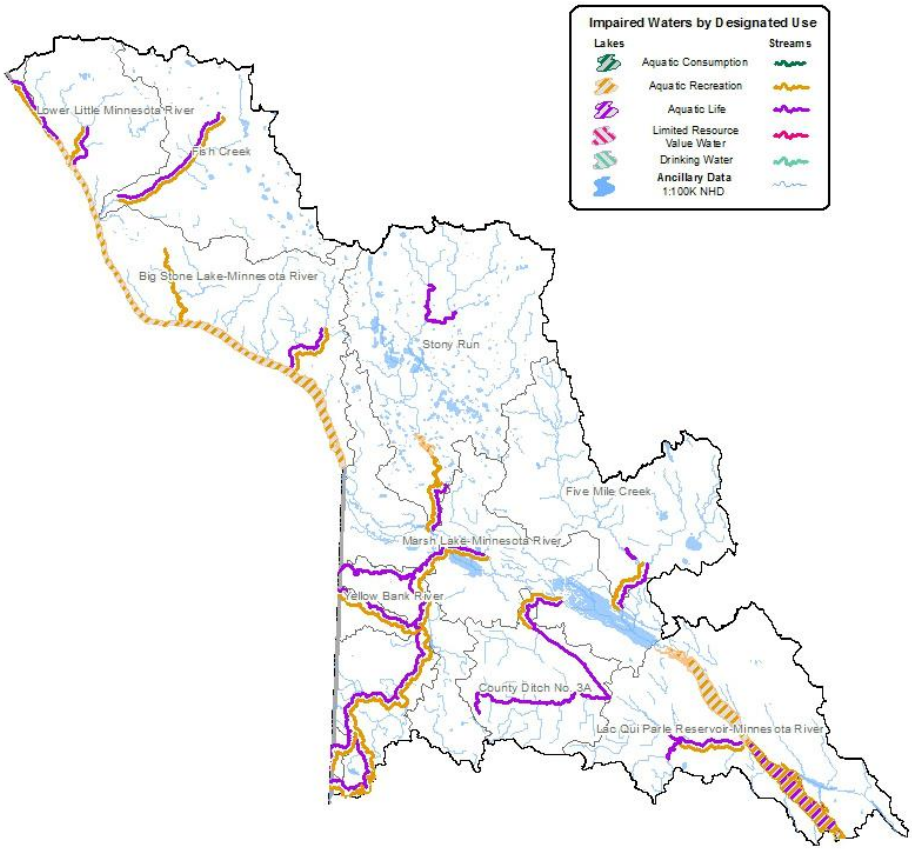
Watershed characteristics

- Size: 2,132 square miles; 784 square miles in Minnesota
- Minnesota Counties: Big Stone, Lac qui Parle, Swift, Chippewa, Traverse, Stevens
- Ecoregion: Northern Glaciated and Western Corn Belt Plains
- Minnesota Municipalities: Browns Valley, Beardsley, Ortonville (the largest), Odessa, Nassau, Bellingham, and Milan.
- Most of the land is cropland
- Headwaters of the Minnesota River
- The 8-digit hydrologic unit code (HUC): 07020001

Watershed-wide Land use - Minnesota River Headwaters Watershed



Assessments: Are waters meeting standards?



This report summarizes the MPCA Watershed Approach findings, addressing the fishable and swimmable status of surface waters in the Minnesota portion of the Minnesota River Headwaters Watershed (MRHW). The majority of monitored stream reaches and lakes in the MRHW are not meeting water quality standards for aquatic life (fishing) and aquatic recreation (swimming). Eight pollutants and/or stressors were identified as impacting aquatic life and recreation.

Of the 25 stream segments assessed, 22 are not supporting aquatic life and/or recreation. Of those streams, 20 are not supporting aquatic life and 15 are not supporting aquatic recreation (13 reaches are not supporting both aquatic life and recreation). Of the assessed streams found not to support aquatic life, 18 had biotic impairments of fish, 10 had biotic impairments of macroinvertebrates and 8 were impaired for both.

No monitored lakes were found to fully support aquatic recreation. Five lakes (Long Tom, Unnamed, Big Stone, and Lac qui Parle Lake NW Bay and SE Bay) had aquatic recreation use impairments added based on lake eutrophication data. Lac qui Parle Lake was found to be impaired for aquatic life use based on ammonia data.

Stressors and pollutants: What factors are affecting fishing and swimming?

Seven common stressors were investigated to determine the causes of the biologically-impaired communities: altered hydrology, connectivity, habitat, dissolved oxygen (DO), eutrophication, suspended solids, and nitrate. Nonpoint sources contribute the majority of phosphorus, nitrogen, and sediment in Minnesota's portion of the watershed.

Nearly half of the stream miles with a definable stream channel are ditched. Ditches typically lack many natural stream features of being complex, meandering, and variable in depth. Ditch features result in unnatural flow dynamics such as excessive flow speed, and have poor geomorphic and biologically important features (i.e. lack of

riffle and pool formation and excessive bank failures). Subsurface tile and surface ditch drainage systems have increased contributing drainage areas and volumes from the soil profile, resulting in greater amounts of water delivered to rivers.

Primary nonpoint pollutant concerns include total phosphorus (TP), total suspended solids (TSS), and bacteria (*E. coli*). Sources of TSS and TP are similar, via erosion, while bacteria is attributed to failing subsurface sewage treatment systems, nonpoint source application, or point source release. The effects of nutrient and organic matter enrichment characteristically result in low DO concentrations, and are reflective of impacted aquatic ecosystems (high decomposition, low primary production, and/or elevated water temperatures).

Restoration and protection strategies

The report presents protection and restoration strategies needed to achieve the watershed goals and 10-year targets. With 65% of the area (in Minnesota) in cultivated crops, the largest opportunity for water quality improvement is from this land use.

A significant effort will be required to reduce overland runoff in the watershed to prevent the loss of excess phosphorus and sediment from the landscape. Landscape management such as the use of cover crops, conservation tillage, improved nutrient management, and streambank or shoreline buffer establishment or maintenance will help to keep sediment and nutrients from running off the landscape and into surrounding waterbodies.

Re-establishment of riparian vegetation where streambank erosion is common, increased or improved stream buffers, and use of best management practices (BMPs) on cultivated lands could greatly reduce nutrient runoff and upland soil loss, leading to declines in suspended sediment and phosphorus concentrations within the streams and lakes of the watershed. Additionally, detention/retention of water over the landscape would especially help with flow regime instability.

Water resource managers within the portion of the MRHW that lies within Minnesota will need to continue to work collaboratively with water resource managers in South Dakota, which has more than 1,348 square miles of the contributing watershed.

Key conclusions of first cycle

The dominant agricultural land use in the MRHW contributes sediment, bacteria, and nutrients, resulting in water quality impairments beyond natural background or pre-European settlement levels. The mutual goals of agricultural production and environmental conservation can be better managed with increased diversity in cropping systems and tillage, better nutrient and manure management, and improved hydrology with more water storage and managed artificial drainage. These can be achieved with available technology, financial incentives, and increased voluntary efforts by landowners.

The means to restore and protect the watershed (i.e. the strategies) are fairly well understood. However, challenges with political boundaries (Minnesota-South Dakota border) could hamper restoration efforts. The MRHW will need to develop working groups with its partners in South Dakota to develop protection and restoration approaches within the whole watershed and ensure many sources of pollutants are reduced and managed.

Next Steps

A key prerequisite for successful strategy development and on-the-ground implementation is meaningful civic engagement. A specific goal of the civic engagement process for this WRAPS was to work closely with local stakeholders to ensure that their ideas, concerns and visions for future conditions were understood and utilized throughout the WRAPS study process.

There are a large number of technical stakeholder groups within the MRHW that are already involved in restoration efforts throughout the watershed. Technical stakeholder organizations include local county environmental offices, local SWCDs, the Upper Minnesota River Watershed District and the neighboring Lac qui Parle-Yellow Bank Watershed District, and local Minnesota Department of Natural Resources (DNR) offices. These groups continue working closely with each other in an effort to develop projects that are mutually beneficial.

Many agricultural BMPs, which reduce the load of nutrients and sediment to receiving waters, also act to decrease emissions of greenhouse gases (GHGs) to the air. Reduction in the application of nitrogen to cropland through optimized fertilizer application rates, timing, and placement is a source reduction strategy; while conservation cover, riparian buffers, vegetative filter strips, field borders, and cover crops reduce GHG emissions as compared to cropland with conventional tillage.

Full report

To view the full report, go to https://www.pca.state.mn.us/water/watersheds/minnesota-river-headwaters, or search "Minnesota River Headwaters" on the MPCA website at www.pca.state.mn.us.

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CLEAN WATER LAND & LEGACY AMENDMENT