**WRAPS report summary**
Watershed Restoration and Protection Strategy

# Roseau River Watershed

## 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 approach incorporates the following activities into a cycle repeated on a regular basis:

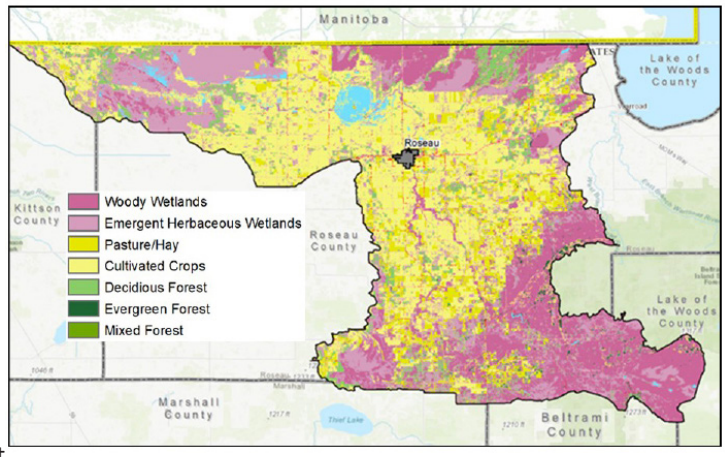
1. Monitoring water bodies and collecting data over two years on water chemistry and biology. (2015)
2. Assessing the data to determine which waters are impaired, which conditions are stressing water quality, and which factors are fostering healthy waters. (2017)
3. Developing strategies to restore and protect the watershed's waterbodies, and report them in a document called Watershed Restoration and Protection Strategies (WRAPS). (2020)
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 are leaders in 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 implementing the best strategies in prioritized locations.

## Watershed characteristics

- Size: Minnesota portion drains 1,062 square miles.
- Water: Roseau River (Headwaters, Upper, South Fork, Middle); Hay, Pine and Sprague Creeks; Hayes Lake.
- Counties: Roseau, Lake of the Woods, Beltrami, Kittson, Marshall.
- Land cover: 44% wetlands, 32% cropland, 9% rangeland, 10% forest, 3.3% developed.
- The 8-digit HUC for the watershed is 09020314.

### Roseau River Watershed Land Cover




The landscape is comprised of glacial lake sediments interspersed with peat deposits. Much of the watershed is in the Northern Minnesota Wetlands Ecoregion with a small part in the Lake Agazzi Plains Ecoregion. Wetlands are abundant. The lower portion of the watershed once known as the "Big Roseau Swamp" has been extensively ditched, drained, and impounded, but 77,000 wetland acres still exist in that region. The watershed has no natural lakes (Hayes Lake is an impounded portion of the upper Roseau River).

## Assessments: Are waters meeting standards?

During the first phase of the watershed approach – intensive watershed monitoring – the Minnesota Pollution Control Agency (MPCA) and local partners collect data about biology such as fish populations, chemistry such as pollutant levels, and flow volumes to determine if lakes and streams are meeting water quality standards. Waters that fail to meet standards and do not support aqautic life, aquatic recreation, or consumption are deemed "impaired."

The 2018 federal 303(d) Impaired Waters list identifies eight RRW streams with a total of 11 impairment listings:

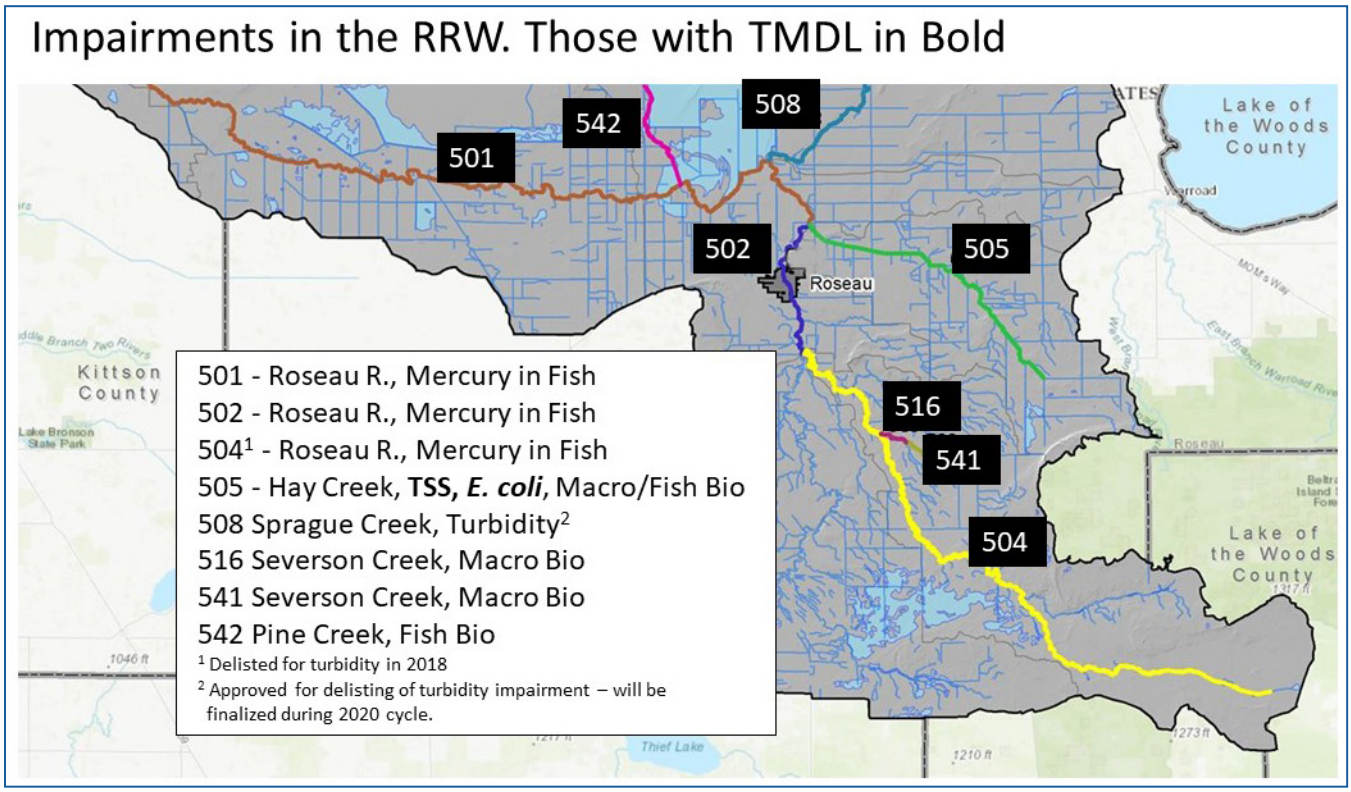
- One for aquatic life (fish and/or aquatic insects/macroinvertebrates) due to turbidity (water is too cloudy)
- One for aquatic life due to high levels of total suspended solids (TSS, similar to turbidity)
- One for aquatic recreation (swimming, fishing) due to high levels of *Escherichia coli* (*E. coli*)
- Three for aquatic life due to low aquatic insect/macroinvertebrate bioassessment or biological integrity scores[1]
- Two for aquatic life due to low fish bioassessment scores, and
- Three for aquatic consumption due to mercury in fish tissue.

All of these impairments (with the exception of the impairments for mercury which are being addressed on a statewide basis) are addressed in the WRAPS report.

In addition, TMDL studies were done to address the aquatic recreation impairment due to *E. coli* and the aquatic life impairments due to excessive TSS in Hay Creek (stream reach 505/green line in the map below). The goal of a TMDL study is to quantify pollutant reductions needed to meet state water quality standards.

TMDLs were not done for the other impairments for a variety of reasons, including that many are caused by periods of insufficient flows or insufficient habitat which cannot be addressed with a TMDL.

[1] Biological integrity is the ability of an aquatic ecosystem to support and maintain a balanced, adaptive community of organisms having a species composition, diversity, and function comparable to that of a natural habitat. A low IBI score indicates the species are significantly different or degraded compared with regional reference sites. A final determiniation of biological impairment is also based on habitat quality, available water chemistry data, and biological condition of nearby upstream and downstream segments, local land use information, and other watershed data. Narrative descriptions can be used to rate the integrity of a site as excellent, good, fair, poor, or very poor.



## Stressors: What factors are affecting fish and bugs?

To develop strategies for restoring or protecting water bodies with biological impairments, agencies and local partners must first identify the possible causes (or stressors) of the impairments. This table summarizes the stressors affecting fish and/or aquatic insects (macroinvertebrates) identified in the assessed streams of the watershed.

More information can be found in the Roseau River Watershed Stressor Identification Report.

| HUC-10 Subwatershed | AUID (Last 3 digits) | Stream | Reach description | Biological impairment | Primary stressor | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Loss of longitudinal connectivity | Flow regime instability /Altered Hydrology | Insufficient physical habitat | High suspended sediment | Low dissolved oxygen |
| Headwaters Roseau River | 541 | Severson Creek/County Ditch 23 | Severson Cr to Unnamed cr | Macroinvert. | | ● | ● | ● | |
| | 516 | Severson Creek (County Ditch 23) | Unnamed cr to Roseau R | Macroinvert. | | ● | ● | ● | |
| Hay Creek | 505 | Hay Creek | Headwaters to Roseau R | Fish & Macroinvert. | | ● | ● | ● | ● |
| Upper Roseau River | 542 | Pine Creek | Unnamed cr to Roseau R | Fish | ● | ● | ● | ● | ● |

## Restoration, protection strategies

The WRAPS process includes a means to categorize and prioritize water bodies for restoration and varied levels of protection as seen in this chart.

The RRW streams in the restoration category were assessed and listed as impaired for aquatic life or aquatic recreation.

The protection category includes water bodies currently designated as supporting aquatic life and aquatic recreation, or those water bodies that have not been assessed

Numerous restoration and protection strategies, or best management practices (BMPs), have been developed through collaboration with local and state partners.

Implementation strategies were created to address locations with high pollutant loading in the RRW. The BMPs were selected based on efficiency of removing pollutants, cost effectiveness, and suitability to the landscape.

| AUID (09020314-XXX) | Waterbody name | Waterbody description | Strategy Level |
|---|---|---|---|
| 505 | Hay Creek | Headwaters to Roseau River | **Restoration** Currently Impaired |
| 542 | Pine Creek | Unnamed creek to Roseau River | |
| 516 | Severson Creek (County Ditch 23) | Unnamed creek to Roseau River | |
| 541 | Severson Creek/County Ditch 23 | Severson Creek to Unnamed creek | |
| 501 | Roseau River | Hay Creek to MN/Canada border | **Protection Level 1** Previously Impaired |
| 508 | Sprague Creek | MN/Canada border to Roseau River | |
| 519 | Lost River | Unnamed ditch to Unnamed ditch | **Protection Level 2** Assessed Reaches/High Potential for Impairment |
| 502 | Roseau River | S Fork Roseau River to Hay Creek | |
| 518 | Unnamed creek | Unnamed creek to S Fork Roseau River | |
| 539 | Unnamed creek | Headwaters to Unnamed creek | |
| 540 | Paulson Creek | Unnamed ditch to S Fork Roseau River | |
| N-1[1] | State Ditch Number Sixty nine | Whitney Lake ditch to Roseau River | |
| N-2[1] | Bear Creek | Headwaters to Roseau River | |
| N-3[1] | County Ditch Number Eight | Headwaters to Roseau River | |
| N-4[1] | Unnamed ditch | Headwaters to Sprague Creek | |
| 68-0004-00[2] | Hayes Lake | Hansen Creek to S Fork Roseau River | **Protection Level 3** High quality Waters |
| 503 | Roseau River, South Fork | Headwaters to Roseau River | |
| 504 | Roseau River | Headwaters to S Fork Roseau River | |
| 512 | County Ditch 9 | T161 R37W S29, south line to Hay Creek | |
| 517 | Hansen Creek | Unnamed lake (68-0083-00) to Roseau River | |
| 521 | Unnamed ditch (Judicial Ditch 63) | Unnamed ditch to Mickinock Creek | |
| 522 | Mickinock Creek | Unnamed ditch to Unnamed creek | |

The focus of implementation strategies for Hay Creek, for example, will be to address the elevated in-stream concentration of TSS. Regional goals for nitrogen and phosphorus are assumed to be accounted for through many of the same BMPs that target TSS.

## Next steps and measuring results

The restoration and protection strategies listed in the WRAPS report will be the basis for developing local implementation plans to restore and protect water resources. The report lays out goals and milestones to address protection and restoration priorities in the watershed. The targets are intended to provide guidance and “measuring sticks” to assess the watershed’s health against the state’s water quality standards.

Water quality in some areas in Minnesota has declined over many decades. While restoration activities continue, new problems develop, such as converting land to intensive cropping that could negatively impact water quality. The perpetual challenge is to make improvements and keep up with new problems. Impacts from other factors such as climate change are still not completely understood. Consequently, it may take decades to fully restore impaired waters. For these reasons, it is more cost-effective to protect clean waters while we can by implementing protection strategies.

## Key conclusions of first cycle

- Stressors associated with the biologically impaired reaches in the RRW include loss of longitudinal connectivity (barriers to fish passage such as dams, culverts, etc.), flow regime instability (excessively high flows followed by very low-flow conditions), insufficient physical habitat, high suspended sediment, and low dissolved oxygen (DO). Stressors associated with water quality impaired reaches include historical channel modifications that contribute to altered stream hydrology (e.g., extreme peak flows and periods of minimal flow), streambed and bank erosion, upland soil erosion, historical changes in land cover (e.g., native vegetation to cropland), and lack of riparian buffers. Furthermore, livestock populations and unrestricted livestock access to streams contribute toward elevated levels of *E. coli* in the watershed.
- Pollutant reductions are needed to achieve water quality attainment for Hay Creek which requires TMDLs for *E. coli* and TSS.
- Implementing BMPs is needed in many places in the watershed to correct impairments and protect unimpaired waters. They may be structural or non structural, and may be applied directly to surface waters, the landscape, or operational and management practices. Examples of BMPs that may be applied directly to surface waters include the removal or modification of barriers (e.g., dams and private road crossings) that are impeding fish passage, evaluation of culverts for resizing or replacement, multi-purpose flood control structures to provide detention/ retention to reduce peak flows and increase base flows, and stream restoration activities that include the principles of natural channel design. Examples of BMPs for the landscape include agricultural nutrient management practices, alternative tile drainage concepts or side water inlets, establishment of perennial vegetation, residue management, improved livestock management, and the establishment and maintenance of stream and ditch buffers. Operational and management BMPs include further data collection and assessment, stakeholder engagement, and community education.

*Images taken during stressor identification field work in the watershed in 2017. Sediment laden water entering Hay Creek from adjacent ditch (left); a partially buffered tributary to Hay Creek (center); and a beaver dam on Severson Creek.*

## Full report

To view the full report, go online and search for "MPCA Roseau Watershed WRAPS Report."

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CLEAN WATER LAND & LEGACY AMENDMENT