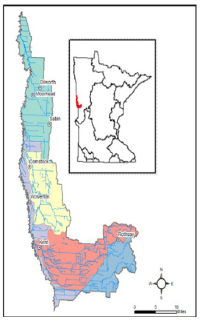
Summary - Upper Red River

Watershed Restoration and Protection Strategies (WRAPS) Report



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 10-year cycle:

- Water quality monitoring and assessment
- Watershed analysis
- Civic engagement
- Planning and implementation
- Measuring results

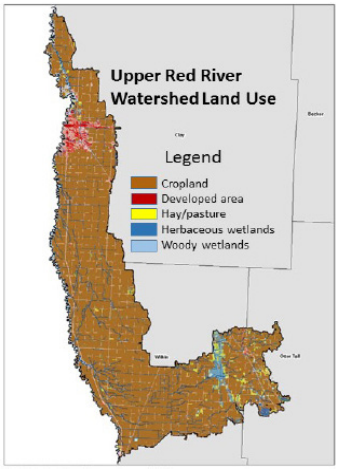
Example of Whiskey Creek floodplain area being farmed.

The MPCA leads the monitoring, assessment and strategy development with local partners usually playing a major role. Local partners, like Watershed Districts and Soil and Water Conservation Districts implement the strategies to restore and protect water resources. They also engage citizens throughout the process.

When a watershed's 10-year cycle is completed, a new cycle begins. The Upper Red River Watershed approach began in 2008 and culminated with the WRAPS document published in November 2017. The watershed is scheduled for its next intensive water monitoring in 2019.

Watershed characteristics

- Size: 499 square miles or 371,689 acres
- Counties: Clay, Wilkin, Otter Tail
- Ecoregion(s): Lake Agassiz Plain, North Central Hardwood Forests
- Municipalities: Rothsay, Kent, Comstock, Wolverton, Dilworth, Sabin, Georgetown, Breckenridge, and Moorhead
- Land use: Land use in the watershed is predominantly Agricultural
- Tributary to the Red River of the North
- The 8-digit hydrologic unit code or HUC for the Upper Red River Watershed is 09020104.

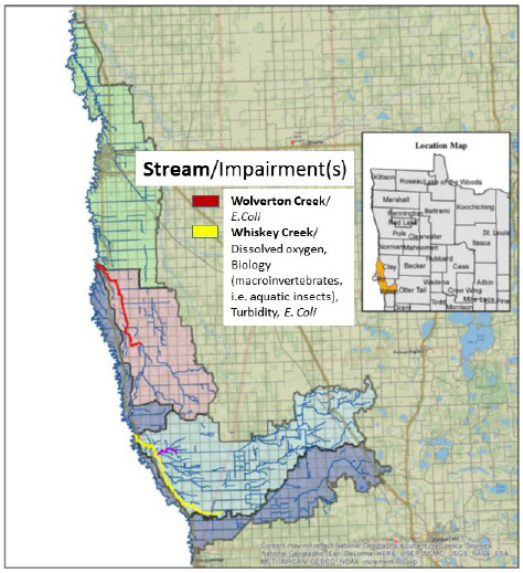


Assessments: Are waters meeting standards and providing beneficial uses?

During the first phase of the watershed approach – intensive watershed monitoring – the MPCA collected data about biology such as fish populations, chemistry such as pollutant levels, and flow to determine if lakes and streams were meeting water quality standards designed to ensure that waters are fishable and swimmable. Waters are "impaired" if they fail to meet standards. The map on the next page shows the impairments for streams and lakes in the Upper Red River Watershed. Under federal and state laws, impaired waters must have Total Maximum Daily Load (TMDL) studies to determine reductions of pollutants needed to again meet water quality standards. In this first WRAPS cycle, the MPCA and local partners completed TMDL studies for three stream sections.

The watershed contains seven lakes and 32 stream reaches that are defined by the state of Minnesota (i.e., have an Assessment Unit ID – AUID – or DNR lake number). Of these, not all were assessed for impairment due to reasons including extensive modification, channelization, insufficient flows, impoundments, no channel or water body present, and limited resource value waters. Of 33 stream reaches monitored, only five had sufficient data to be able to be assessed, and were determined to have impairments.

These waterbodies (Wolverton and Whiskey Creeks) contain a total of five impairment listings: one for *E. coli*, one for fecal coliform, one for turbidity, one for macroinvertebrate bioassessment (aquatic insects), and one for dissolved oxygen (DO). The URRW TMDL study addresses three of those impairments: one stream reach for turbidity, and two stream reaches for bacteria (*E. coli*) standards. In this first WRAPS cycle, the MPCA and local partners completed TMDL studies for three stream sections.



Impairments:

- Bacteria: *E. coli* and/or fecal coliform can indicate sewage or manure in water and also make the water unsafe for swimming.
- Biology (fish and/or macroinvertebrates): Number and type of creatures are indicators of water's health.
- Dissolved Oxygen: Low levels make it hard to sustain fish, aquatic insects.
- Turbidity and Total Suspended Solids: Soil and other particles make the water murky.

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. In the URRW, the primary biological threat is to aquatic insects in Whiskey Creek. The table below identifies the four predominant stressors.

HUC-12 Subwatershed	AUID (Last 3 digits)	Stream	Reach Description	Biological Impairment	Stressors				
					Flow Alteration	Habitat	Suspended Sediment	Dissolved Oxygen	Pesticide Toxicity
Whiskey Creek	520	Whiskey Creek	T133 R47W S13, east line to Red R	Macroinvertebrate Bioassessments	●	●	●	●	

*● = high risk, ◘ = medium risk, ○ = low risk

Restoration and Protection Strategies

Water quality restoration and protection strategies within the URRW were identified through collaboration with local and state partners (i.e., SWCDs, BRRWD, MPCA, DNR, and BWSR). Due to the homogeneous nature of the watershed, most of the suggested strategies are applicable throughout the watershed.

Altered hydrology has been cited as a primary stressor to the biological impairment in the URRW (MPCA 2015). Based on the results of the URRW SID Report (MPCA 2015), restoration and protection strategies can be developed to prevent or mitigate activities that further alter the hydrology of the watershed, and improve storage capacity in an effort to restore the hydrology of the URRW.

The BRRWD and the Wilkin, Clay, and West Otter Tail SWCDs have a long history of improving water quality. All three have been actively seeking grants to improve local water quality before and since the passage of the Clean Water, Land and Legacy Amendment.

A study has been completed for the URRW that identifies areas that are suitable for best management practices (BMPs), based on sediment, phosphorous, and nitrogen delivery (HEI 2014). Bacteria risk areas have also been identified (HEI 2014). Below is an example from that study showing a portion of a table of BMP projects that could be implemented as part of restoration and protection efforts.

Strategy Key	
Description	Example BMPs/actions
Improve upland/field surface runoff controls: Soil and water conservation practices that reduce soil erosion and field runoff, or otherwise minimize sediment from leaving farmland	Cover crops
	Water and sediment basins, terraces
	Rotations including perennials
	Conservation cover easements
	Grassed waterways
	Strategies to reduce flow- some of flow reduction strategies should be targeted to ravine subwatersheds
	Residue management - conservation tillage
	Forage and biomass planting
	Open tile inlet controls - riser pipes, french drains
	Contour farming
	Field edge buffers, borders, windbreaks and/or filter strips
	Stripcropping
Protect/stabilize banks/bluffs: Reduce collapse of bluffs and erosion of streambank by reducing peak river flows and using vegetation to stabilize these areas.	Strategies for altered hydrology (reducing peak flow)
	Streambank stabilization
	Riparian forest buffer
	Livestock exclusion - controlled stream crossings
Stabilize ravines: Reducing erosion of ravines by dispersing and infiltrating field runoff and	Field edge buffers, borders, windbreaks and/or filter strips

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, milestones and responsible entities to address protection and restoration priorities in the Upper Red River Watershed. The targets are intended to provide guidance and "measuring sticks" to assess the watershed's health and success of actions taken.

Water quality in Minnesota has declined over many decades. While restoration activities continue, new problems develop, such as converting land to intensive cropping that negatively impacts 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.

Key conclusions of first cycle

- Water quality conditions in the URRW are generally poor and reflect the intensely cultivated land use, altered watercourses, intensive drainage, and a consistent lack of vegetated cover (buffers) around many wetlands and streams. Impairments for Total Suspended Solids (TSS) and *E. coli* are found in Wolverton Creek and Whiskey Creek and to a lesser degree throughout the watershed. Sources of sediment and turbidity are overland runoff, field erosion, wind erosion, and stream bank scouring. The susceptibility of naturally occurring fine silts and clays to erosion is a major driver of the TSS problems.
- Elevated bacteria levels were found in many of the monitored streams. Fish, aquatic insect and recreation use impairments were found throughout the watershed. Pollutant reductions needed to correct impaired waters are large and will be challenging to accomplish. A coordinated, long-term effort will be needed to both restore the impaired waters and to protect the others. Required reductions for sediment (TSS) values range from 7% on the low end to as high as 29% for impaired stream segments. Required reductions for bacteria are even higher, ranging from 17 to 64%, depending on stream flow conditions.
- Stressors that contribute to poor fish and aquatic insect populations include barriers to fish passage and altered stream flows (hydrology). Some examples of connectivity problems in the URRW include migration barriers that are both naturally occurring (beaver dams) and manmade (e.g. perched culverts and control structures).
- Examples of the results of altered hydrology include increased peak flows and reduced base flows. This is common in artificially-drained agricultural areas.
- To correct impairments and prevent further degradation, increased use of best management practices (BMPs) will be required for the working lands and managing drainage systems. Examples for the landscape include livestock management, nutrient management, field windbreaks, cover crops and year-round vegetation, residue management, and buffers along streams, shoreline and ditches.
- Examples for the waters themselves include engineered hydrologic controls, regional water retention, stream channel restoration, culvert resizing/replacement, and restoring unconnected streams. Maintaining/upgrading septic systems

Full report

For the full report, go online and search for “MPCA Upper Red River report.”

Contact

Tim James, MPCA, at tim.james@state.mn.us,

MINNESOTA POLLUTION CONTROL AGENCY

The Clean Water, Land and Legacy Amendment is funding a large part of the MPCA’s watershed approach.

CLEAN WATER LAND & LEGACY AMENDMENT