

Lower Rainy 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, increasing effectiveness and efficiency. This watershed approach incorporates the following into a cycle repeated on a regular basis:

1. Monitoring waterbodies and collecting data over two years on water chemistry and biology (2017-2018).
2. Assessing the data to determine which waters are impaired, which conditions are stressing water quality, and which factors are fostering healthy waters (2020-2021).
3. Developing strategies to restore/protect the watershed’s waterbodies, and report them in a document called Watershed Restoration and Protection Strategies (WRAPS) (2021-2022).
4. Coordinating with local One Watershed-One Plan efforts for implementation of restoration/protection projects (2022-beyond).

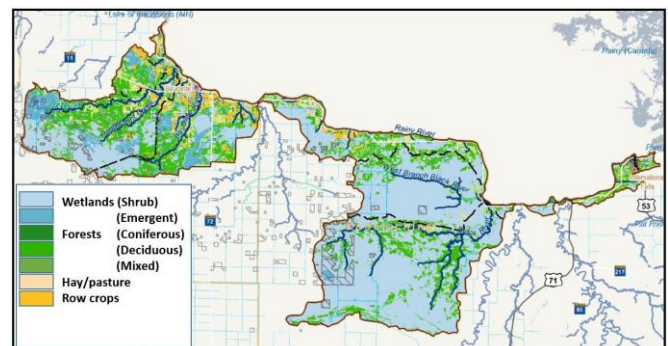


The Minnesota Pollution Control Agency (MPCA) leads the technical work and coordinates and supports strategy development with local, state, and federal partners. Watershed partners are leaders in implementing strategies to restore and protect waters. Their past and current work provides opportunities 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 local partners, such as the Koochiching and Lake of the Woods Soil and Water Conservation Districts, can use it for planning and implementing the best strategies in prioritized locations.

Watershed characteristics

- Size: 525,797 acres
- Counties: Koochiching (67%), Lake of the Woods (37%)
- Ecoregions: Laurentian Mixed Forest Ecological Province
- Major streams: Rainy River, Baudette River, Winter Road River, Peppermint Creek, Black River, West Fork Black River
- Towns: Baudette, International Falls, Rainier
- Land cover: Wetlands 48%, Forest 32%, 17%, grass/pasture/hay 9%, crops 7%
- The 8-digit hydrologic unit code (HUC): 09030008

Land cover in the Lower Rainy River Watershed



Assessments: Are waters meeting standards and providing beneficial uses?

In general, water quality conditions in the Lower Rainy River Watershed (LRRW) are good. While many of the natural streams remain unaltered, the wetlands and peat bogs bear the legacy of significant ditching campaigns undertaken at the beginning of the 20th century. These ditches failed to drain land for farming and have left a fundamentally altered landscape.

Fifteen stream segments were assessed for their ability to support aquatic life use (fish and aquatic insect communities) and recreational use. Of those, 12 demonstrated water quality for aquatic life to thrive. In two of the other segments (in the Black River and West Branch of the Black River, segments 547 and 543 respectively), levels of *E. coli* bacteria exceeded standards for recreational use (see map and chart).

Other water quality issues include high total suspended solids (TSS; sediment), and low dissolved oxygen (DO) in some streams, although these factors do not appear to negatively affect fish and aquatic insect (macroinvertebrate) communities, which were found to be very healthy and meet standards for exceptional use (MPCA's highest use class designation). Altered hydrology, namely channelization and ditching, likely plays a role in these issues, in addition to the natural low-gradient glacial wetland topography, which can contribute to elevated sediment levels and limit DO.

The watershed supports what many experts deem world-class sturgeon and walleye fishing.

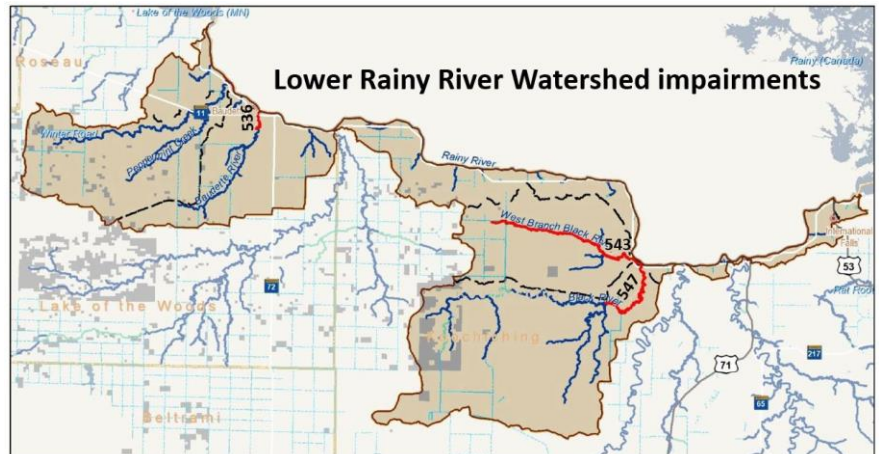
***E. coli* impairments trigger TMDL study**

A total maximum daily load study (TMDL) is underway to address the *E. coli* impairments in the LRRW. A TMDL establishes the amount of each pollutant that a water body can accept and still meet water quality standards, and the amount of reductions needed from various sources to meet the standards.

A DO impairment in segment 536 of the Baudette River (see map above) was determined in 1998. Further studies determined DO levels were likely influenced by several things, including backflow from the Rainy River into Baudette Bay, the low-gradient, wetland nature of the watershed, and natural background inputs from the Baudette and Rainy Rivers. Therefore, the U.S. Environmental Protection Agency (EPA) and MPCA are working to re-categorize this river segment into "meets standards."

Lake of the Woods nutrient impairment

The LRRW drains to the Lake of the Woods, which is impaired for recreational use due to elevated nutrient levels that cause nuisance algae blooms. Studies and projects are underway in the LRRW, and other U.S. tributaries to identify and reduce sources of phosphorous that may be contributing to the [Lake of the Woods impairment](#).



Subwatershed	Stream reach #	River	Reach description	Aquatic life				Aq. rec
				Fish Index of biotic integrity	Macroinvertebrate index of biotic integrity	Dissolved oxygen	Turbidity/TSS	Bacteria
Black River	546	Black River	South Fork Black River to Unnamed Creek	MTS	MTS	IF	IF	NA
	547	Black River	Unnamed Creek to West Fork Black River	MTS	NA	IF	EXS	IMP
West Fork Black River	543	Black River, West Fork	Headwaters to Black River	MTS	NA	IC	IC	IMP
Middle Rainy River	552	Moonlight Creek	Headwaters to Rainy River	NA	NA	MTS	IC	NA
South Fork Black River	NA	NA	NA	NA	NA	NA	NA	NA
Trib to Black River	NA	NA	NA	NA	NA	NA	NA	NA

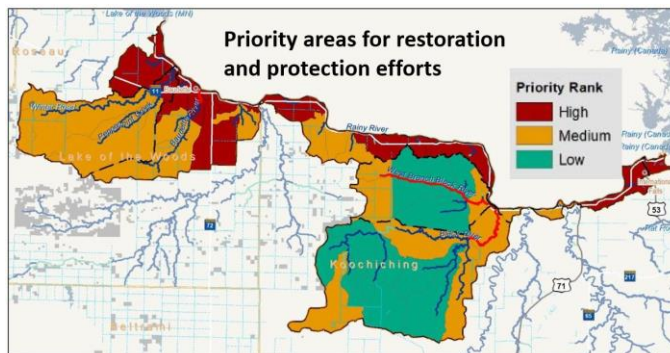
MTS = found to support use case; NA = does not support use case and is impaired; no shading = inconclusive or insufficient to draw a conclusion

MTS = Meets Standard; EXS = Fails Standard; IF = the data collected was insufficient to make a finding; NA = not assessed; IC = Information was inconclusive to draw a conclusion

Restoration and protection strategies

Given the overall good quality of the water resources in the LRRW, protection strategies will be key to preventing future water quality degradation.

A variety of monitoring reports and other information was reviewed by local resource managers and public stakeholders to understand watershed characteristics and prioritize protection and restoration efforts. This process identified reducing pollutant loading and improving altered hydrology (ditching, etc.) as key issues to address in the watershed. The map at right shows areas identified as high priority for implementing restoration and protection efforts. Specific restoration and protection strategies identified include:



Agricultural best management practices

With 13,496 acres of the LRRW in cropland, agricultural best management practices (BMPs) can help restore and protect downstream waterbodies. Agricultural BMPs have been developed to reduce, control, and trap pollutants leaving agricultural areas. Examples include buffer strips, no-till or conservation tillage, and water and sediment control basins. There are approximately 26 registered feedlots and approximately 40 unregistered feedlots with fewer than 50 animals in the watershed. Despite the relatively low numbers of facilities, feedlots can pose a risk to water resources, especially when they are in close proximity to waterways. Current impairments in the LRRW could be from poor manure management and lack of BMPs for cattle feeding, grazing, and watering operations. Investigations of root causes for the impairments has yet to take place. A primary focus should be protecting and or limiting the extent of heavy use areas where animals frequently congregate, activity that can limit plant growth and create areas of exposed, unprotected soil.

Maintain forest protection programs and timber harvesting best management practices

Fortunately, many subwatersheds in the LRRW are already forested and protected by public ownership (federal, state, and county). Forest protection programs play a major role in ensuring private forestlands stay working forestlands to provide optimal ecosystem services such as wildlife habitat, enhanced water quality, carbon sequestration, and many other benefits. Studies have estimated that the use of timber harvesting BMPs can result in sediment reduction between 53% to 94% compared to timber harvesting without BMPs.

Urban BMPs

Urban areas can contribute to the degradation of downstream waterbodies through the rapid transport of pollutants from impervious areas. To mitigate these negative impacts, national, state, and local policies have been developed to manage stormwater from newly developed areas. Additional benefits can be gained through local ordinances that expand these requirements as well as require retrofit BMPs to capture and treat runoff from existing development. Many potential retrofit BMP locations were identified, including the developed area along Highway 172, and in Baudette, International Falls, and Rainier. The MPCA and local partners are working with the city of International Falls on BMP stormwater retrofit plans.

Stream restoration projects

Streams in the LRRW have extensive ditch systems in their watersheds, often through wetlands. These were built to drain land for agriculture and in support of timber harvesting activities. Because downstream waterbodies had to evolve to new conditions that can cause channel instability and aquatic habitat loss, streams could benefit from a combination of wetland restoration (ditch plugging/removal) and/or stream restoration projects.

Climate protection cost-benefit strategies

Impacts due to climate change are and will continue to occur in the LRRW. For example, tree species ranges now common in northern Minnesota forests such as paper birch, quaking aspen, balsam fir, and black spruce will migrate farther north altering the current native forest communities and landscape. 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. Beyond agricultural BMPs, wetland protection will play a critical role in reducing GHGs and promoting resilience to climate change throughout the watershed.

Key conclusions of first cycle

- Intensive watershed monitoring of 15 stream reaches found 12 reaches fully support aquatic life (fish and aquatic insect communities) and one fully supports aquatic recreation.
- Aquatic biological communities in all assessed reaches meet the state standards. Although water quality remains relatively good, some water quality indicators could be improved, including reducing TSS, and increasing DO for aquatic organisms, and reducing bacteria levels for recreation purposes. Likely causes of these issues include poor manure management, altered hydrology (ditching, channelization, etc.), and the natural low-gradient glacial wetland topography.
- Three stream reaches failed to meet water quality standards and were placed on the federal Clean Water Act Section 303(d) impaired waters list. Streams on this list require a TMDL study. The Black River and West Fork Black River had TMDLs developed for *E. coli*, and the Rainy River is subject to phosphorus limits under a TMDL for Lake of the Woods. Previously, the downstream reach of the Baudette River experienced seasonally low DO and failed to meet the DO standard. Further analysis in the Baudette River could not connect various land uses to the DO impairment. It has been determined the Baudette River DO issues are related to poor site selection for monitoring.
- TMDL monitoring and source assessments identified watershed runoff, failing septic systems, and livestock stream access as nonpoint sources of pollution, and several industrial National Pollutant Discharge Elimination System (NPDES)-permitted facilities as point sources. More investigation is needed to focus on exact causes of these recreational impairments and will be completed next Cycle of Watershed Restoration and Protection

Next steps

The LRRW watershed approach began in 2017, and the first cycle was completed in 2022 with publication of the WRAPS report. The restoration and protection strategies listed in the WRAPS report will be the basis for developing comprehensive local water management plans that include implementation efforts to restore and protect water resources. The WRAPS report lays out goals, milestones and responsible entities to address protection and restoration opportunities in the watershed. The targets are intended to provide guidance and “measuring sticks” to assess the watershed’s health and success of actions taken.

Full report

To view the full WRAPS report, search “Lower Rainy River Watershed” on the MPCA website at <https://www.pca.state.mn.us>.

Contact

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