



# Rainy River – Rainy Lake 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 watershed approach incorporates the following activities 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 (2019-2021).
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).

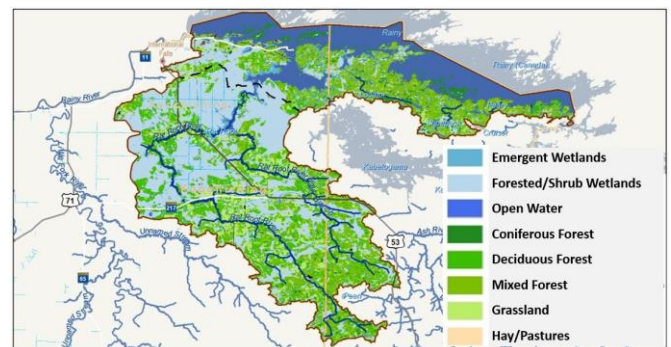


The Minnesota Pollution Control Agency (MPCA) leads the technical work and coordinates and supports strategy development with local, state, and federal partners. Watershed partners are leaders in implementing strategies to restore and protect waters. Their past and current work provides opportunities for watershed improvement, and will continue to be a critical component to overall water quality. The main purpose of the WRAPS report is to generate, compile, and summarize all the technical information so that local partners such as the soil and water conservation districts can use it for planning and implementing the best strategies in prioritized locations.

## Watershed characteristics

- Size: 296,624 acres (U.S./Minnesota portion)
- Counties: Koochiching (67%), St. Louis (33%)
- Ecoregions: Transition between Northern Minnesota Wetlands and Northern Lakes and Forest
- Major streams: Rat Root River, Rat Root River East Branch
- Towns: Island View, Ericsburg, Ray, Rainer
- Land cover: Wetlands 48%, Forest/shrub 32%, 17% open water, 2.7% rangeland
- The 8-digit hydrologic unit code (HUC): 09030003

## Land cover in the Rainy River – Rainy Lake Watershed



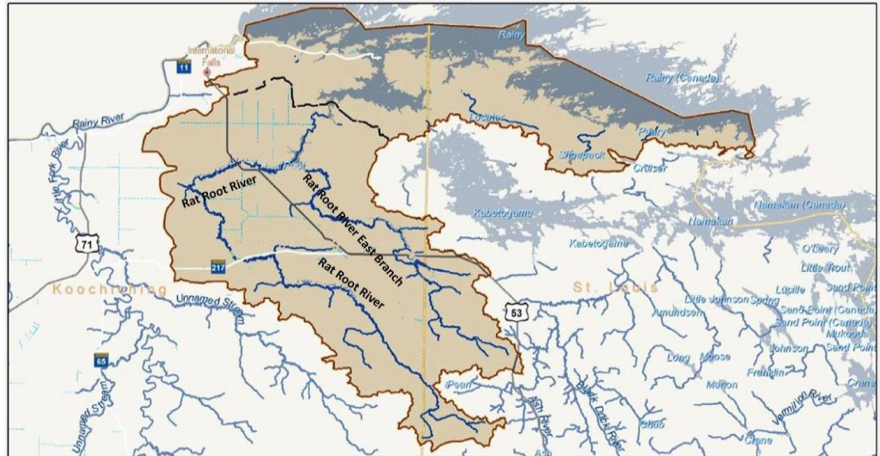
## Assessments: Are waters meeting standards and providing beneficial uses?

Water quality is good throughout the Rainy River - Rainy Lake Watershed (RRRLW) due in large part to the forests and wetlands that dominate land cover. They absorb and filter precipitation, resulting in far less runoff carrying pollutants into lakes and streams.

This region includes lakes and streams designated as outstanding resource value waters (ORVWs) that have exceptional recreation, cultural, aesthetic or scientific value.

There are a total of 27 lakes greater than 10 acres in size and only two streams of significant size. These waters are key drivers of the region's economy, which is based largely on recreation.

Streams in the RRRLW are limited to the Rat Root River and the Rat Root River, East Branch. Three of the four assessed stream reaches fully support aquatic life (fish and aquatic insect communities) and/or recreation. The fourth stream reach, the Rat Root River (from Unnamed Creek to Rat Root River, East Branch) had inconclusive information to make a determination of aquatic life use support, but was determined to be supporting of aquatic recreation (see table).



Aggregated HUC-12 Subwatershed	AUID (Last 3 digits)	River	Reach description	Aquatic life Indicators:					Aquatic life	Aquatic rec. (Bacteria)
				Fish Index of biotic integrity	Macroinvertebrate index of biotic integrity	Dissolved oxygen	Turbidity/TSS	Eutrophication		
Rat Root River	634	Rat Root River	Headwaters to Unnamed Creek	MTS	MTS	IF	IF		SUP	--
	635	Rat Root River	Unnamed Creek to Rat Root River, East Branch	MTS	--	NA*	EXS	IC	IC	SUP
Rat Root River, East Branch	632	Rat Root River, East Branch	Headwaters to Unnamed Creek	MTS	--	IF	IF		SUP	--
	633	Rat Root River, East Branch	Unnamed Creek to Rat Root River	MTS	MTS	IF	EXS		SUP	SUP

Sup = found to meet the water quality standard, Imp = does not meet the water quality standard and, therefore, is impaired, EXS = fails standard, MTS = meets standard, IF = the data collected was insufficient to make a finding, NA = not assessed, IC = Inconclusive information  
Assessment Unit Identification (AUID); Hydrologic Unit Code (HUC)

### No impairments found; however, total suspended solids, low dissolved oxygen are issues

No reaches in the RRRLW are designated as impaired for aquatic life use (healthy fish and aquatic insect communities). Fish index of biological integrity (F-IBI) and macroinvertebrate index of biological integrity (M-IBI) scores (used to evaluate habitat health) are below expected thresholds in the middle section of the Rat Root River. Total suspended solids (TSS; sediment in the water) and dissolved oxygen (DO) at times do not meet state standards in the downstream to mid-river reaches of the Rat Root River. This is likely a function of the fine, glacially derived sediments that are found in this area in the case of TSS, and due to natural wetland environments, low gradient non-aerating reaches, and the "backwater" effect from downstream damming in the case of low DO.

TSS is frequently elevated in the downstream to mid-river reaches of the East Rat Root River. Despite elevated TSS in the East Rat Root River, biological index scores are good and meet expected thresholds at the sampled locations.

Although all lakes were designated as impaired for aquatic consumption (mercury in fish), Rainy Lake and other lakes clearly met recreational use goals (all of Rainy Lake is designated an ORVW). The high recreational quality of the lakes reflects the undisturbed nature of their contributing watersheds.

The Minnesota Department of Natural Resources confirmed the presence of zebra mussel veligers (larval stage of zebra mussels) in Black Bay of Rainy Lake in 2021. Zebra mussels, an aquatic invasive species, have multiple effects on lakes they invade. Federal, Provincial, State, and County partners are collaborating on Aquatic Invasive Species prevention efforts.

## Restoration and protection strategies

The RRRLW contains a relatively large percentage of protected resources, as compared to other watersheds in Minnesota. The high quality of water resources within this watershed represents the combined protection efforts of Voyageurs National Park and state and county agencies. Given the watershed's conditions, 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 as key issues to address in the RRRLW.

Specific protection strategies identified for the RRRLW include:

### Large in-stream wood protection

In-stream wood deposits provide critical habitat for aquatic life, provide flow variation and riffle pools, stabilize streambanks, and help trap sediment and prevent erosion. The streamside forests along the Rat Root River have historically supplied the riparian ecosystem with large wood that has shaped the river's geomorphology and fostered stream complexity and biodiversity. However, as the local economy has developed, large wood has often been removed for navigational, aesthetic, and recreational purposes, as well as potentially to reduce localized flooding. Large wood removal projects must carefully evaluate and balance the needs of the local community with a full suite of stream health and riverine ecosystem benefits.



### Wild rice management

The operation of dams in Rainy Lake poses major challenges to the growth of wild rice, that in turn threatens indigenous communities who rely on the resource. Tribal nations successfully advocated and worked with the International Joint Commission in 2018 to modify the Rainy Lake Rule Curve to promote wild rice survivability and harvest, and the growth of muskrat populations which control competitive species of cattails. These changes accounted for new research that identified optimal water levels and conditions for wild rice growth and harvest, and shorter winter drawdown periods for improved muskrat survival.

### Maintain forest protection programs and timber harvesting best management practices

Fortunately, many subwatersheds in the RRRLW are already forested and protected by public ownership (federal, state, and county). Forest protection programs play a major role in ensuring private forest lands stay working forest lands 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 best management practices (BMPs) can result in sediment reduction between 53% to 94% compared to timber harvesting without BMPs.

### Stream restoration projects

Specific stream restoration recommendations include removing a bridge and its pilings just downstream of where the Rat Root River crosses MN State Highway 217. This would address high TSS and extremely low DO relative to the rest of the river system.

### Walleye spawning enhancement

Recreational walleye fishing represents a major economic driver within the Rainy Lake regional tourism industry. As a result, local interest in improving walleye spawning has spurred several recent monitoring and implementation programs in the Rat Root River. In the last decade, a coordinated effort between public and private entities arose to spearhead several spawning improvement projects.

## Key conclusions of first cycle

- Three of four stream reaches assessed in the watershed fully support aquatic life (fish and aquatic insect communities). Two stream reaches were also assessed for, and fully support, recreational use. Although several lakes are impaired for aquatic consumption (mercury in fish), all lakes clearly meet recreation use goals.
- The high quality of recreational use opportunities on lakes in the watershed reflects the undisturbed nature of their contributing watersheds. In the remote northeastern region of the watershed where obtaining water quality samples can be difficult, lake clarity data suggests that these lakes too are suitable for recreation.
- Overall, water quality conditions are good and can be linked to the forest and wetlands that dominate land cover within the RRRLW.
- In parts of this watershed, TSS and DO may at times exceed the state standards. The underlying fine sediments and generally flat topography of the region, a function of this region's geologic past, likely contribute to the TSS and DO exceedances.
- Human-caused stressors, such as historical and recent forest cover changes, flow alterations, and the draining of wetlands, may locally affect aquatic life health. Where standards are being met, protection strategies to maintain good water quality are important.

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### Next steps

The RRRLW approach began in 2017, and monitoring, assessment, watershed analysis, and strategy development were 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.

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### Full report

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

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### Contact

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