



Rainy River - Headwaters 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 water bodies and collecting data over two years on water chemistry and biology (2014-2015).
2. Assessing the data to determine which waters are impaired, which conditions are stressing water quality, and which factors are fostering healthy waters (2017-2019).
3. Developing strategies to restore/protect the watershed’s water bodies, and report them in a document called Watershed Restoration and Protection Strategies (WRAPS) (2019-2021).
4. Coordinating with local One Watershed-One Plan efforts for implementation of restoration/protection projects (2021-beyond).

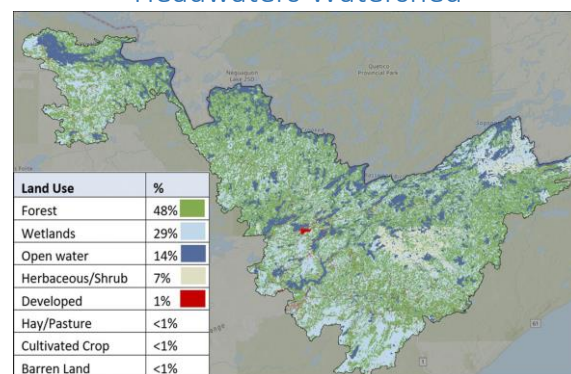


The Minnesota Pollution Control Agency (MPCA) leads the watershed science work and coordinates and supports strategy development with local, state, tribal, and federal partners. Watershed partners are leaders in local water planning and implementing strategies to restore and protect waters. Their past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

Watershed characteristics

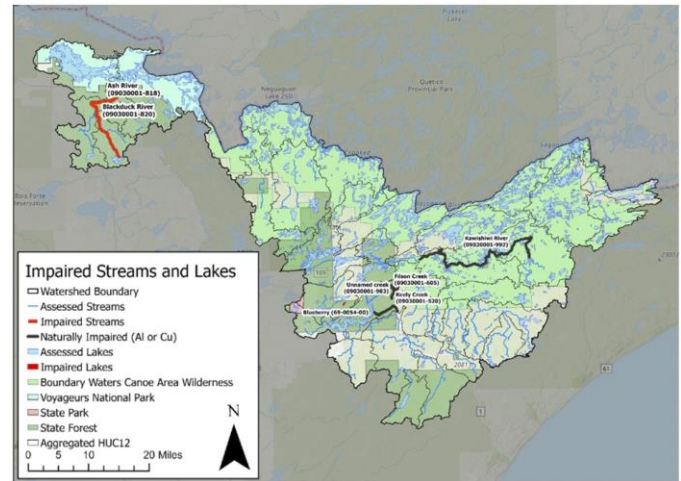
- Size: 2,954 square miles (Minnesota portion of the watershed)
- Counties: Lake (46%), St. Louis (43%), Cook (11%), Koochiching (<1%)
- Ecoregion: Northern Lakes and Forests (99.8%)
- Major streams: Kawishiwi, Ash, Bear Island, Dunka, Blackduck, Dumbbell, Burntside, Cross, Greenwood and Horse Rivers
- Towns: Ely (pop. 3,841) and Winton (pop. 158). Total watershed pop. 6,784
- Land cover: forests 48%, wetlands 29%, open water 14%, herbaceous/shrub 7%, developed land 1%, remaining uses less than 1% each. The RRHW contains the majority of the Boundary Waters Canoe Area Wilderness providing protection of the waters within. Over 99% of the watershed is undeveloped and used for timber production, hunting, fishing, canoeing, hiking, and other recreational opportunities.
- The 8-digit hydrologic unit code (HUC): 09030001

Land use in the Rainy River Headwaters Watershed



Assessments: Are waters meeting standards and providing beneficial uses?

Overall, water quality in the Rainy River-Headwaters Watershed (RRHW) is excellent. Focusing on assessing aquatic life use (fish and aquatic insects) and aquatic recreation (swimming), several stream reaches were identified as having exceptional fish and macroinvertebrate (aquatic insect) communities, and only two stream reaches and one lake were identified as impaired. These impairments are in the western part of the watershed. Waters are “impaired” if they fail to meet standards. Impaired waters require a study called a Total Maximum Daily Load (TMDL), a federal Clean Water Act requirement. The goal of a TMDL study is to quantify pollutant reductions needed to meet water quality standards.



The Ash River and Blackduck Rivers have reaches impaired based on total suspended solids (TSS) measurements, which

can be harmful to aquatic life (fish and aquatic insect communities). Within the Blackduck River, a tributary to the Ash River, there is bank erosion, cattle pasture/farming, and substantial land alterations including stream channelization. A portion of the Blackduck River also has an aquatic recreation impairment due to elevated levels of *E. coli* bacteria.

A TMDL study was done in the Blackduck River to address the TSS and *E. coli* impairments affecting aquatic life and aquatic recreation designated uses, respectively.

There are currently no point source permitted sources of pollution in the Blackduck River Watershed. Near-channel sources account for the majority of the TSS load in the impaired reach, and pastured animals are the primary source of *E. coli*.

Additionally, four stream reaches sampled as part of a separate U.S. Geological Survey (USGS) study on baseline conditions in wilderness streams were found to be naturally impaired by high levels of aluminum, and one of these reaches was also impaired by high levels of copper. These aquatic life impairments are caused by surface water contact with mineralized bedrock in undeveloped areas and do not require a TMDL due to their natural causes.

The RRHW had 245 of its 1,273 lakes greater than 10 acres (19%) assessed during the period of intensive water monitoring. One lake, Blueberry Lake, is impaired for aquatic recreational use due to excessive nutrients that cause nuisance algae blooms. It was determined this impairment is due to natural background conditions and no TMDL study is required.

Stressors and pollutants: What factors are affecting fish and recreation?

Stressor identification work identified potential stressors to fish and aquatic macroinvertebrate communities in the watershed. Sixty-two stream reaches were monitored and sampled for the health of their fish and aquatic insect communities. No biological impairments were found.

The MPCA did a more in-depth analysis on pollutant sources on impaired stream reaches and their upstream waters, and reaches that need more investigation to determine trout suitability. This work helped identify protection and restoration measures for the watersheds.

The Ash River (reaches -818 and -819) and the Blackduck River (reach -820) were selected based on their chemistry impairments, and the Dunka River (reaches -986 and -987) was selected to look at whether its aquatic life use classification should be upgraded to support trout habitat. The lower reach of the Dunka River was found to have appropriate coldwater habitat and to support a population of naturally reproducing brook trout.

Further investigations of pollutants and trout suitability

HUC-12 Subwatershed	WID (Last 3 digits)	River	Reach description	Biological impairment	Water Quality Impairment	Further Investigation For		
						Trout suitability	TSS	<i>E. coli</i> (bacteria)
Ash River	818	Ash River Lower	Blackduck R to Ash River Falls	None	TSS	●	●	
	819	Ash River Upper	Headwaters (Ash Lk 69-0964-00) to Blackduck R	None	None	●	●	
Blackduck River	820	Blackduck River	Headwaters (Blackduck Lk 69-0842-00) to Ash R	None	TSS, <i>E. coli</i>	●	●	●
Dunka River	986	Dunka River	Headwaters to Unnamed Ditch	None	None	●		
	987	Dunka River	Unnamed Ditch to Birch Lk	None	None	●		

Restoration and protection strategies

The WRAPS process includes a means to categorize water bodies for restoration and varied levels of protection. With minimal impairments in the watershed, the Rainy River Headwaters WRAPS is mainly focused on protection strategies.

The WRAPS process included a public meeting in Ely that provided an overview of the MPCA's watershed approach, details on exceptional use waters and impairments within the watershed, and an introduction to WRAPS. Participants asked questions about the process and shared concerns about protecting the RRHW.

Watershed partners have completed many projects to protect and improve the water quality in the RRHW. The number of projects implemented from 2004-2019 are outlined in the figure at right.

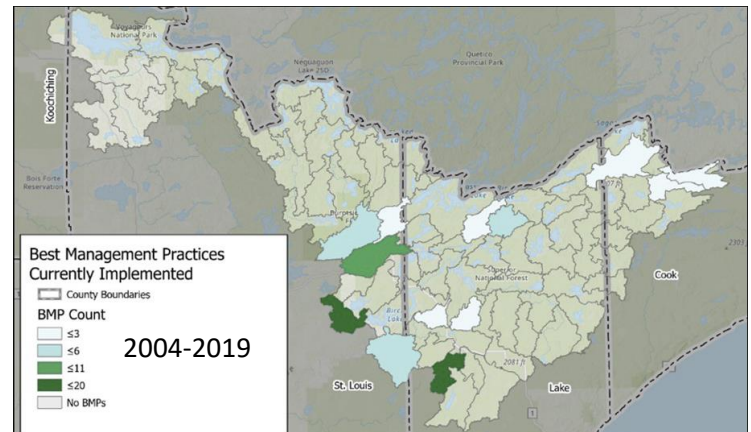
A Core Team of representatives from local, state, federal agencies met throughout the watershed approach process to guide assessment, problem investigation, and strategy development. This included the guidance of developing strategies for restoration of the Blackduck River, impaired by TSS and *E. coli*. Strategies for restoration include pasture and forest management, streambank stabilization, and channel restoration. The Core Team also developed several protection-focused strategy themes to address key issues. They include:

- drinking water protection
- forestry management
- habitat and stream connectivity management
- lake management
- recreational management
- septic system and waste management improvement
- stormwater runoff control, and
- streambank and gully protection and restoration.

While some strategies directly affect the quality of waterbodies, there are many other strategies, such as education and outreach, that lay the groundwork for water quality improvement. For example:

- Develop lake management plans for individual lakes
- Encourage formation of organization and lake associations
- Conduct outreach to lakeshore landowners about best management practices
- Coordinate education and outreach messages and delivery methods with and between federal and state agencies, county and local governments, lake associations, and other groups.

Continued monitoring is critical for determining if progress has been made in restoration and protection and for determining the effects of future impacts on water quality.



Key conclusions of first cycle

- Overall, water quality conditions are excellent and can be attributed to the forest and wetlands that dominate land cover in the watershed. A limited number of impairments do exist. These include a few impairments caused by TSS, and *E. coli* (bacteria). Sources include stream channelization and pasture operation.
- Impairments found within this watershed are likely a function of both natural and human-caused stressors. In addition to natural wetland influences on fish communities, historical and recent forest cover changes, along with development are likely stressors affecting biological communities within the watershed. The majority of the waterbodies within this watershed had exceptional biological, chemical, and physical characteristics that are worthy of additional protection.
- Sixty-two stream stations were sampled for biology at the outlets of variable sized subwatersheds and 97% fully supported aquatic life (fish and aquatic insect communities) and 92% fully supported aquatic recreation.
- All but one lake assessed met eutrophication standards in the ecoregion, and nearly all lakes had good water quality supportive of recreation.
- More than 99% of the watershed is undeveloped and used for timber production, hunting, fishing, hiking, and other recreational opportunities.
- Nonpoint sources account for more than 99% of runoff, sediment, and total nitrogen (TN) and nearly 98% of total phosphorus (TP) delivered to streams and lakes in the RRHW. When compared to other watersheds throughout the state, the RRHW has some of the lowest concentrations of nitrate plus nitrite nitrogen, TSS, and TP.
- Streams are generally short and connect the many lakes that are present throughout.
- Two hundred-twelve lakes have aquatic consumption impairments due to an exceedance of standards for mercury in fish tissue. Of these, 117 mercury TMDLs were approved as part of the 2018 Mercury TMDL, and the remaining TMDLs are expected to be completed between 2021 and 2033.

Next steps

The Rainy River Headwaters Watershed approach began in 2014. 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.

Full report

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

Contact

Minnesota Pollution Control Agency

Amy Mustonen, Watershed Project Manager: amy.mustonen@state.mn.us, 218-302-6638