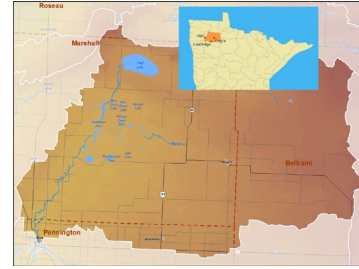


# Thief River Watershed



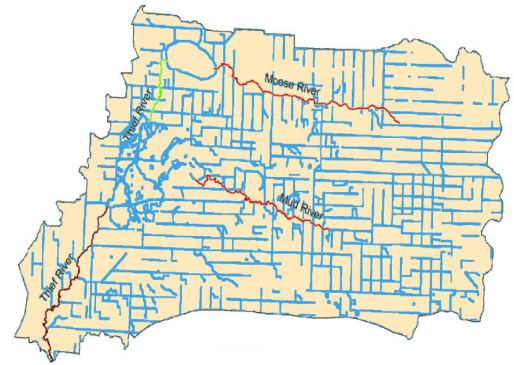
## Watershed approach

Minnesota has adopted a watershed approach to address the state's 80 major watersheds. This approach looks at the drainage area of a watershed 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 and public participation
- Planning and implementation
- Measuring results

The Minnesota Pollution Control Agency (MPCA) leads the monitoring and assessment of the waters with large contributions by local partners, and works with these local partners to develop restoration and protection strategies. Local partners lead efforts to implement the strategies to restore and protect water resources, and also engage citizens throughout the process.

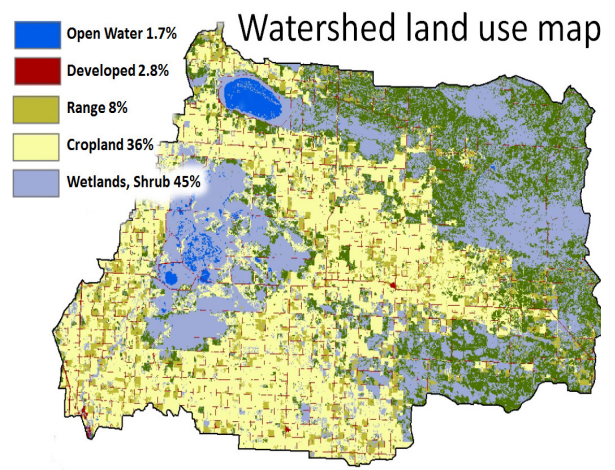
The Thief River intensive watershed monitoring cycle began in 2011 and culminated with a Watershed Restoration and Protection Strategies (WRAPS) Report published in 2018. This document summarizes key findings and recommendations contained in the full Thief River Watershed WRAPS Report. The next cycle for the watershed is scheduled to begin in 2023.



**Nearly all streams in the watershed have been straightened/channelized. This altered hydrology greatly impacts water quality in the watershed.**

## Watershed characteristics

- Size: 1090 square miles or 624,422 acres
- Counties: Marshall, Beltrami, Pennington
- Ecoregion(s): Lake Agassiz Plain, Northern MN Wetlands
- Municipalities: Thief River Falls, Holt, Goodridge, Grygla
- Land cover: Cultivated Crops (36%), Wetlands (45%), Range (8%), Developed (2.8%), Open water (1.7%), Other (6.5%)
- Tributary to: Red Lake River (confluence at Thief River Falls)
- The 8-digit hydrologic unit code or HUC for the Thief River Watershed is 09020304.



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

During the first phase of the WRAPS study – intensive watershed monitoring – the MPCA and the Red Lake Watershed District collected water chemistry data, such as pollutant concentrations, and biology (fish and aquatic insect communities) to determine if lakes and streams were meeting water quality standards designed to ensure that waters are swimmable and fishable. The map on the next page shows impairments on three reaches within the Thief River Watershed: turbidity on the Thief River, *E. coli* (bacteria) and low dissolved oxygen (DO) on the Mud River, and low DO on the Moose River.

In 2015, the state adopted Tiered Aquatic Life Use (TALU) standards to assess for biological impairments in highly channelized streams. Since the Thief River Watershed was one of the last to be assessed before the adoption of TALU, decisions regarding aquatic life impairments for fish and aquatic insects were deferred. Now that TALU has been adopted, fish and insect communities will be assessed using TALU during the winter of 2018-2019.

## Highlights of the 2013 assessment of the Thief River Watershed

Seven stream segments and one lake were assessed. Twenty stream segments were not assessed due to insufficient data, modified channel condition, or their status as limited resource waters. Also, numerous lakes were not assessed due to insufficient data. For example, most of the lakes are located within Agassiz National Wildlife Refuge and have no public access; as a result, little or no historical water quality data has been collected.

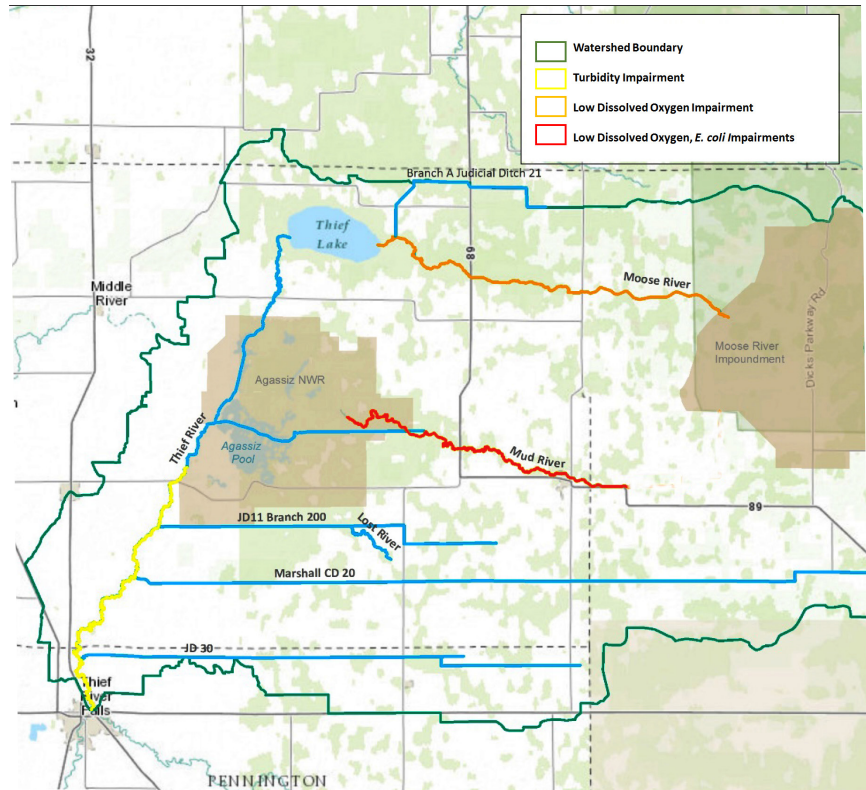
Three stream segments assessed within the watershed failed to fully support aquatic life.

Most of the aquatic life impairments were based on habitat conditions such as low DO and/or high levels of turbidity.

No aquatic life impairments were the result of poor fish and aquatic insect communities because impairment decisions on all channelized (straightened) streams (a large percentage of all streams in the watershed) were deferred pending the adoption of TALU standards.

Of the seven stream segments assessed for aquatic recreation (swimming), six showed full support. The remaining reach is impaired due to elevated levels of bacteria (*E. coli*). The only lake in the watershed with assessment level data is Thief Lake, which fully supports aquatic recreation.

The Agassiz National Wildlife Refuge which makes up much of the watershed's western boundary is managed for waterfowl production and is a popular tourist destination for recreational activities. Water releases from pools within the refuge, as well as other sources, contribute to the turbidity impairment in the Thief River.



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

To develop strategies for restoring or protecting water bodies with biological impairments (those affecting fish and aquatic insect communities), agencies and local partners first identify the possible causes, or stressors, of the impairments. This is called the stressor identification process.

A stressor identification study was not completed at this time for the Thief River Watershed because assessments on all channelized streams were deferred for fish and aquatic insect data until after the adoption of TALU standards, which took place in 2015, two years after this watershed was assessed.

TALU will be used to assess the channelized reaches in the Thief River Watershed during the winter of 2018-2019.

## Total maximum daily loads

Under federal laws, impaired waters must have total maximum daily load (TMDL) studies to determine reductions of pollutants needed to meet water quality standards. During this WRAPS study, the MPCA and local partners completed two TMDLs for two impairments in two stream reaches (identified below).

- A TSS (total suspended solids) TMDL was written to address high turbidity levels in a reach of the Thief River from Agassiz pool in the Agassiz National Wildlife Refuge to the Red Lake River in Thief River Falls. Agassiz pool receives water from the Mud River, Thief River and smaller ditches. Occasional drawdowns of the pool have been required to manage water levels to meet recreational and wildlife management objectives. Strategies are being developed to reduce the high levels of turbidity/TSS in the Thief River coming from this and other sources.
- An *E. coli* TMDL was written to address excessive levels of bacteria that impair the Mud River for aquatic recreation (swimming) from its headwaters to the Agassiz pool. *E. coli* standards are applicable only during warm months (April-Oct.).
- Two additional impairments for low DO in the Moose River from its headwaters to Thief Lake, and the Mud River from its headwaters to the Agassiz pool, were also identified but data analysis determined low water flow as the cause. TMDLs cannot be calculated where low flows are the cause of the impairment; however, management strategies have been developed to augment base flow with Moose River Impoundment discharges.

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## Restoration and protection strategies

Water quality restoration and protection strategies within the Thief River Watershed were identified through collaboration with local and state partners (i.e., Soil and Water Conservation Districts, Red Lake Watershed District, MPCA, Minnesota Department of Natural Resources, and Minnesota Board of Waters and Soil Resources. Due to the homogenous nature of the watershed, most of the suggested strategies are applicable throughout the watershed.

**To protect fish/aquatic insects:** Address overland/streambank erosion, improve stream connectivity with properly sized/placed culverts, potentially modify the Agassiz pool dam and Thief River dam, reduce runoff and leaching of pesticides, reduce peak flows, increase base flows.

**To improve dissolved oxygen concentrations:** Improve nutrient and soil health management, improve base flows in Moose and Mud rivers through management of impoundment discharges, restore natural stream meanders, and increase natural vegetation along streams.

**To reduce TSS:** Improve stream buffers, restore meanders, install windbreaks to reduce erosion, increase flood plain maintenance and revegetation along ditches, stabilize streambanks, install field side-inlet controls and grade control structures, minimize effects of Agassiz pool drawdowns, and reduce sediments deposited in Agassiz pool.

**To reduce *E. coli* bacteria:** Increase conservation practices in critical areas, improve septic system compliance, and improve grazing management and feedlot compliance.

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## Next steps and measuring results

The restoration and protection strategies listed in the WRAPS report will be the basis for developing local implementation plans, such as the Thief River One Water One Plan (1W1P), to restore and protect water resources. The 1W1P process began in 2017 and should be completed by early 2019. The WRAPS Report lays out goals, milestones, and responsible entities to address protection and restoration priorities in the Thief 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 cultivated crops 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 WRAPS cycle

- There are currently four impairments in the Thief River Watershed: Turbidity on the Thief River from Agassiz pool to the Red Lake River; *E. coli* and DO on the Mud River from the headwaters to Agassiz pool; and DO on the Moose River from the headwaters to Thief Lake. TMDLs have been written for the turbidity and *E. coli* impairments.
- TMDLs were not written for the low DO impairments because it was determined these impairments were due to low flow conditions. One of the strategies developed to address low DO conditions in the Moose and Mud rivers is to modify the discharge of the Moose River impound to maintain higher base flows throughout the season.
- Drinking water sources downstream from the turbidity impairment have been impacted by high sediment levels in the rivers downstream. This affects Thief River Falls and possibly East Grand Forks and Crookston.
- The low number of impairments isn't necessarily due to widespread good water quality throughout the watershed. Most of the streams have been modified for drainage and were not assessed for biology (fish and aquatic insects) because TALU, the special standards developed to assess highly altered streams, had not yet been adopted. These streams will be assessed for biology during the winter of 2018-2019.



Photos show the confluence of the Thief River (to the right in both images) with the Red Lake River in Thief River Falls. The Thief River's higher concentration of total suspended solids shows up gray in contrast to the cleaner water coming from the Red Lake River.

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### Full report

For the full report, go online and search for "MPCA Thief River WRAPS report."

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