UPPER MISSISSIPPI

Grand Rapids Watershed

Comprehensive Watershed Management Plan

2025 - 2035

CLEAN WATER LAND & LEGACY AMENDMENT

ACKNOWLEDGEMENTS

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ACRONYMS

Aquatic Invasive Species	AIS
Aquatic Management Area	AMA
Best Management Practices	BMPs
Board of Water and Soil Resources	BWSR
Capital Improvement Project	CIP
Coalition of Lake Associations	COLA
Comprehensive Watershed Management Plan	CWMP
Conservation Reserve Enhancement Program	CREP
Conservation Reserve Program	CRP
Cooperative Stream Gaging	CSG
Drinking Water Supply Management Area	DWSMA
Emerald Ash Borer	EAB
Environmental Protection Agency	EPA
Environmental Quality Incentives Program	EQIP
Farm Services Agency	FSA
Federal Highway Administration	FHWA
Hydrologic Unit Code (watershed size on maps)	HUC
Joint Powers Agreement	JPA
Land Stewardship Plan	LSP
Local Government Units	LGUs
Memorandum of Agreement	MOA
Minnesota Agriculture Water Quality Certification Program	MAWQCP
Minnesota Department of Agriculture	MDA
Minnesota Department of Health	MDH
Minnesota Department of Natural Resources	DNR
Minnesota Department of Transportation	MnDOT
Minnesota Pollution Control Agency	MPCA
Municipal Separate Storm Sewer System	MS4
National Resource Conservation Service	NRCS
National Weather Service	NWS
One Watershed, One Plan	1W1P
Per- and Polyfluroalkyl Substances	PFAS
Perfluorooctanesulfonic Acid	PFOS
Reinvest in Minnesota	RIM
Scenic Natural Areas	SNA
Soil and Water Conservation District	SWCD
Subsurface Sewage Treatment Systems	SSTS
Sustainable Forest Incentive Act	SFIA
The Nature Conservancy	TNC

ACRONYMS

Total Suspended Solids	TSS
United States Army Corps of Engineers	USACE
United States Department of Agriculture	USDA
United States Fish and Wildlife Service	USFWS
United States Forest Service	USFS
United States Geological Survey	USGS
University of Minnesota	UMN
Upper Mississippi - Grand Rapids	UM-GR
Watershed Pollutant Load Monitoring Network	WPMLN
Watershed Restoration and Protection Strategy	WRAPS
Watershed-Based Implementation Funding	WBIF
Wetland Conservation Act	WCA
Wildlife Management Area	WMA

TABLE OF CONTENTS

EXECUTIVE SUMMARY

SECTION 1. EXECUTIVE SUMMARY

Introduction

The Upper Mississippi - Grand Rapids (UM-GR) Watershed collects the water that topography and gravity provide from the borders of 3 adjacent watersheds (Figure 1.1):

- Laurentian Divide, flowing to the north via Rainy to Hudson's Bay;
- The St Laurence, to the east through the Great Lakes;
- The St. Croix, to the south joining the Mississippi's journey near Prescott, south-east of the Metro Area.

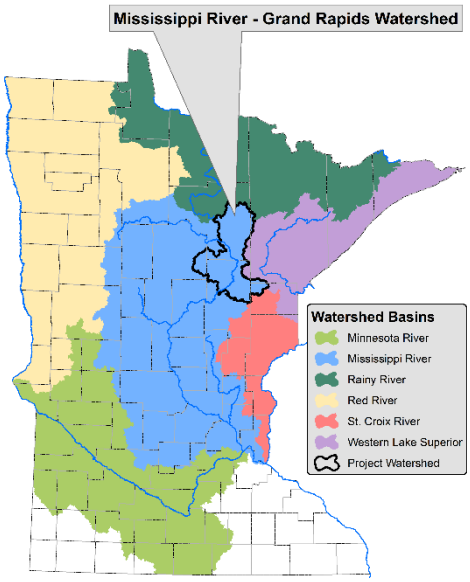


Figure 1.1. UM-GR watershed and Minnesota River Basins.

The Mississippi River itself enters the UM-GR at the Pokegema Dam in Cohasset, just to the north-west of Grand Rapids. From there it flows into the Mississippi-Brainerd Watershed just south of Palisade at the confluence with the Willow River. Along the way two principal arteries provide cumulative input to the UM-GR (Figure 1.2):

- Prairie River, from the north-east quadrant of lakes and highland;
- Willow River from the south-west lowlands with wetland drainage.

The UM-GR also has the somewhat unique feature of the east end of the Mesabi Iron Range - an extensive development stretching north-east from Grand Rapids to Keewatin, bordering the Lake Superior/St Laurence watershed. This area is characterized by an industrial landscape with large open pits, many of which are now recreational lakes, surrounded by immense tailing piles.

The UM-GR drains over 1.3 million acres and contains almost 2,000 miles of streams and 625 lakes greater than 10 acres. It spans five counties: Aitkin, Carlton, Cass, Itasca, and St. Louis (Figure 1.2). The watershed also includes portions of the Mille Lacs Band of Ojibwe Reservation, and a number of communities including Grand Rapids, Colerain, Cromwell, Hill City, McGregor, and Remer. This watershed has an abundance of beautiful lakes that make it an important recreational destination. It is also home to unique plant and animal species such as wild rice, peatlands, and trout, along with an abundance of healthy forests.

This Comprehensive Watershed Management Plan (CWMP) was developed in 2023-2024 as a part of the Board of Water and Soil Resources (BWSR) One Watershed, One Plan Program (1W1P). This program seeks to align watershed planning along hydrologic boundaries rather than jurisdictional ones, making partnerships between local government units within the watershed essential during planning and implementation. With very few water quality impairments and 37% public land ownership, the UM-GR CWMP focuses on **nondegredation**, as evidenced by the vision statement below.

nondegredation

non.deg.ra.da.tion

noun

1. Prevention of a significant change that lowers the condition of high-quality land and waters.

Watershed Vision:

From the peatlands to the iron range, we work to protect our vibrant Northwoods lands and waters for vibrant communities.

Credit: Matt Gutzmann

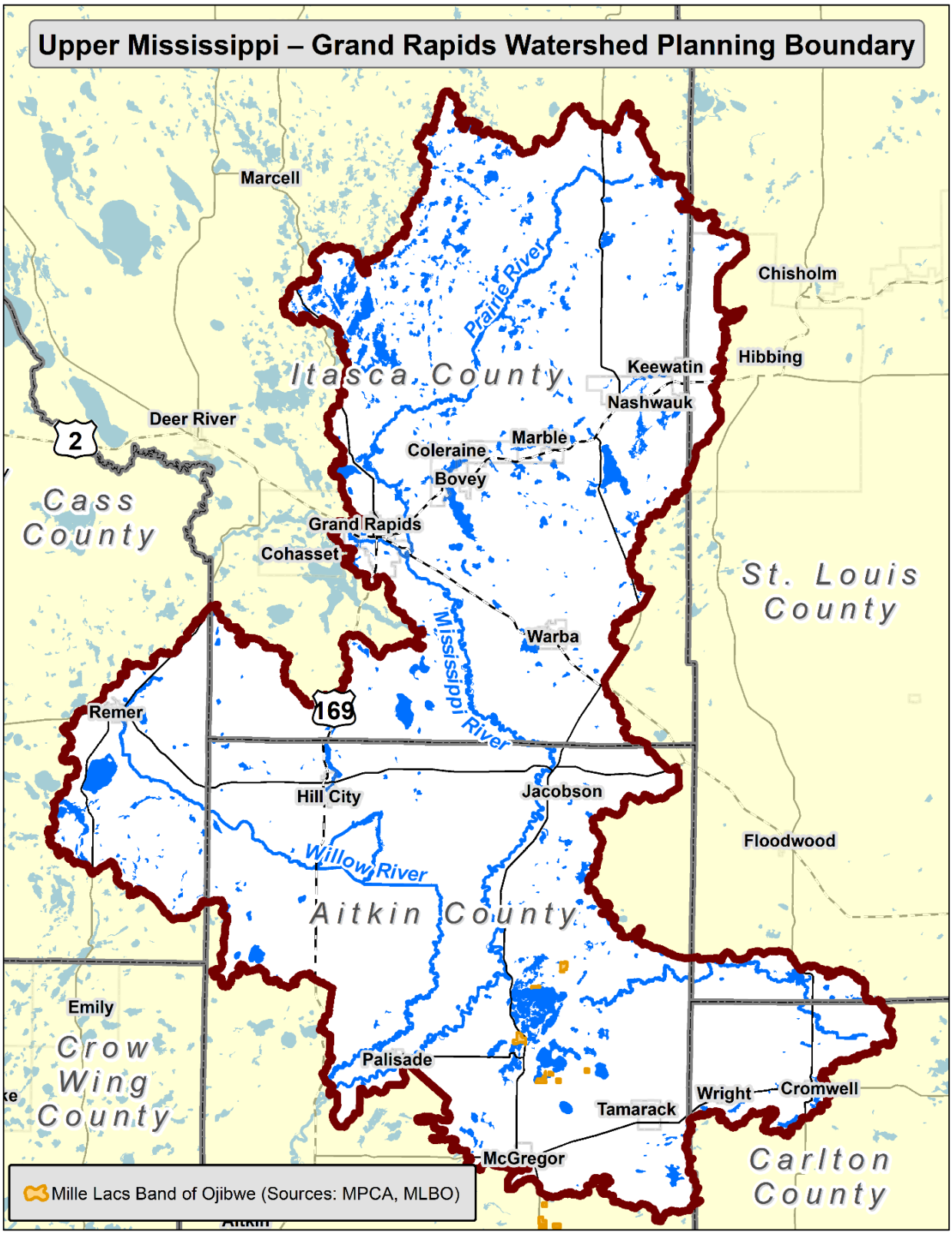


Figure 1.2. Location map for the UM-GR Watershed.

Roles

The UM-GR Partnership is a Memorandum of Agreement (MOA) between Aitkin County, Aitkin Soil and Water Conservation District (SWCD), Carlton County, Carlton SWCD, Cass SWCD, Itasca County, Itasca SWCD, Mille Lacs Band of Ojibwe, and Salo Township (see Figure 1.3).

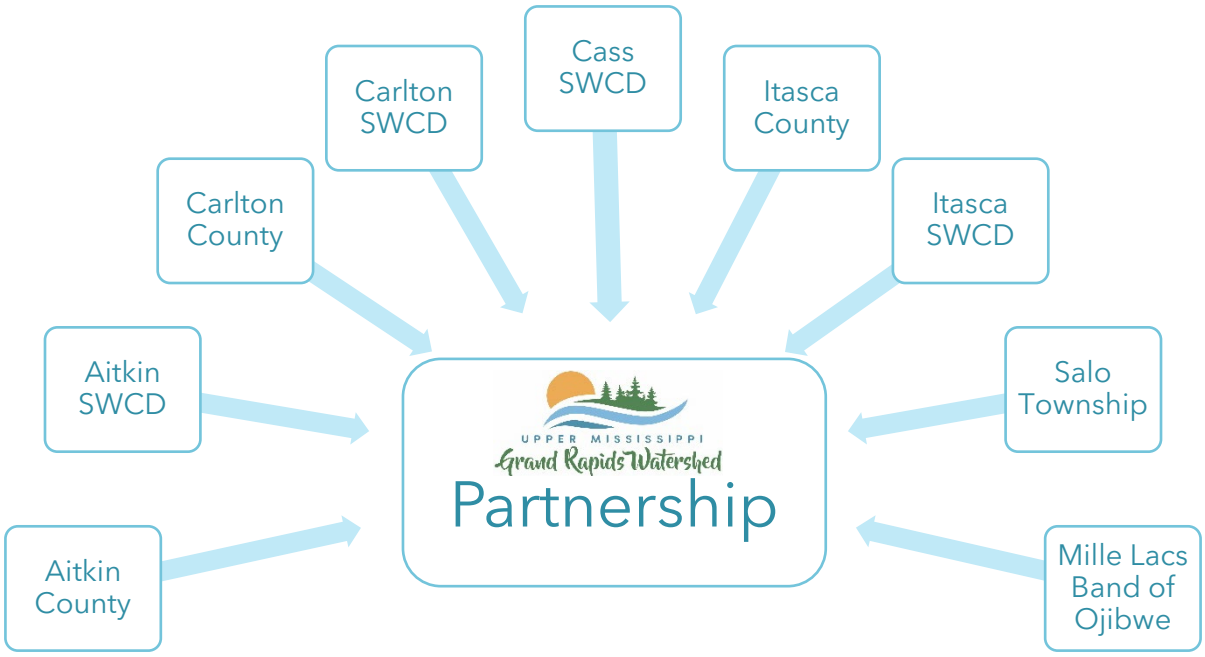


Figure 1.3. Planning Partners.

The CWMP development process is driven by three committees, the Policy, Steering, and Advisory Committees (Figure 1.4). The Steering Committee contains local government unit staff (LGUs), guided by an Advisory Committee made up of local stakeholders, federal and state agencies, and tribal entities. The decision-making body for the plan is a Policy Committee made up of elected officials from each entity in the MOA.

Policy Committee

Includes: An elected official from each entity in Figure 1.1.
Role: Decision-making body for the CWMP.

Steering Committee

Includes: One staff member from each LGU on the MOA, BWSR, and the consultant.
Role: Guides plan development and produces plan content.

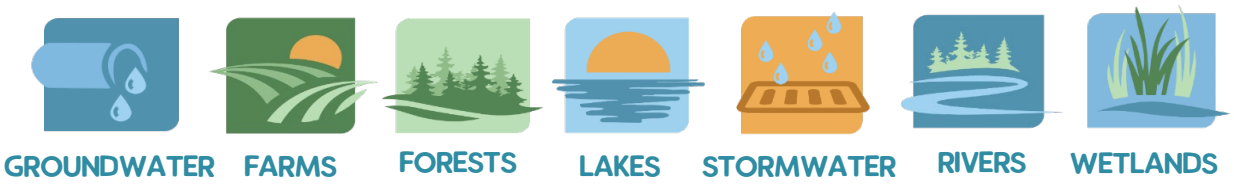
Advisory Committee

Includes: Local stakeholders such as state agency staff, watershed residents, and private businesses.
Role: Advises on plan content.

Figure 1.4. Roles of the Policy, Steering, and Advisory Committees involved in the development of the UM-GR CWMP.

Plan Development

After establishing the committees, the planning process began with requesting letters from state agencies on watershed priorities and issues. A public kick-off event was held in June 2023 to solicit resident input on issues. See Appendix B for the public kickoff summary. The Steering Committee reviewed existing reports and data, agency letters, and the public kick-off feedback and categorized issues into seven resource categories, shown below:



Topic Meetings

In the first step in the planning process, six topic meetings were held to solicit expert and stakeholder opinion when developing issues, measurable goals, and actions on each topic. The topic meetings were: 1) lakes, 2) forests, 3) wetlands & ditching 4) rivers & streams 5) stormwater and 6) farms & groundwater.

Table 1.1. Experts at topic meetings.

Topic	Expert Affiliations
Farms Groundwater	City Staff, SWCD Staff, Minnesota Department of Agriculture (MDA), Minnesota Pollution Control Agency (MPCA) Feedlot Inspector, Mississippi Headwaters Board (MHB)
Forests	SWCD Forester, County Land Commissioner, Conservation Center, Deer Hunters Association, Minnesota Department of Natural Resources (DNR) Forester, DNR Wildlife Staff, Tamarack Water Alliance, United States Fish and Wildlife Service (USFWS) Staff, MHB
Lakes	County Highway Departments, Lakes and River Association/Advocates, Big Sandy Area Lake Watershed Management Project, Tamarack Water Alliance, City Staff, Lake Associations, SWCD Staff, Conservation Center, DNR Fisheries, DNR Wildlife Staff, Minnesota Department of Transportation (MnDOT) , MHB
Stormwater	County Highway Departments, County Transportation Department, DNR Fisheries, MnDOT, MPCA Staff, MHB
Streams	County Highway Departments, Lakes and River Association/Advocates, County Transportation Department, Big Sandy Area Lake Watershed Management Project, City Staff, Lake Associations, SWCD Staff, Conservation Center, DNR Fisheries, DNR Wildlife Staff, MnDOT, MPCA Staff, Tamarack Water Alliance, USFWS Staff, MHB
Wetlands	BWSR Wetland Specialists, MPCA Staff, USFWS Staff

Issues

To help understand what issues and opportunities affect each topic in the watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the issues for the UM-GR Watershed. At each topic meeting, attendees brainstormed issues and settled on 1-6 issue statements. These were further prioritized into 1-3 statements, and then finalized at the January 2024 Advisory Committee meeting. The process for issue development is shown in Figure 1.5, and the final issue list is shown in Table 1.2.

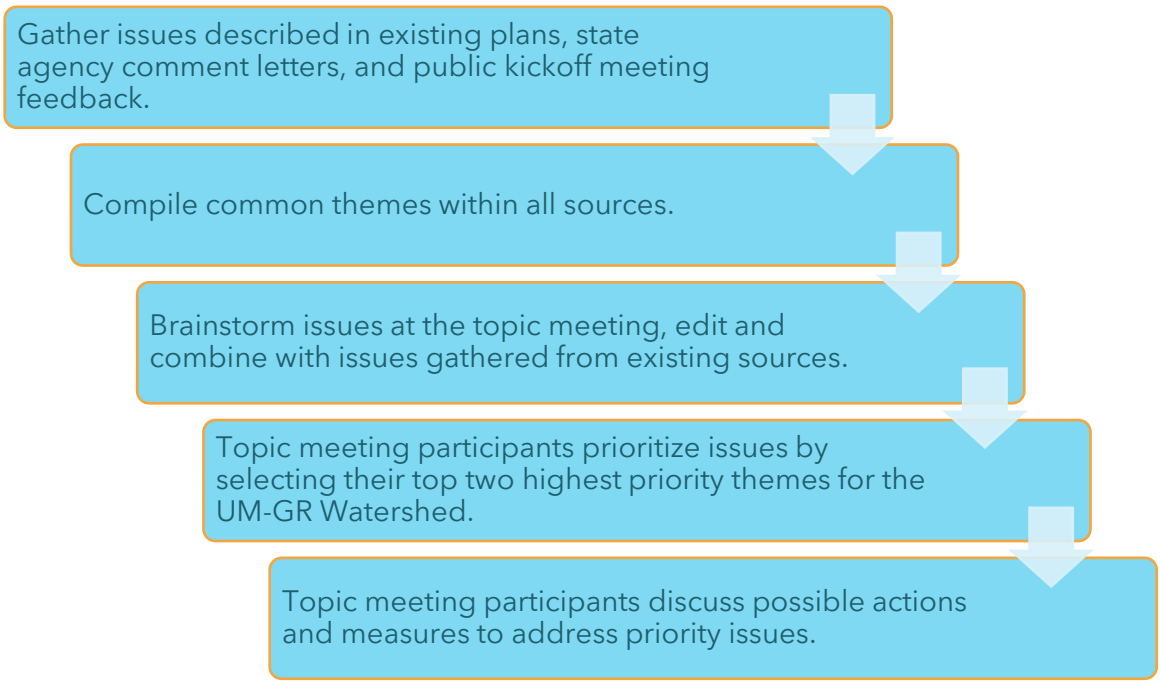


Figure 1.5. Issue statement development process.

Table 1.2. Priority Issue Statements.

Resource Topic	Issue Statement
	Sufficient protection is needed for outstanding resources and sensitive species (i.e., trout, cisco, wild rice, forests) to maintain water quality, native species, wildlife, and plant communities.
Lakes	**Lakeshore alteration** from development, conversion of cabins to year-round homes, removal of native vegetation, and wake boats impact water quality and shoreline habitat.
Lakes	**Nutrients** from lakeshore development, septic systems, internal loading, and land use changes contribute to algal growth along with recreational impairments.
Forests	**Forest health** is vulnerable to climate variability, pests, and invasive species which can affect forest diversity and productivity.
Streams	**Riparian alteration and loss of connectivity,** from development and land use change increases streambank erosion and temperature of streams in the watershed.
Wetlands	**Wetland health and function** is impacted by invasive species, ditching, recreation, and beavers.
Wetlands	Historic **straightening of natural watercourses** impacts water quality, aquatic life, and flooding.
Stormwater	**Stormwater runoff** from developed areas delivers sediment, nutrients, chloride, and bacteria to lakes, streams, and wetlands.
Farms	**Agricultural runoff and livestock access** increases erosion, nutrients, sediment, and bacteria in streams and groundwater.
Groundwater	**Groundwater quality and quantity needs protection** from contamination due to activities on the land and environmental conditions.
Groundwater	More **testing and screening** are needed to track groundwater and drinking water safety and quality.

Goals

Ten measurable goals were set to cover the seven topics. Goals were discussed during three Advisory Committee meetings and were further refined based on what is possible with available funding and staff capacity.

Each topic has a short-term goal (to be met within 10 years) and a long-term goal, a desired future condition. The short-term goals are the focus of this plan and are listed below:

Table 1.3. Short-term (10-year) measurable goals.

10-Year Goals for the UM-GR Watershed	
 **Lakes**	Reduce phosphorus in Priority Enhance and Restore lakes by **40lbs/yr**; Restore **3 linear miles** of shoreline on priority lakes
 **Streams**	Protect or enhance **1 mile** of priority streams
 **Farms**	Implement **3,659 acres** of agricultural best management practices (BMPs)
 **Forests**	Implement **8,162 acres** of forest protection; Implement **36,000 acres** of forest management
 **Wetlands**	Maintain and enhance wetlands and peatlands at **current rate**
 **Stormwater**	Complete stormwater retrofit analysis for **3 communities**; Implement **5 stormwater project**s
 **Groundwater**	Seal **50 unused wells**.

Overall Priorities

To prioritize where to work first overall, the focus areas for the resource topics were stacked together to determine overall watershed priorities. The outcome is shown below in Figure 1.6 and indicates where outreach and funding will be focused in the first five years of plan implementation.

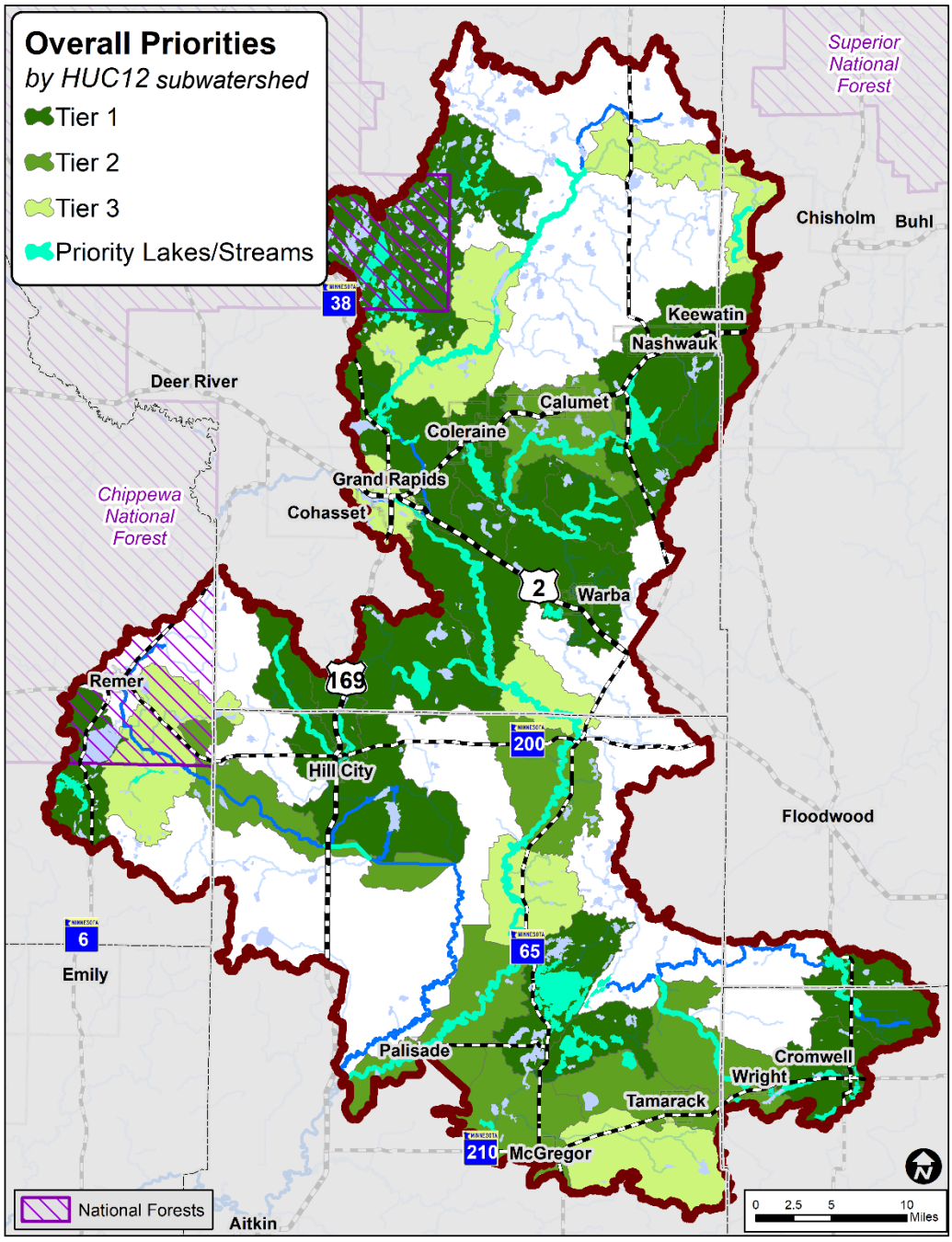


Figure 1.6. Overall priorities of where to work first in the UM-GR Watershed.

Actions

The Advisory Committee and Topic Meeting Experts brainstormed a list of possible actions to address the priority issues and make progress towards the short-term goal. These actions are included in the targeted implementation schedule, at the end of each topic section. The targeted implementation schedule contains the 'what', 'where', 'who', 'when', and cost.

- What: Action name, outcome, and program.
    - For example, the first action in the groundwater table is 'seal abandoned wells' in the 'Fix it' program, with an output of 50 wells sealed (within the 10 years of plan implementation).
- Where: Rather than implementing the action anywhere in the watershed, a specific area or resources are targeted for more effective implementation.
- Who: Agencies that will be involved in the action are listed and the lead(s) are indicated.
- When: The estimated time of implementation is indicated. Many actions are annual and will continue throughout implementation. Others have a targeted biennium.
- Cost: The funding source and the estimated 10-year cost are given.

Implementation of actions will fall under one of four programs: Planned Landscape Management ("Manage It"), Constructed Environmental Enhancements ("Fix It"), Protected Lands Maintenance ("Keep It"), and Data Collection and Outreach ("Know It").

Fix It

Constructed Environmental Enhancements are actions that involve installation or construction.

Manage It

Planned Landscape Management actions manage the soil, forest, cropland, and water resources.

Keep It

Protected Lands Maintenance actions include permanent landscape protection.

Know It

Data Collection & Outreach actions involve gathering information or education and outreach to the public.

Current programs and funding will not be enough to accomplish all the actions planned in the targeted implementation schedule. BWSR provides non-competitive Watershed-Based Implementation Funding (WBIF) with this CWMP from the Clean Water Land and Legacy Amendment. This is estimated to be $1,324,120 per biennium based on the 2025-2026 allocation. This plan will operate using baseline + WBIF funds, with additional partner funding/grants set aside as 'Other'.

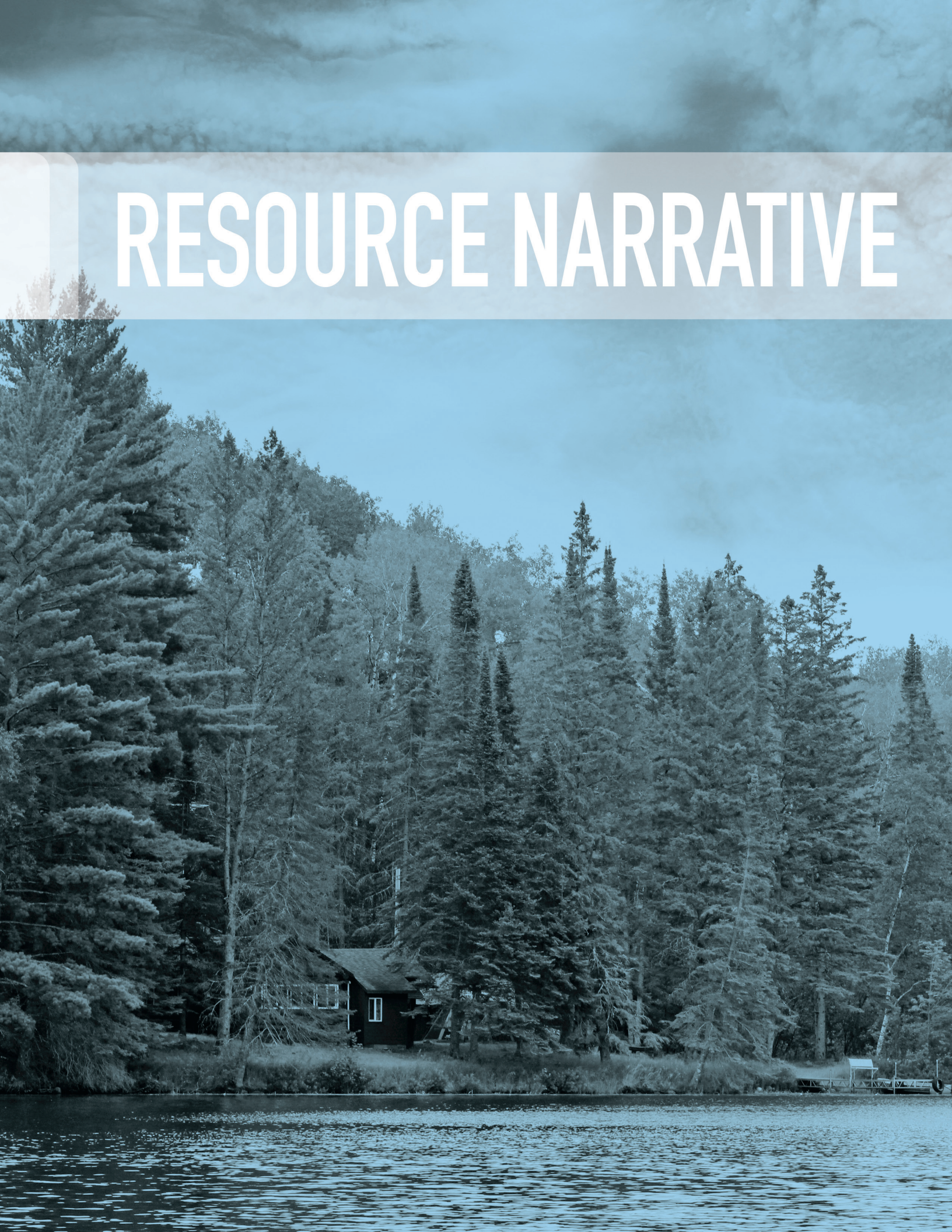
The success of plan implementation will hinge on reliable non-competitive WBIF being available for plan implementation in addition to competitive state, federal, and private grant dollars. The CWMP's Steering Committee and Policy Committee acknowledge that additional staffing may be necessary to meet plan goals. Because implementation is occurring under a Joint Powers Agreement (JPA), staff will be hired by existing local government units in the watershed.

Table 1.4. Annual and 10-year funding summary.

Funding Level	Estimated Annual Average	Estimated Plan Total (10-year)
Baseline Funding	$720,000	$7,200,000
Funding needed to fully implement this plan *Baseline funding=$720,000/year* *2025-2026 WBIF Allocation=$662,000/year* *Additional needed=$511,400/year*	**$1,893,000**	**$18,930,000**
Other *Partners and other agencies, including NRCS, USFWS, USFS, SFIA, LSOHF, MHB, DNR, MPCA, etc.*	$1,485,237	$14,852,371

The same partnership for planning will continue into plan implementation. The same committees shown in Figure 1.4 will continue to meet, but not as often as during plan development.

RESOURCE NARRATIVE




Mississippi River near Hill City

SECTION 2.
LAND & WATER RESOURCE NARRATIVE

Background

The Watershed

The UM-GR Watershed is the first watershed downstream from the Mississippi River-Headwaters Watershed and is one of the largest watersheds in the state. All 1.3 million acres of the UM-GR Watershed drain to the Mississippi River, which flows through the watershed from the United States Army Corps of Engineers (USACE) dam in Cohasset, meanders south into the Mississippi River-Brainerd Watershed north of Aitkin, and eventually flows into the Gulf of Mexico.

The UM-GR Watershed extends to the north and east where it straddles two continental divides, a rare tri-vide. A drop of water north into the Laurentian Divide will flow into Canada's Hudson Bay, a drop of water east of the divide will flow through the St. Lawrence River Divide into the Atlantic Ocean, and a drop of water in the south will flow down to the Guld of Mexico.

To describe the UM-GR Watershed as wet doesn't seem to do it justice. It has almost 2,000 miles of rivers and streams, vast amounts of peatlands and wetlands, 625 lakes larger than 10 acres, 79 designated wild rice lakes, and 48 cold water fishery lakes that support fish, like trout and cisco - truly the land of sky-blue waters (MPCA 2019). It spans five counties: Aitkin, Carlton, Cass, Itasca, and St. Louis. The watershed also includes portions of the Mille Lacs Band of Ojibwe Indian Reservation, and a number of communities including Grand Rapids, Coleraine, Cromwell, Hill City, McGregor, and Remer.

Past

Glaciation and Soils

The advances and retreats of glacial lobes Des Moines, Rainy, and Superior, some thousands of feet thick, covered the landscape around 12,000 years ago and created most of the soil and geology that we see today. Glacial Lake Aitkin was created due to the melting and retreating of the St. Louis glacial lobe and was about 20 miles long, five miles wide, and relatively shallow. Peat, which is the result of dead and decaying plant matter over thousands of years, slowly started to accumulate in this area almost 7,000 years ago due to the poor drainage in this glacial lakebed (MnDOT, 1997). Peatlands and other wetlands are important resources for natural flood control. They act as a natural filter for water and they are also carbon storing champions.

People


credit: Matt Gutzmann

14,000 years ago, temperatures started warming and glaciers started receding leaving massive lakes while more land was exposed and new vegetation began to grow. The first humans began living in this area about 12,000 years ago and lived alongside woolly mammoths, mastodons, and other large animals. During the Woodland period around 2,500 years ago, people began making and using pottery in this area as well as cultivating plants. Eventually people started to use the bow and arrow for hunting (Admin a, n.d.).

Ojibwe oral history explains that about 500 years ago, as Europeans began settling in North America, the Ojibwe people began a migration westward from the Atlantic coast. Encouraged by an Ojibwe prophecy to move west to "the land where food grows on water", they began establishing communities, which includes what is now Central Minnesota in the land of manoomin (wild rice) (Mille Las Band of Ojibwe a, n.d.; MHS, n.d.).

French voyageurs were the first Europeans to arrive to this area in the early 1600s in search of fur bearers like beavers, muskrat, and mink. Some arrived by traveling the Great Lakes routes, while others traveled north via the Mississippi River. By the 1700s, alliances were made between the native inhabitant Tribes in the area and European settlers where they established trade (Admin, n.d.). The population within the watershed began to boom as more settlers moved to the area to make a living off the natural resources. They arrived by foot,

canoe, and eventually by steamboat which took around 20 hours to travel from Aitkin to the rapids below Pokegama Falls in Grand Rapids (Itasca Co Hist. Society).

The massive amount of timber resources in the area brought increased European settlement to the area, which initiated the first industry of Minnesota, though at the detriment of the Ojibwe people in the area. Treaties signed by Ojibwe ancestors between 1837 and 1867 ceded millions of acres of Ojibwe land to the United States government, with the government setting 61,000 acres aside which became the Mille Lacs Reservation. This newly acquired federal land greatly expanded the area's timber industry. This rapid, unsustainable timber harvest boom almost completely exhausted all of Minnesota's timber resources. Sawmills soon closed down leaving only a small fraction of white pine forests by the 1920s. (Admin b, n.d.)

In 1862, due to their instrumental role keeping peace among the Ojibwe during the Dakota war in Minnesota, the Mille Lacs Band received a guarantee in the 1863 and 1864 treaties with the United States government that Band members would not be forced to leave the Mille Lacs Reservation, becoming henceforth the Non-Removable Mille Lacs Band of Ojibwe (Mille Lacs Band of Ojibwe b, n.d.)

Present

Climate

The climate in the UM-GR Watershed is typical for north-central Minnesota with four distinct seasons with a warm and mosquito filled summer and a cold winter that freezes over most of the lakes and rivers. Plants and animals have learned to adapt and live with the extreme range of temperatures and conditions. However, DNR climate scientists have been tracking recent changes that have been happening at a faster pace than historically noted. Comparing state averages for ice coverage days on lakes, the current number of days that lakes are frozen over is 10-14 days fewer than it was 50 years ago. This lines up with other data that shows warming average daily temperatures, especially during the winter and overnight temps (DNR a, 2023).

Weather measurements in the UM-GR Watershed have been kept since 1895. Temperatures have increased an average of 0.33°F per decade, or about 4°F warmer on average compared to the start of the 20th century. This has already shown a change in plant and animal species and makes the area more vulnerable to nuisance and invasive species (DNR b, 2023).

Precipitation has also increased about ¼" per decade over the same time period, though in recent decades the rain tends to fall in heavier amounts with more periods of drought between storms. The number of rain events greater than 3" are also becoming more frequent in the last 20 years. These powerful events can lead to flooding and more erosion which can negatively affect lakes and streams (DNR b, 2023; DNR, 2019).

Surface Water (Hydrology & Water Quality)

The Mississippi River is the basin where all surface water in the UM-GR Watershed flows to and continues to collect water from downstream watersheds until it reaches the Gulf of Mexico. The boundaries of water are discussed on multiple scales, from large basins to smaller hydrologic units. The MR-GR Watershed is a Hydrologic Unit Code (HUC) 8 watershed in Minnesota. Smaller subwatersheds with a HUC 8 are HUC 10s and HUC 12s. The MR-GR Watershed contains 53 HUC 12 subwatersheds, which is the scale used for geographic prioritization of actions.

According to MPCA Watershed Restoration and Protection Strategy Report (WRAPS), there are 625 lakes in the watershed over 10 acres and almost 2,000 miles of streams, including the portion of the Mississippi River that flows through this watershed. It's no wonder why the people that live and visit this area list lakes and streams as one of the most important resources. The WRAPS report uses MPCA monitoring data to provide a science-based understanding of water quality, issues, and strategies to address issues in the watershed. WRAPS strategies were considered when planning UM-GR CWMP actions.

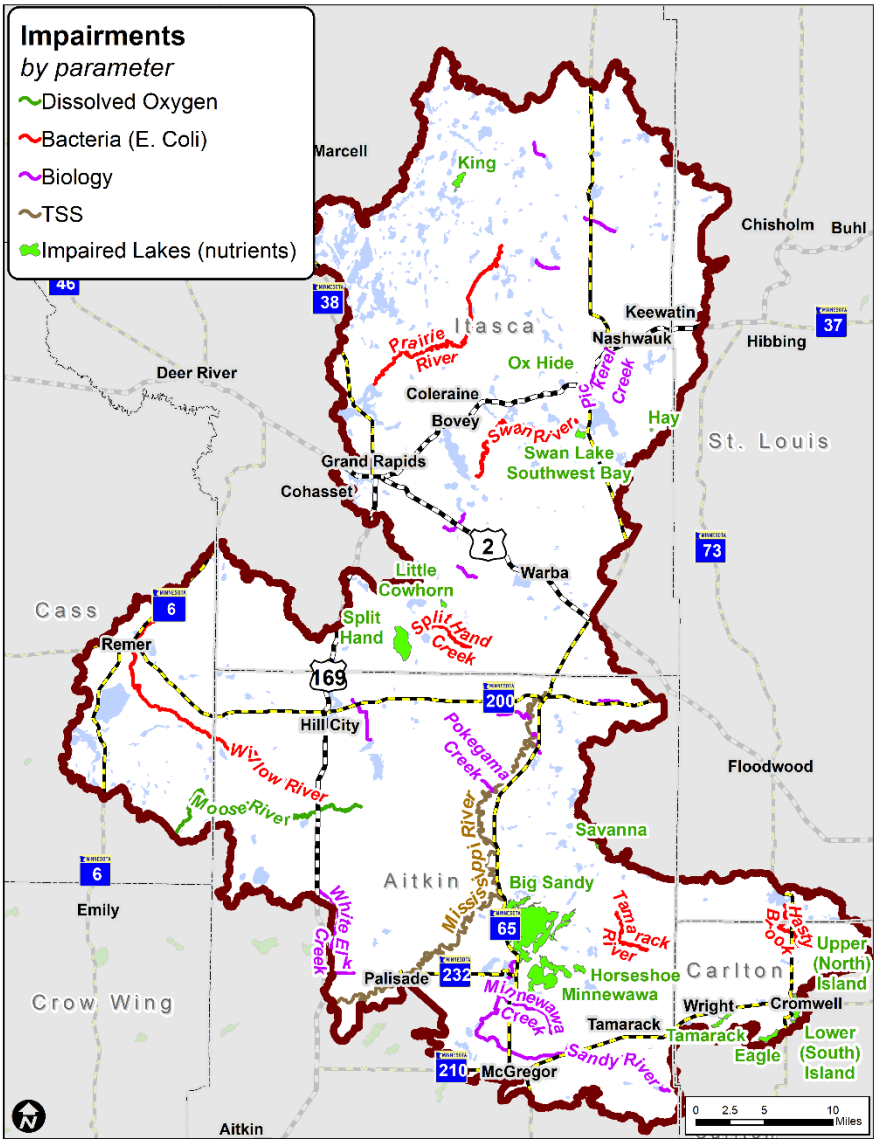


Figure 2.1. Surface water impairments in the UM-GR Watershed.

The Mississippi River provides drinking water to millions of people downstream including the city of Minneapolis, which uses 21 billion gallons of water annually. This underscores the significance of why it is crucial to protect the clean water here. Lakes and rivers in the MR-GR Watershed generally have good or excellent water quality in large part due to the relatively small amount of development around the waterbodies. In the early

1900s, peatlands were seen as potential crop fields, and a ditching network was dug in an attempt to dry these low-lying areas out for agricultural use. As a result, approximately 25% of the streams and rivers in this watershed have been altered (MPCA 2019).

Overall, the water quality in this watershed is excellent and a key resource to the local economy. Of the waterbodies sampled in the 2019 WRAPS, it was found that almost 90% of lakes and 97% of the river reaches support aquatic recreation while 91% of river reaches and all but one lake (98%) support aquatic life (MPCA, 2019). Currently, 10 lakes are listed as impaired for aquatic recreation due to excess nutrients, including Big Sandy and Minnewawa Lakes near McGregor which can be impacted by fluctuating water levels. For rivers and streams, the WRAPS identifies 30 reaches that don't meet the standards for aquatic recreation and/or aquatic life, including six reaches with bacteria impairments (Figure 2.1).

Groundwater

According to the Minnesota Department of Health (MDH), everyone in the watershed gets their drinking water from groundwater supplies. MDH is involved in the UM-GR Partnership and provided input during the planning process on drinking water-related issues and actions. MDH will be a key state partner during UM-GR CWMP implementation. There are 18 Well Head protection areas and Drinking Water Supply Management Areas (DWSMAs) throughout the watershed with over 4,600 private groundwater wells which supply drinking water (MDH, 2023). The soils above the groundwater act as a protective layer from pollution at the surface. Due to the abundance of sand that is so common in the soil, there's a significant portion of the groundwater supply that is moderately or

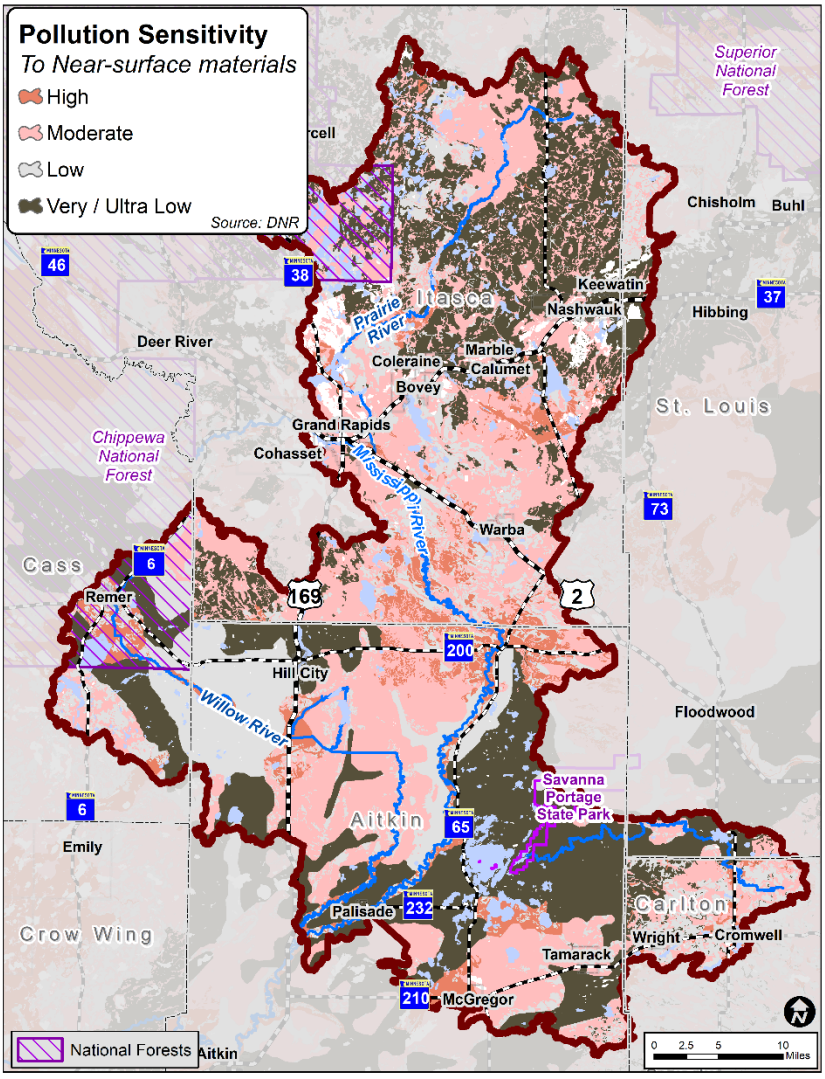


Figure 2.2. Pollution sensitivity to near-surface materials (DNR).

highly sensitive to near-surface pollutants (Figure 2.2). In fact, approximately 800 of those private groundwater wells are in a highly vulnerable setting, including some wells that are at risk for high levels of arsenic, nitrates, and manganese (MDH, 2023).

Unsealed wells that are no longer in use pose groundwater contamination risk. There are an unknown number of unsealed wells that are not in use in the watershed, however, progress to seal those wells will increase groundwater and drinking water protection in this watershed.

Land Use

Public land ownership is currently at 37% and private land ownership is 63% (DNR LSP). Forest land (40%) makes up most of the watershed followed by woody wetlands (36%), emergent wetlands (9.5%), open water (5.6%), urban and rural development (3.9%), prairie (hay/pasture, 3.4%), prairie (grasslands, 0.9%), and cultivated land (0.6%) (Figure 2.3 and Figure 2.4) (USGS, 2019). Compared to pre-European settlement, the watershed has maintained similar forest and open water proportions but has lost around 16% of its wetlands with increases in urban, emergent wetlands, and hay/pastureland. (LSP)

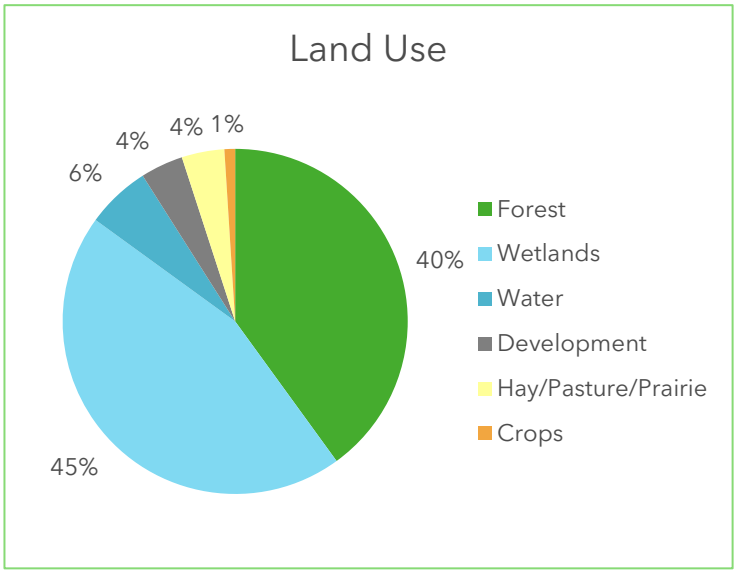


Figure 2.3. Land use in the UM-GR Watershed (NLCD 2021).

This watershed is predominantly made up of forest and wetlands (85% total). While the forested lands can hold a lot of surface water to help grow trees and plants, the vast wetland areas act as a giant filter which catch and clean large amounts of sediment and pollutants while being able to absorb large amounts of snowmelt and rainfall. (LSP)

There has been a long history of industries that have utilized and harvested the natural resources in the watershed for human use. Mined by hand with pickaxes and shovels while horses and mules hauled the ore out, the first amounts of iron mined on the Mesabi iron range was in 1892 (DNR, n.d.). Loggers harvesting timber started felling trees for lumber decades before mining began, using the lakes and rivers to transport logs leading to channelization and alteration to a number of stream channels (MPCA, 2019). The UM-GR Watershed is still experiencing the historical impacts of logging. In order to transport felled trees, rivers were straightened and cleared. Removal and transport of trees also brought sediment into the rivers. As mentioned, starting in the 1900s peatlands in the area were ditched in hopes to drain these areas for crops which proved difficult due to the water content and relatively flat landscape.Today, these types of industries and land uses continue to exist, though with great improvements to the sustainability and environmental impacts of the watershed.

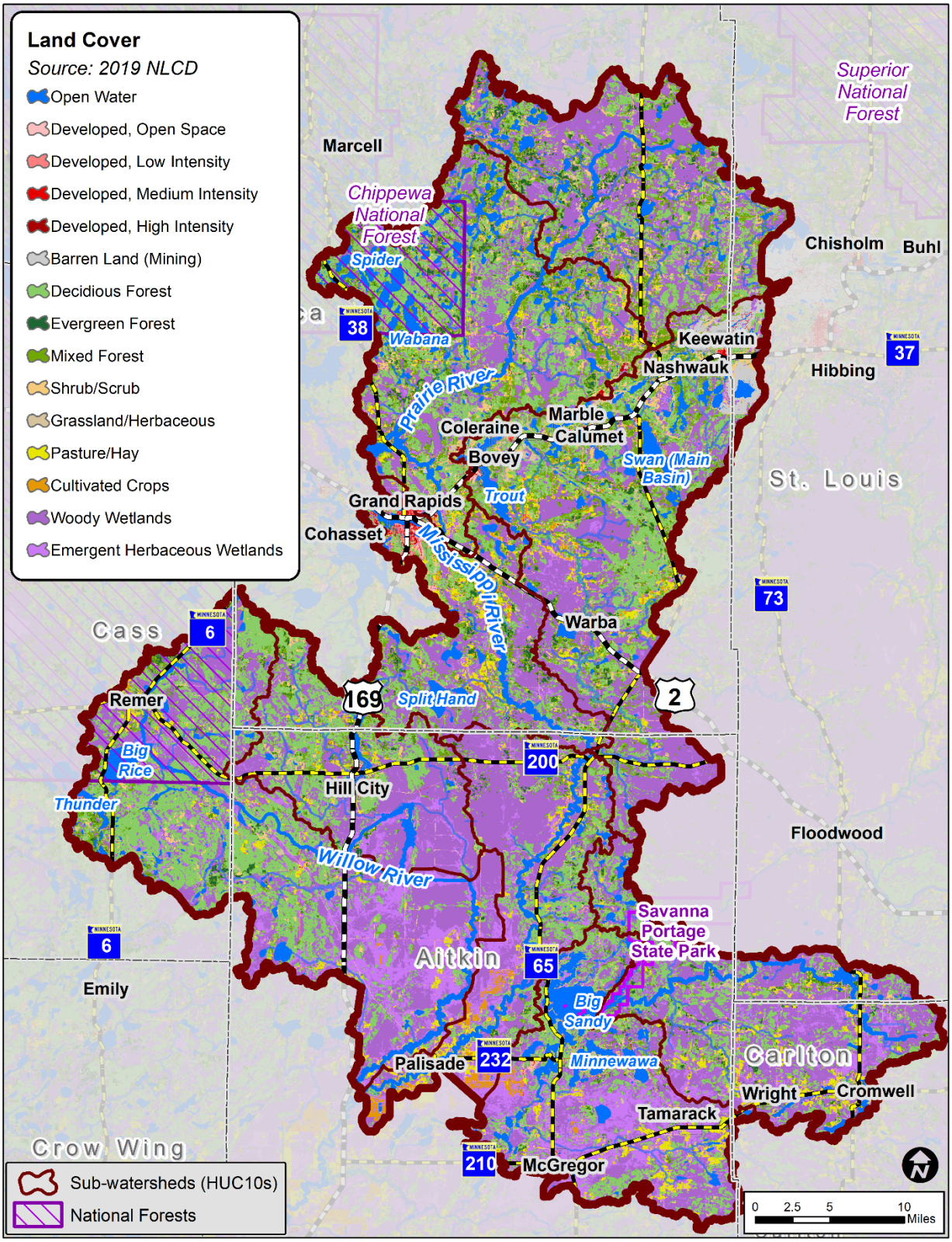


Figure 2.4. Land use in the UM-GR Watershed.

Habitat and Recreation

Due to the high density of clean, quality lakes and streams in the watershed, this area draws visitors from all over the world to enjoy. From fishing and boating to hunting, biking, and snowshoeing, there is an almost endless amount of recreation opportunities that are possible in the MR-GR Watershed.

There are 48 waterbodies in the UM-GR Watershed categorized as cold-water habitats where fish like trout and cisco (tullibee) require cold, oxygen rich water to survive. There are also 79 waterbodies that produce manoomin (wild rice), a unique resource which has low tolerance for chemical changes in the water (MPCA, 2019) (Figure 2.5).

This watershed also has numerous protected areas to help manage and protect natural habitat for the future including two state parks, three Scientific and Natural Areas, nine state forests, and 27 Wildlife Management Areas.

The quality waterbodies draw many people to recreate in this area, which can also pose a great risk to the spread of aquatic invasive species (AIS). Zebra mussels, Eurasian watermilfoil, starry stonewort, flowering rush, Asian carp, and other AIS pose a risk to native plants and animals as they often outcompete native species for resources. The DNR manages AIS in lakes and streams and works with local governments to help prevent the spread of these invasive species and remains a top priority to those in the watershed.

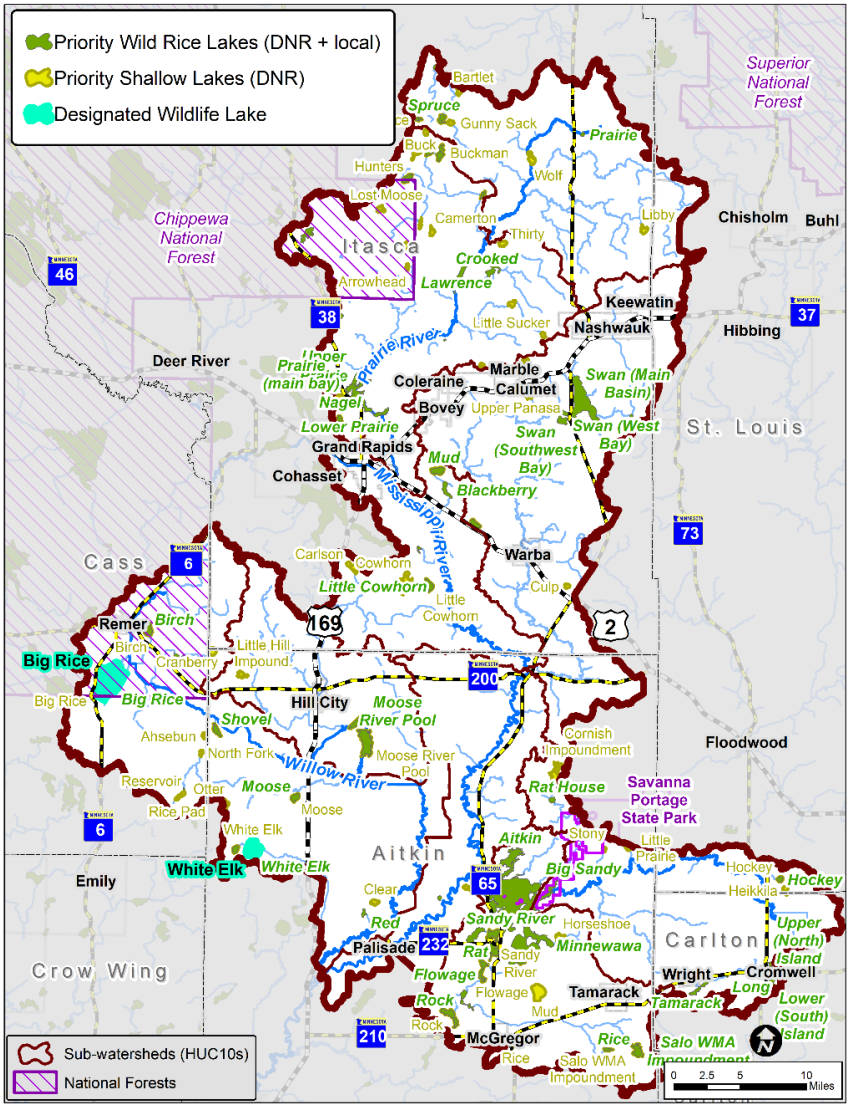


Figure 2.5. Outstanding Resources in the UM-GR Watershed.

Demographics

Demographics in the UM-GR Watershed were aggregated by using census data from 2022 and the proportion of the watershed in each county. There are five counties in the planning region, Aitkin County with the largest percentage (40%), followed by Itasca (33%), Calton (11%), Cass (6%), and St. Louis (1%). There are an estimated 30,000 people that call this watershed home with the largest community being the City of Grand Rapids, having a population of just over 11,000 people.

While the general population in the watershed has been relatively stable, there are some areas with a growing number of people. Grand Rapids, Hill City, and Big Sandy/Minnewawa areas have seen recent population increases, especially summer seasonal residents who flock to the area due to the proximity and availability of lakes and rivers in the watershed.

Development along lakes can degrade water quality, emphasizing the importance of education and outreach to property owners on AIS, fertilizer use, shoreland alterations, and more. Seasonal residents also add to the tax base in the watershed. The total property value on large lakes surpasses $100 million:

- Big Sandy Lake (Aitkin Co): $563,000,000
- Thunder Lake (Cass Co): $188,000,000
- Swan Lake (Itasca Co): $134,000,000

Future

It's taken a lot of time and work to restore much of these resources from impacts in the past. That work has paid off as the UM–GR Watershed has some of the cleanest waters and most diverse and abundant resources in the state. Strategic planning with local partners can help make improvements to resources that are declining or impaired while further protection will help ensure high-quality resources remain excellent. Much progress has been made in this watershed to improve water quality, and with steadfast determination, much progress will continue.

Wetland near Hill City


LAKES

SECTION 3. LAKES

Lower Island Lake Carlton County

Introduction

There are 625 lakes larger than 10 acres in the watershed, providing a variety of valuable habitat. Of these lakes, 79 are DNR-designated wild rice lakes and 48 are DNR cold-water fisheries lakes that provide habitat to trout and cisco.

Although most of the lakes and rivers in the watershed are very healthy, there are some that could be improved. Too much phosphorous in a lake can lead to algae blooms, making swimming and fishing less enjoyable. There are 11 lakes that are listed as impaired for nutrients and affecting their use for aquatic recreation. These lakes are Big Sandy, Eagle, Horseshoe, King, Little Cowhorn, Lower Island Lake, Minnewawa, Savanna, Split Hand, Tamarack, and Upper Island Lake. In addition, five lakes do not meet standards for wild rice production due to high levels of sulfate. These lakes include Hay Lake, Ox Hide Lake, North Twin Lake, Trout Lake, and Southwest Bay of Swan Lake, which are on the MPCA list of waters that do or could support wild rice. One lake (Lower Island Lake) is impaired for aquatic life, meaning the expected diversity of fish species were not found during monitoring. Fifteen lakes have been tested and found to be impaired due to mercury in fish tissue. There are 16 lakes that are either nearly impaired or barely impaired, meaning that they are close to being considered impaired by MPCA, or are already impaired but the impairment is close to the standard. These 16 lakes include Bluebill, Eagle, King, Libby, Lower Island, Marble, Prairie, Rat, Rock, Round, Savanna, Sherry, Twenty-Four, Upper Island, Upper Panasa, and Washburn (MPCA, 2022). Finally, at least 14 lakes are infested with AIS. As of 2024, AIS the DNR is aware of in the UM-GR include Eurasian watermilfoil, flowering rush, and zebra mussels.

Lake Issues

A diverse group of lake experts plus the UM-GR Advisory Committee gathered in a topic-focused meeting to discuss issues and future management efforts related to lakes in the watershed. To illustrate the diversity of viewpoints, at the beginning of the lake meeting, the experts and Advisory Committee members were asked what comes to mind when they think about the watershed's lakes. The responses were assembled to create a word cloud (Figure 3.1).

Figure 3.1. Word cloud depicting the diversity of responses to the question, "when you think of the UM-GR's lakes, what comes to mind?"

To help understand what issues and opportunities surround lakes in the watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the priority lakes issues for the UM-GR Watershed.

The lake meeting attendees then brainstormed issues for lakes in the watershed. The brainstormed list was either grouped with the compiled themes or new themes were created. The group then agreed on a final list of six themes (Table 3.1). In addition, two issues were tabled until the stream and stormwater meetings (culverts impacting fish passage and salt use on roads).

Table 3.1. Lake issue statements developed at the Lake Topic Meeting

#	Draft Issue Statement	References
1	**Sufficient protection** is needed for outstanding resources and sensitive species (i.e., trout, cisco, wild rice) to maintain water quality, native species, wildlife, and plant communities.	WRAPS, Carlton & St. Louis County Water Plans, DNR Comment Letter, Topic Meeting
2	**Aquatic invasive species** impact lake health, water quality and recreation.	Aitkin, Carlton, Cass, Itasca, and St. Louis County Water Plans, Public Kickoff Meeting, DNR Comment Letter, Topic Meeting
3	**Lakeshore alteration** from development, conversion of cabins to year-round homes, removal of native vegetation, and wake boats impact water quality and shoreline habitat.	Aitkin, Carlton, Cass, Itasca, and St. Louis County Water Plans, Public Kickoff Meeting, DNR Comment Letter, Topic Meeting, WRAPS
4	**Fluctuating water levels** in lakes can lead to shoreline erosion and flood damage.	Itasca County Water Plan, Public Kickoff Meeting, Topic Meeting
5	**Ice Fishing waste**, including garbage and human waste, is a concern for water quality.	Aitkin Water Plan
6	**Nutrients** from lakeshore development, septic systems, internal loading, and land use changes contribute to algal growth along with recreational impairments.	Aitkin, Carlton, Cass, Itasca, and St. Louis County Water Plans WRAPS, Public Kickoff Meeting, Topic Meeting

Each participant ranked their top three issues for lakes, and the top three priorities overall were:

- **Sufficient protection** (29 votes)
- **Nutrients** (27 votes)
- **Lakeshore alteration** (22 votes)

In January, the Advisory Committee convened and developed the final issue statements from the draft issues developed at the topic meetings. The lake issue statements were condensed into three statements as shown below and approved by the Policy Committee.

Sufficient protection is needed for outstanding resources and sensitive species (i.e., trout, cisco, wild rice, forests) to maintain water quality, native species, wildlife, and plant communities.

Lakeshore alteration from development, conversion of cabins to year-round homes, removal of native vegetation, and wake boats impact water quality and shoreline habitat.

Nutrients from lakeshore development, septic systems, internal loading, and land use changes contribute to algal growth along with recreational impairments.

The final issue statements could be summarized as the insufficient protection from lakeshore alteration leads to nutrient loading, decreasing lake quality. As 'sufficient protection' applies

to multiple resources, the issue statement was also created for forests, lakes, rivers and streams, and wetlands. The group brainstormed a list of possible actions to address the priority issues. Actions to address the issues related to lakes are summarized in this section's targeted implementation schedule.

Local Concerns

Local concerns are issues or topics of interest specific to this watershed that are also outside the scope of the plan and local water managers but are important considerations to water and land management.

Mining Impacts

The Mesabi Iron Range stretches through the northern section of the watershed, where iron ore is mined to make steel. The Iron Range represents an economically important resource, as it contributes 10,000 jobs to the state (UMD, 2020). Mine pits can become lakes for recreation and can be stocked for fishing. They can also fill too high and need to be dewatered. However, there are also potential environmental impacts that occur due to mining, including runoff and groundwater seepage, loss of wetlands, altered hydrology, and sulfate impairments. Tailings and waste rock from iron mines can leach sulfate into water, which can elevate concentrations beyond the 10 ppm standard. The 2024 Impaired Waters List includes five lakes in the UM-GR Watershed impaired for sulfate: North Twin Lake, Trout Lake, Hay Lake, Swan Lake, and Ox Hide Lake. Wild rice is sensitive to sulfate and is a food for people and wildlife, as well as a culturally important grain to Indigenous groups. Because of this, monitoring for the potential impacts of mining and continued management of water quality and quantity near mining operations will be important moving forward to best protect the cultural resources and water bodies in the UM-GR Watershed. To read more, visit: https://www.pca.state.mn.us/air-water-land-climate/protecting-wild-rice-waters.

Population Density & Growth

With the growth of internet access and remote work, more people have been moving to beautiful remote areas that have excellent water quality and scenic forests, like the UM-GR Watershed. The number of people moving to the UM-GR Watershed is likely to increase and careful management is necessary to minimize the impacts of a growing population on the resources of the watershed. Development and resource use should be considered as more people relocate into the watershed. DNR shoreland regulations guide development along lake shoreland, including lot sizes, structures, alteration, and access roads. Counties, MHB, municipalities, and some townships have their own shoreland regulations in their zoning rules and/or ordinances, and specific detail on UM-GR Watershed county rules can be found in Section 10.

Changes in Protection Status from Public to Private

The UM-GR has significant public acres of forests, wetlands, and prairies. With increasing pressure of development, some of this land may be swapped or sold to private entities to build housing or other development. Public lands are protected from land use change, however when this land is sold, protection is no longer possible. This loss of protection puts the resources of the watershed at greater risk to water quality degradation, habitat loss, and water storage reductions.

Resource Prioritization

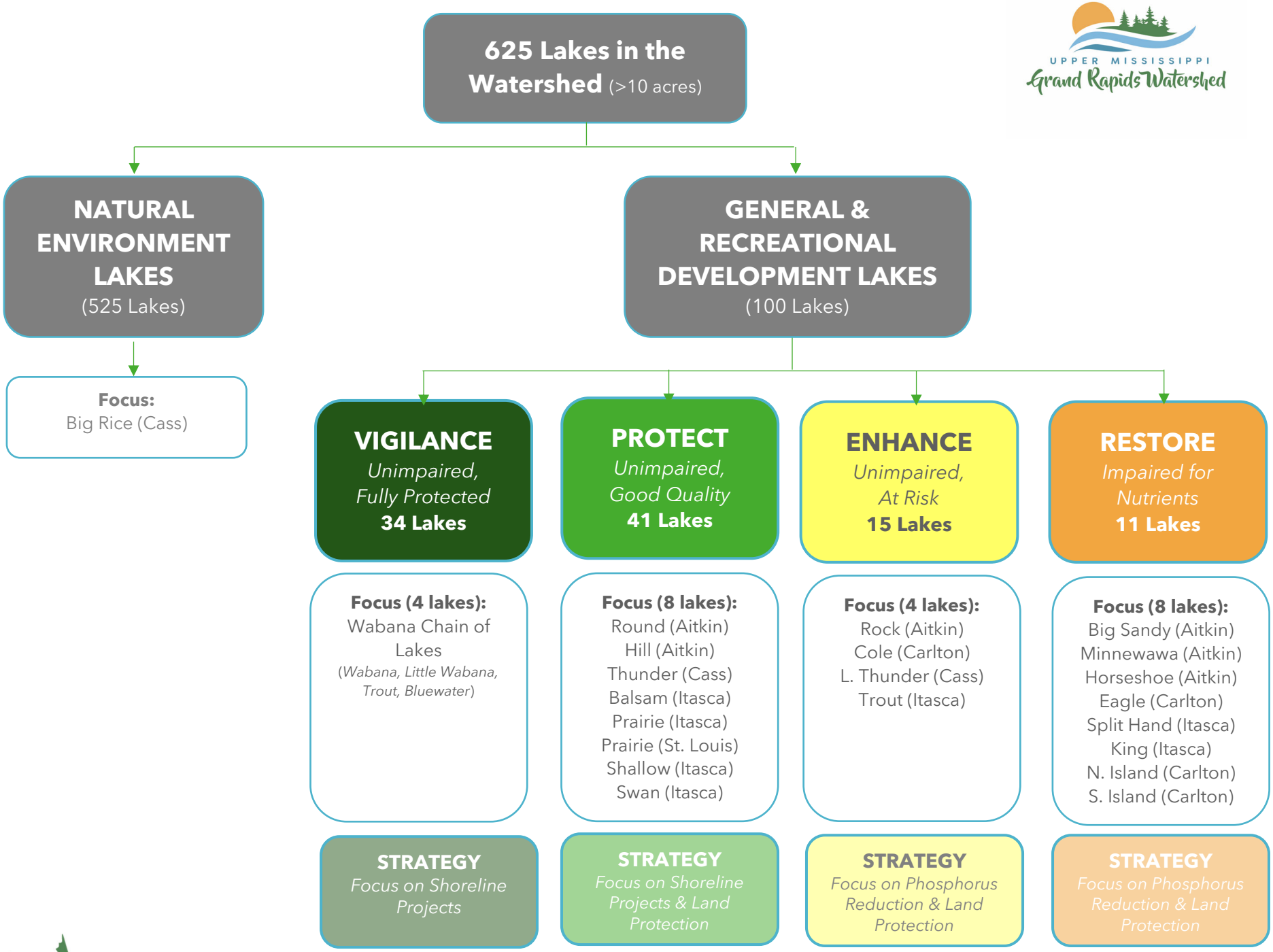
The UM-GR Watershed spans over 1.3 million acres and has 625 lakes over 10 acres in size, so targeting implementation actions to specific lakes is more effective at making measurable change than dispersing actions throughout the watershed. The Steering and Advisory Committees discussed how to prioritize resources and used the following datasets to evaluate the lakes in the watershed.

- Trout lakes (DNR)
- Priority wild rice lakes (DNR)
- Priority shallow lakes (DNR)
- Designated wildlife lakes (DNR)
- Lakes of biological significance (DNR)
- Nearly-barely and impaired lakes with anthropogenic sources of pollution (MPCA)
- Lake water quality trends (MPCA)
- Cisco refuge lakes (DNR)
- Phosphorus sensitivity significance (DNR)
- Lake benefit: Cost assessment (DNR)

Lakes were then categorized based on shoreline classification, watershed protection, disturbance, water quality trends, and impairments (next page). Out of the 625 lakes in the watershed, 100 are General and Recreational Development Classification and 525 are Natural Environment Classification. Natural Environment lakes were separated out for habitat protection focus. Recreational Development and General Development Lakes were placed into four categories: **VIGILANCE**, **PROTECT**, **ENHANCE**, or **RESTORE**. The **VIGILANCE** category includes lakes with over 75% of minor watershed permanently protected (public land, public waters, easements, Sustainable Forest Incentive Act [SFIA], wetlands). **PROTECT** lakes are those in generally good condition, which includes an improving water quality trend or no trend, under 25% of minor watershed disturbed, or less than 75% of the minor watershed is protected. **VIGILANCE**, **PROTECT**, and **ENHANCE** lakes all meet state water quality standards.

ENHANCE lakes are those at anthropologic risk, which includes those with declining water quality trend, over 25% of the minor watershed disturbed (developed, agriculture, or mining), or nearly impaired. The final management strategy, **RESTORE** lakes, were categorized as those impaired due to nutrients.

Within these four categories, the lakes were further refined through Steering and Advisory Committee discussion into focus lakes based on the lake's development pressure and the existence of a Lake Association. Ultimately, there is one focus lake that is a Natural Development Lake, four focus lakes in the **VIGILANCE** category, eight focus lakes in the **PROTECT** category, four lakes in the **ENHANCE** category, and eight lakes in the **RESTORE** category. See the next page for the list of lakes. Figure 3.2 shows priority lakes and subwatersheds (HUC12) around priority lakes. Work done in the subwatershed around the lakes improves lake quality.


625 Lakes in the Watershed (>10 acres)
NATURAL ENVIRONMENT LAKES
(525 Lakes)
Focus:
Big Rice (Cass)
GENERAL & RECREATIONAL DEVELOPMENT LAKES
(100 Lakes)
VIGILANCE
Unimpaired, Fully Protected
34 Lakes
PROTECT
Unimpaired, Good Quality
41 Lakes
ENHANCE
Unimpaired, At Risk
15 Lakes
RESTORE
Impaired for Nutrients
11 Lakes
Focus (4 lakes):
Wabana Chain of Lakes
(Wabana, Little Wabana, Trout, Bluewater)
Focus (8 lakes):
Round (Aitkin)
Hill (Aitkin)
Thunder (Cass)
Balsam (Itasca)
Prairie (Itasca)
Prairie (St. Louis)
Shallow (Itasca)
Swan (Itasca)
Focus (4 lakes):
Rock (Aitkin)
Cole (Carlton)
L. Thunder (Cass)
Trout (Itasca)
Focus (8 lakes):
Big Sandy (Aitkin)
Minnewawa (Aitkin)
Horseshoe (Aitkin)
Eagle (Carlton)
Split Hand (Itasca)
King (Itasca)
N. Island (Carlton)
S. Island (Carlton)
STRATEGY
Focus on Shoreline Projects
STRATEGY
Focus on Shoreline Projects & Land Protection
STRATEGY
Focus on Phosphorus Reduction & Land Protection
STRATEGY
Focus on Phosphorus Reduction & Land Protection

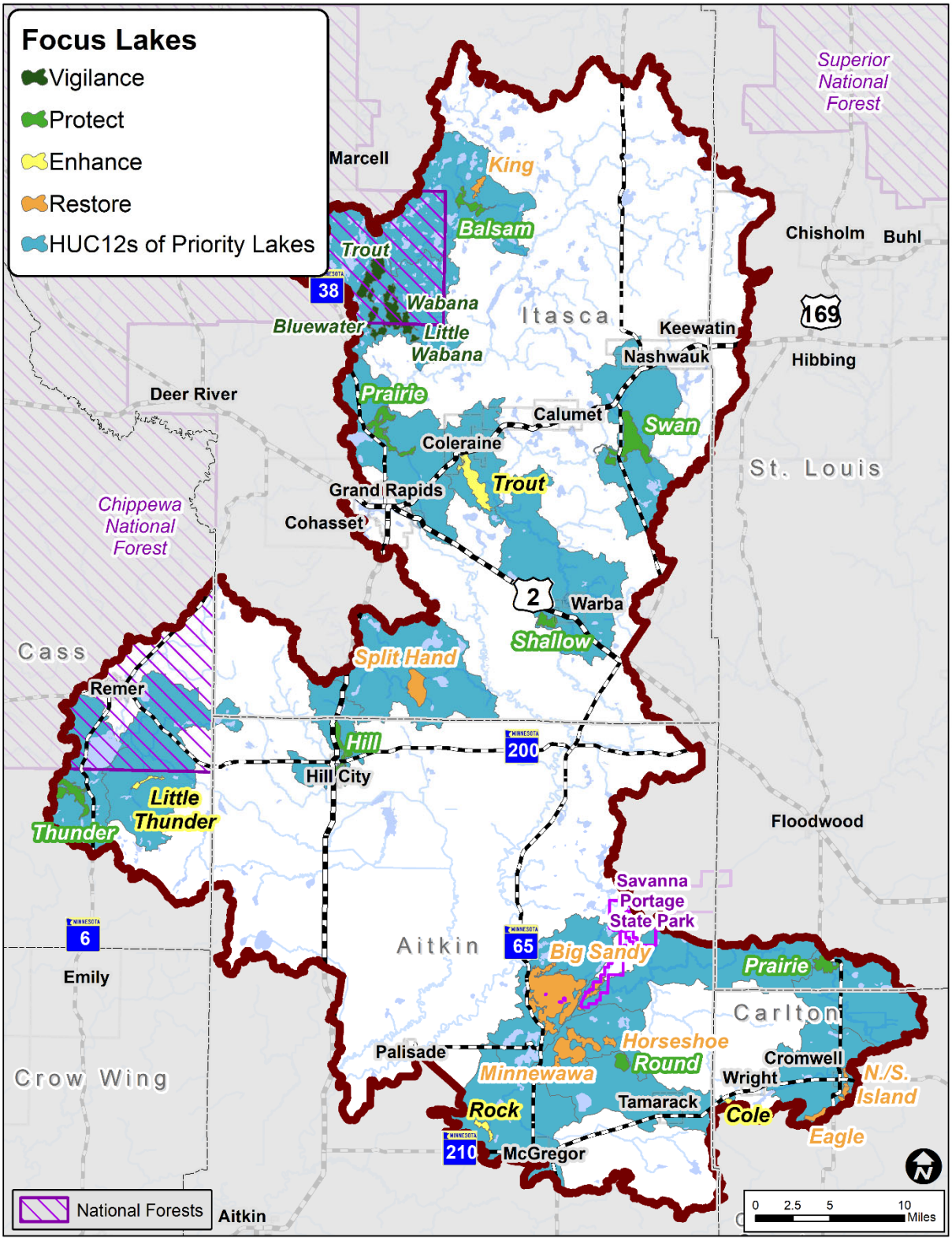


Figure 3.2. Priority lakes in the UM-GR Watershed.

Lake Goals

Why It Matters

Numerous fishing, boating, and swimming recreational opportunities are found in the many lakes in the UM-GR Watershed. The large amount of forested land protects water quality and results in excellent lake water quality. The status of UM-GR lakes draws in tourists that support the local economy.

Issues Addressed

- Lakeshore alteration
- Nutrients
- Sufficient Protection

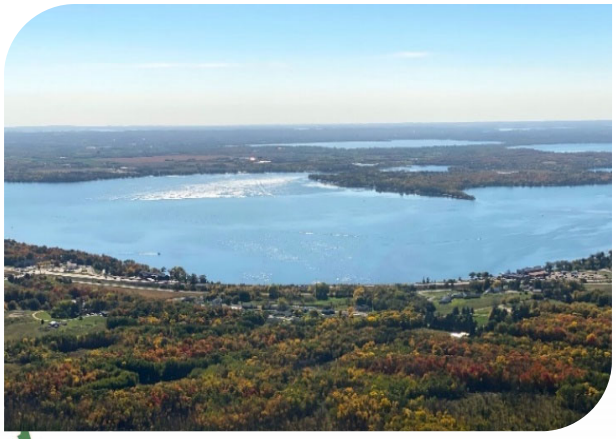
However, human activities such as shoreland development, removal of native plants and trees, and the removal of in-lake and riparian vegetation can impact a lake's quality. A 'lawn to lake' shoreline allows seven to nine times more phosphorus to enter the lake than a more naturally vegetated shoreline (Radomski and Ashe 2014). Minnesota has currently lost 40 to 50% of its natural shorelands, and they are being degraded at a rate of 1-2% more each decade. At this rate, a majority of Minnesota shorelines will soon be unable to protect water quality and provide fish and wildlife habitat (Radomski 2006).

Protecting good quality lakes from phosphorus loading and restoring impaired lakes can be achieved through implementation of agricultural BMPs, septic system upgrades and maintenance, stormwater BMPs, and lakeshore enhancements. Protecting the many high-quality waterbodies and restoring the impaired lakes will ensure the UM-GR Watershed is a place full of recreational opportunities in the future.

Work Already Done in the Watershed

From 2004-2022 (source: MPCA Healthier Watersheds)

- 61 septic system improvements
- Seven miles of lakeshore restoration
- Multiple stormwater retention basins



Short-Term Goals

- Reduce phosphorus in priority **ENHANCE** and **RESTORE** lakes by a total of 40 lbs/year (see page 30).
- Restore three linear miles of shoreline on priority lakes.

Metrics: pounds of phosphorus, miles of shoreline restored.

Long-Term Goals

- Halt the 1-2% of shoreline loss per decade in the watershed and achieve a net gain instead of loss.
- Change the **ENHANCE** lakes to **PROTECT** lakes by improving their water quality. Reach the TMDL for **RESTORE** lakes.

Implementation

Actions to address the lake goals and issues are described in the targeted implementation table on the following page. Actions were brainstormed at the topic meeting and further developed based on what was achievable with available funding, identified as actions in the WRAPS report, and adopted by neighboring watershed plans.

The targeted implementation schedule includes:

- What: Action name, outcome, and program.
- Where: Rather than implementing the action anywhere in the watershed, a specific area or resource is targeted for more effective implementation.
- Who: Agencies that will be involved in the action are listed and the lead(s) are indicated.
- When: The estimated time of implementation is indicated. Many actions are annual and will continue throughout implementation. Others have a targeted biennium.
- Cost: The funding source and the estimated 10-year cost are listed.
    - Baseline + WBIF indicates funding from local county and SWCDs sources plus WBIF.
    - Other indicates outside and partner funding sources such as the Outdoor Heritage Fund, Natural Resource Conservation Service (NRCS), DNR, MPCA, etc.

The 'Output' column lists the trackable output of the action, i.e., number of acres or projects. If the outcome says 'per year' it is annual, otherwise the number is the 10-year outcome. Implementation will focus on the targeted areas in the 'Where' column. A variety of factors may influence how work will be done in practice, and actions in non-priority areas may be considered on a case-by-case basis.

Some actions apply to multiple goals and issues, called "Overlapping Actions". They are included in all relevant action tables, but the cost column contains a resource icon when an action is in more than one table (preventing estimating the same cost multiple times). The estimated cost of the action is listed in the implementation schedule of that resource section.

Implementation of each action will occur through one of four programs, described below and indicated through the icon in the 'Program' column of the targeted implementation schedule. Further detail on implementation programs is described in Section 11.

Fix It

Constructed Environmental Enhancements are actions that involve installation or construction.

Manage It

Planned Landscape Management actions manage the soil, forest, cropland, and water resources.

Keep It

Protected Lands Maintenance actions include permanent landscape protection.

Know It

Data Collection & Outreach actions involve gathering information or education and outreach to the public.

Lakes Targeted Implementation Schedule

What			Where	Who	When					Cost	
Action	Output	Program	Targeted Resources	Responsibility (**Bold** = Lead)	2025-2026	2027-2028	2029-2030	2031-2032	2033-2034	Funding Source	10-Year Estimated Cost
Shoreline Ordinance *Implement shoreline ordinance*	Continue program		All Lakes	**Counties, Cities,** SWCDs, MHB	❖	❖	❖	❖	❖	Baseline +WBIF	$738,000*
Lakeshore Restoration *Buffers, soft armor, coir logs, berms, aquatic vegetation, technical assistance*	3 miles		Priority Lakes Figure 3.2	**SWCDs**, DNR, Cities, Counties, Lake Associations	❖	❖	❖	❖	❖	Baseline +WBIF	$1,584,000
Subsurface Sewage Treatment Systems (SSTS) *Replace non-compliant systems*	5 upgrades per year (50 total)		Priority Lakes Figure 3.2	**Counties, MPCA,** SWCDs, UMN Extension	❖	❖	❖	❖	❖	Baseline +WBIF	$750,000
SSTS Ordinance *Implement SSTS Ordinance*	Continue program		All Lakes	**Counties, MPCA,** MHB	❖	❖	❖	❖	❖	Baseline +WBIF	$738,000*
Near-shore Stormwater BMPs *Rain gardens, technical assistance*	40 lbs TP		Priority Lakes Figure 3.2	**Cities, Counties,** SWCDs, Lake Associations, MHB	❖	❖	❖	❖	❖	Baseline +WBIF	$500,000
Water Quality Monitoring *Monitor lake water quality*	Trend Analysis		Priority Lakes Figure 3.2	**Lake Associations, COLA,** SWCDs, MPCA	❖	❖	❖	❖	❖	Other	$162,500
AIS Prevention & Management *Continue county & DNR programs*	Implement County AIS Plan		All lakes	**Counties, SWCDs, DNR, Lake Associations, COLA,** MHB	❖	❖	❖	❖	❖	Other	$2,930,000
Data Collection *Lake-wide septic system surveys, impervious surface maps, drone surveys of shoreline, LiDAR comparisons*	Data for targeting projects		Priority Lakes Figure 3.2	**SWCDs**, Counties, Lake Associations			❖	❖	❖	Baseline +WBIF	$20,000
Outreach Program • *Outreach to lakeshore landowners, and resorts on lake topics* • *Score your shore* • *Partner with Lake Associations* • *Lakeshore Stewards Program* • *Explore developing an incentive program* • *Contractor/Realtor Training*	Implement Outreach Program		Priority Lakes Figure 3.2	**SWCDs**, Counties, Lake Associations, Local Businesses, Minnesota Lakes & Rivers, MHB	❖	❖	❖	❖	❖	Baseline +WBIF	$167,000**

What			Where	Who	When					Cost	
Action	Output	Program	Targeted Resources	Responsibility (**Bold** = Lead)	2025-2026	2027-2028	2029-2030	2031-2032	2033-2034	Funding Source	10-Year Estimated Cost
Overlapping Actions											
Forest Stewardship Plans *Plans for lakeshore, small parcels, and priority areas*	30 plans/year		Priority Lakes Figure 3.2	**SWCDs, DNR, Forest Consultants,** TNC, BWSR, MHB	❖	❖	❖	❖	❖	Baseline +WBIF	See Forest Topic Section
Forest and Land Protection *SFIA, easements, and acquisitions on land at risk of deforestation, near lakes, wild rice, and where groundwater is at risk*	8,162 acres		Priority Lakes Figure 3.2	**SWCDs, DNR**, BWSR, TNC, TPL, MN Land Trust, Northern Waters Land Trust, MHB, Counties	❖	❖	❖	❖	❖	Other	See Forest Topic Section

*Regulatory Program costs are an even portion of the total Planning & Zoning budget for the counties in the watershed.
**Outreach Program costs are an even portion of the total Outreach Program estimate for the watershed.

Lake Loading and Load Reduction Explanation

A lake's phosphorus load describes the total quantity of phosphorus that is being delivered into a lake within a certain period such as per day or per year. This amount can vary greatly year to year due to precipitation and varying phosphorus sources. Therefore, in planning, we usually use an average load per year. To determine the load, you need to know the volume of water and the concentration of phosphorus in the water. You multiply these together and you get a weight or load.

Lake Volume (annual average) x Phosphorus Concentration (annual average) = Annual Average Phosphorus Load (lbs/yr)

Increased phosphorus loads from various sources will lead to increased phosphorus concentrations in the lake and can feed algae blooms.

The goal in this plan is to reduce the phosphorus loading to the focus lakes (page 25) by 40 lbs/yr to improve water quality (reduce phosphorus concentration in the lake). The 40 lbs/year applies to the annual average phosphorus load and is a total reduction for 10 years.

Lake Implementation Reference Table

Lake Name	DOW	County	Management Category	Current Phos. Concentration (ppb, ug/L)	Current Phos. Load (lbs/yr)	Watershed: Lake Ratio	Phosphorus Load Focus	Focus on Nearshore Projects (Shoreline Restoration and SSTS)	Focus on upstream Watershed Projects	Focus on Urban Stormwater Management
Bluewater	31-0395-00	Itasca	VIGILANCE	6	45	4	Nearshore	☑		
Little Wabana	31-0399-00	Itasca	VIGILANCE	9	15	3	Nearshore	☑		
Trout	31-0410-00	Itasca	VIGILANCE	6	736	10	Nearshore	☑		
Wabana	31-0392-00	Itasca	VIGILANCE	9	1,319	12	Nearshore	☑		
Balsam	31-0259-00	Itasca	PROTECT	15	1,632	38	Mixed	☑	☑	
Prairie	69-0848-00	St. Louis	PROTECT	27	2,701	30	Mixed	☑	☑	
Shallow	31-0084-00	Itasca	PROTECT	10	54	2	Nearshore	☑		
Round	01-0023-00	Aitkin	PROTECT	11	26	2	Nearshore	☑		
Thunder	11-0062-00	Cass	PROTECT	12	724	8	Nearshore	☑		
Swan	31-0067-00	Itasca	PROTECT	18	5,714	27	Mixed	☑	☑	☑
Hill	01-0142-00	Aitkin	PROTECT	20	4,842	39	Mixed	☑	☑	☑
Balsam	31-0259-00	Itasca	PROTECT	15	1,632	38	Mixed	☑	☑	
Prairie	31-0384-00	Itasca	PROTECT	26	20,728	234	Watershed	☑	☑	
Trout	31-0216-00	Itasca	ENHANCE	26	1,971	7	Nearshore	☑		☑
Rock	01-0072-00	Aitkin	ENHANCE	28	546	15	Nearshore	☑		
Little Thunder	11-0009-00	Cass	ENHANCE	11	915	43	Mixed	☑	☑	
Cole	09-0068-00	Carlton	ENHANCE	16	26	NA	Nearshore	☑		
Eagle	09-0057-00	Carlton	RESTORE	29	312	6	Nearshore	☑		
Minnewawa	01-0033-00	Aitkin	RESTORE	40	2,208	6	Nearshore	☑		☑
Horseshoe	01-0034-00	Aitkin	RESTORE	48	568	12	Nearshore	☑		
Split Hand	31-0353-00	Itasca	RESTORE	45	3,753	15	Nearshore	☑		
Big Sandy	01-0062-00	Aitkin	RESTORE	34	31,766	43	Mixed	☑	☑	☑
King	31-0258-00	Itasca	RESTORE	36	130	3	Nearshore	☑		
Lower (S) Island	09-0060-02	Carlton	RESTORE	36	1,177	27	Nearshore	☑		
Upper (N) Island	09-0060-01	Carlton	RESTORE	30	585	27	Nearshore	☑		

Lake Sensitivity and Cost Benefit

The Lakes of Phosphorus Sensitivity Significance analysis estimates the inches of water clarity gained if 5% of the phosphorus in the lake is reduced (Radomski & Carlson 2022). Lakes with small phosphorus loads and numerous inches of clarity gained have the best return on investment (left side of Figure 3.3). In lakes like Swan, Hill, Split Hand, Minnewawa, and Big Sandy, it is still important to conduct outreach to lake residents about stewardship and implement projects, but it will be more difficult to achieve a 5% reduction in phosphorus. Big Sandy Lake is not included in Figure 3.3 because the loading is so high that it doesn't fit on this chart (5% phosphorus reduction in Big Sandy Lake = 1,588 pounds).

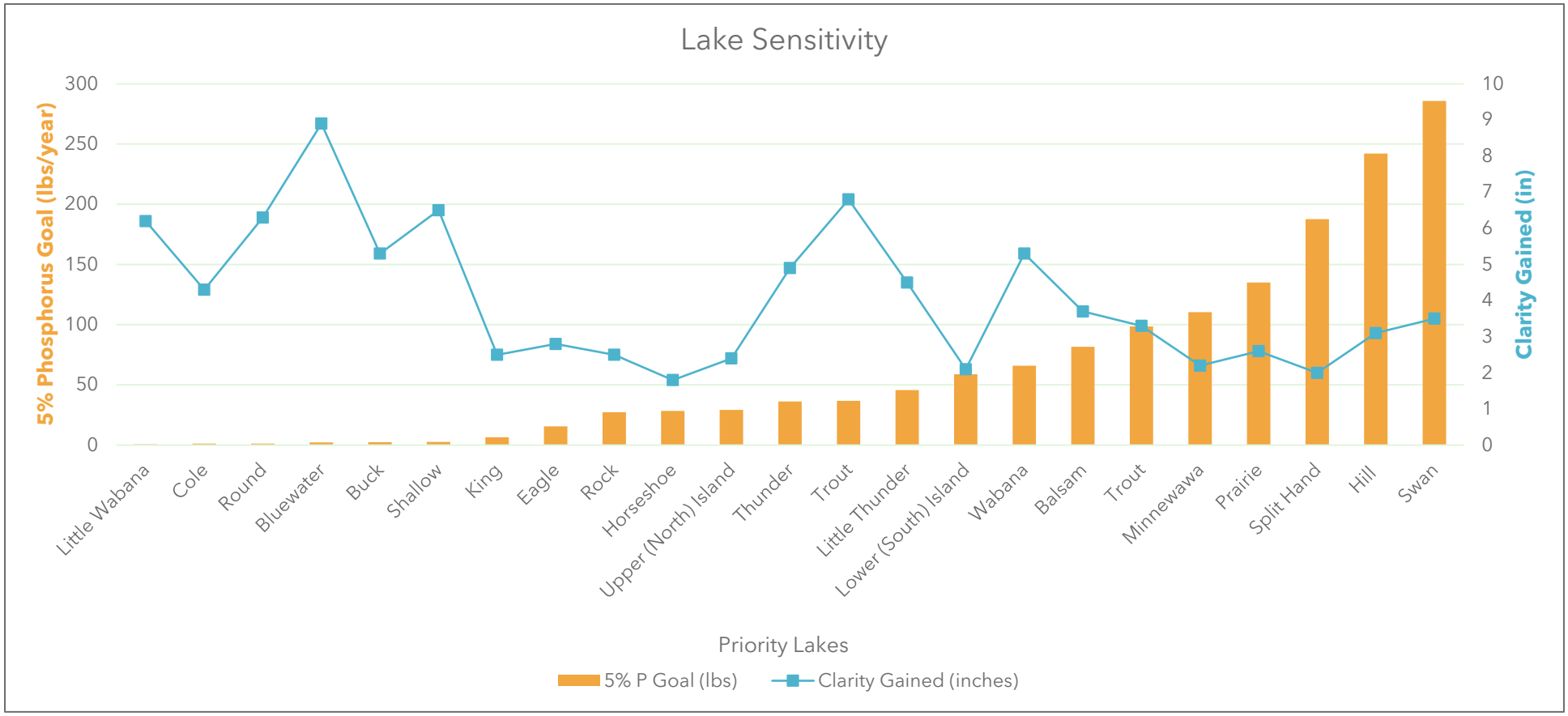


Figure 3.3. Inches of clarity gained in each lake if 5% of the phosphorus is reduced (DNR 2022).


STREAMS

SECTION 4. STREAMS & RIVERS

Introduction

There are about 2,000 miles of streams and rivers in the UM-GR Watershed. Compared to other parts of Minnesota, most of these streams and rivers are healthy. Many of these streams and rivers support sensitive species, and the MPCA classified four streams as exceptional, meaning the streams have the highest quality fish and macroinvertebrate communities and have the most natural conditions. Finally, seven streams are designated trout streams, meaning they have suitable habitat and temperature for trout growth and survival.

While most streams and rivers are healthy, a total of 29 of the 73 streams assessed by the MPCA were found to be impaired, meaning they did not meet state standards for one or more parameters. There are 21 impaired streams that do not support fish or aquatic macroinvertebrate (bug) life. In addition, six streams are impaired due to high levels of *E. coli* bacteria. Finally, the Mississippi River is listed as impaired for high levels of sediment or Total Suspended Solids (TSS) from the confluence of the Swan River to the confluence of the Crow Wing River (MPCA, 2019) [Figure 4.2].

The use of Mississippi River tributaries to transport logged trees downstream resulted in the channelization of many streams. The largest stressor to stream health is historical ditching of peatlands (see Wetlands section for more information), which results in low dissolved oxygen and stream habitat degradation. About a quarter of the UM-GR Watershed streams are altered (MPCA, 2019). Other stressors to water quality include undersized culverts, altered hydrology, stormwater runoff, failing septic systems, manure runoff and livestock access to streams.

Mississippi River

The Mississippi River is the fourth longest river in the world, beginning in Itasca State Park and flowing all the way to the Gulf of Mexico, slicing the United States into east and west portions. Its headwater region flows through the UM-GR Watershed from the Laurentian Divide to the city of Palisade. What happens to the river in Minnesota affects the rest of the river downstream.

The topography of the Mississippi Headwaters region was shaped by the glaciers and the river. A major feature that formed from the melt water of glacial retreat was Glacial Lake Aitkin. The soils associated with Glacial Lake Aitkin are fine, interbedded layers of silt and clay. As Glacial Lake Aitkin began to drain, peat deposits developed in the bog areas that remained (MGS 2004). These fine-grained soils are highly susceptible to erosion when disturbed, especially along stream banks where there is a slope. This area is also very flat and was ditched in the 1940s to drain water for agriculture. The flow of the Mississippi River is impacted by dams both within the MR-GR Watershed and in the headwaters watershed. Notable dams include those in Bemidji, Winnie, Pokegama, and Blandin. Dams provide transportation and flood control benefits, but also act as fish barriers and change the natural flow regime.

The stretch of the Mississippi River that flows from the Swan River to the Pine River has a water quality impairment for TSS, which means the water is cloudier than it should be (MPCA 2020) (Figure 4.1). This portion of the Mississippi River that flows through Glacial Lake Aitkin soils is the only portion of the Upper Mississippi River that has high levels of TSS. This suggests that the high erodibility of Glacial Lake Aitkin soils contributes TSS to the Mississippi River in this stretch. In addition, the biological scores for fish and bugs are good in this portion of the Mississippi River suggesting that high TSS levels are not a recent change and causing stress to the fish community (MPCA 2020).

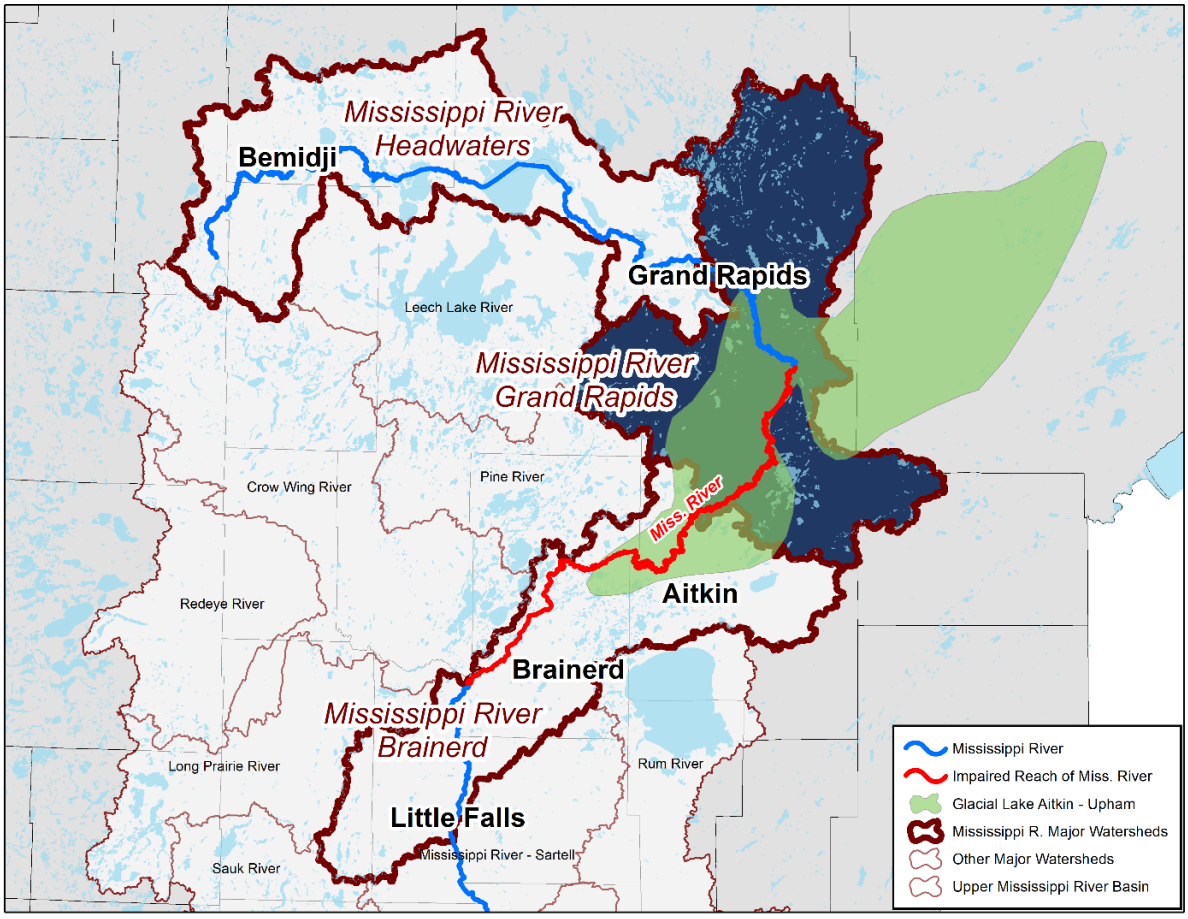


Figure 4.1. Upper Mississippi River basin, containing the first 400 miles of the Mississippi River.

Land use conversions near the river channel also contribute sediment through greater soil erosion from physical trampling of the banks from livestock, less stabilization of the soil from shallow rooted plants, more areas of exposed soil, and more concentrated runoff. Watershed runoff and regulated wastewater and stormwater sources contribute a small fraction of the total sediment to this part of the Upper Mississippi River (MPCA 2020).

Improving the water quality and protecting the cultural, transportation, environmental, and recreational benefits of the Mississippi River is an important priority for watershed planning. Actions that will improve the quality of Mississippi River are included in this section's targeted implementation schedule.

MISSISSIPPI RIVER

Anything in this section pertaining to the Mississippi River will be in these callout boxes for easy reference.

Mississippi Headwaters Board

The MHB works to protect and preserve the first 400 miles of the Mississippi River in Minnesota, including the UM-GR. A joint powers board of Clearwater, Beltrami, Cass, Hubbard, Itasca, Aitkin, Crow Wing and Morrison Counties, the MHB is mandated by Minnesota Statutes 103F.361-377 to enhance and protect the natural, cultural, historic, scientific and recreational values of the headwaters region.

The Minnesota Legislature has empowered the MHB to protect the Mississippi Headwaters Corridor through regulation of land use above the Ordinary High-Water Mark (OHWM).

- The standards of the MHB supersede all provisions that are less restrictive than any other zoning ordinances that apply to the Mississippi Headwaters Corridor.
- In this watershed, the boundary of the Mississippi Headwaters Corridor extends 500 feet from the OHWM on both sides of the Mississippi River (Scenic River).
- Specific MHB standards can be found in Section 8. Plan Programs.
- The full *Mississippi Headwaters Comprehensive Plan* can be found here: https://www.mississippiheadwaters.org/comprehensiveManagementPlan.asp

Regional and National Implications

The Mississippi River is an important waterway for the southern portion of Minnesota as well as the states on the way to its outlet into the Gulf of Mexico. Communities along the Mississippi River Corridor, including St. Cloud, Minneapolis, and St. Paul are dependent on the quality of the water maintained in the Mississippi Headwaters for their drinking water. In all, the Mississippi Headwaters provides drinking water for 2.5 million Minnesotans and delivers 57 million gallons of water a day to customers in Minneapolis and beyond – more than 44% of the state's residents (TNC).

In addition, numerous cities downstream from Minnesota also use the Mississippi River as a drinking water source, from Wisconsin to Louisiana. As a result, the significance of protecting and enhancing the Mississippi Headwaters impacts the drinking water of more than 20 million people in 50 cities (American Rivers).

Stream Issues

A diverse group of stream and river experts plus the UM-GR Watershed Advisory Committee gathered in a topic meeting in fall of 2023 to discuss issues and future management efforts related to streams and rivers in the watershed. To illustrate the diversity of viewpoints, at the beginning of the topic meeting, the experts and Advisory Committee members were asked what comes to mind when they think about the watershed's streams and rivers. The responses were assembled to create a word cloud (Figure 4.2).

Figure 4.2. Word cloud depicting the diversity of responses to the question, "When you think of the UM-GR Watershed's streams and rivers, what comes to mind?"

To help understand what issues and opportunities surround streams and rivers in the watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the priority streams and rivers issues for the UM-GR Watershed.

The streams and rivers topic meeting attendees then brainstormed issues for streams and rivers in the watershed. The brainstormed list was either grouped with the compiled themes or new themes were created. The group then agreed on a final list of four themes (Table 4.1).

Table 4.1. Streams and rivers issue statements developed at the Streams and Rivers Topic Meeting.

#	Draft Issue Statement	References
1	**Riparian alteration** from development and land use change increases streambank erosion and temperature of streams in the watershed.	WRAPS, Aitkin, Carlton and Itasca, St. Louis County water plans, Public Kickoff Meeting, BWSR Letter
2	**Protection** of critical stream habitats with rare/sensitive species, including cold-water fish species such as trout and cisco, is needed to support native fish, wildlife, and plan communities.	DNR Letter, Landscape Stewardship Plan
3	Improperly sized culverts can contribute to flooding and related repair costs, loss of floodplain **connectivity**, impacts to fish and other aquatic habitat, and disruption of ecologically important stream functions.	WRAPS, Public Kickoff Meeting, DNR Letter,
4	**Historic straightening of natural watercourses** impacts water quality, aquatic life and flooding/hydrology.	WRAPS, Public Kickoff Meeting, DNR Letter, MPCA Letter, BWSR Letter

Each participant ranked their top two issues for streams and rivers, and the top two priorities overall were:

- **Protection** (18 votes)
- **Riparian alteration** (14 votes)

In January, the Steering and Advisory committees convened and developed the final issue statements from the draft issues developed at the topic meetings. The stream issue statements were condensed into two statements:

MISSISSIPPI RIVER

These two priority issues also apply to the Mississippi River.

Sufficient protection is needed for outstanding resources and sensitive species (i.e., trout, cisco, wild rice, forests) to maintain water quality, native species, wildlife, and plant communities.

Riparian alteration and loss of connectivity, from development and land use change increases streambank erosion and temperature of streams in the watershed.

As 'sufficient protection' applies to multiple resources, the issue statement was also created for forests, lakes, streams and rivers, and wetlands. The group brainstormed a list of possible actions to address the priority issues along with ways success might be measured relative to a goal. Actions to address the issues related to streams and rivers are summarized in this section's targeted implementation schedule.

Emerging Concerns

Emerging concerns are issues in the watershed that lack detailed information for addressing them and measuring progress but may affect the resources in the watershed in the future.

Extreme Rainfall Events and Erosion

Climate variability in the coming decades is expected to create heavier and more irregular precipitation events in Minnesota. Extreme rainfall events cause increased streamflow and erosion, which has the potential to reduce water quality and increase downstream flooding. On the other side of the issue, drought can cause low flows in small streams which impact habitat. Careful management, trees and vegetation, and increased storage on the landscape can help reduce the potential impacts of extreme rainfall events.

Local Concerns

Local concerns are issues or topics of interest specific to this watershed that are also outside the scope of the plan and local water managers but are important considerations to water and land management.

Water Quantity on the Mississippi River

The UM-GR Watershed is uniquely positioned near the headwaters of the Mississippi River. Flows and water level on the river can vary significantly based on seasonal and yearly conditions. High water levels and flooding are a concern, especially downstream of this watershed. In addition, Big Sandy Lake is a reservoir operated by USACE. Big Sandy Lake was a natural lake system prior to construction of a dam at the lake outlet in 1895, which has raised the average water level approximately 9 feet above natural lake levels (MPCA 2011). Backflow from the Mississippi River into Big Sandy can occur in high water years. It is important to continue monitoring water levels and water quality in Big Sandy Lake into the future. The Mississippi River has smaller segments that can be more easily traveled, visit https://www.mississippiheadwaters.org/scenicRecreation.asp for more information.

Economic and Recreational Opportunities

The streams in the watershed also provide economic and recreational opportunities for both the residents of the UM-GR Watershed and for visitors from around the region. Recreational activities such as paddling and fishing are common on UM-GR streams. The Mississippi River in the watershed is a Minnesota State Water Trail. Maintaining these streams and rivers for their economic and recreational purposes is important for the watershed.


Credit: Matt Gutzmann

Resource Prioritization

The UM-GR Watershed spans over 1.3 million acres, so targeting implementation actions to specific areas is necessary for achieving measurable change in 10 years. The Steering Committee and topic meeting attendees discussed how to prioritize resources, and used the following datasets to arrive at the priority areas shown in Figure 4.3:

- Trout lakes and streams
- Exceptional Use Standards
- Impaired streams

MISSISSIPPI RIVER

The Mississippi River is a priority for protection.

"**PROTECT**" streams are a priority for land protection. "**RESTORE**" streams are impaired and are a priority for projects to improve the water quality. "**VIGILANCE**" indicates streams that are already well protected (over 75% of the minor watershed).

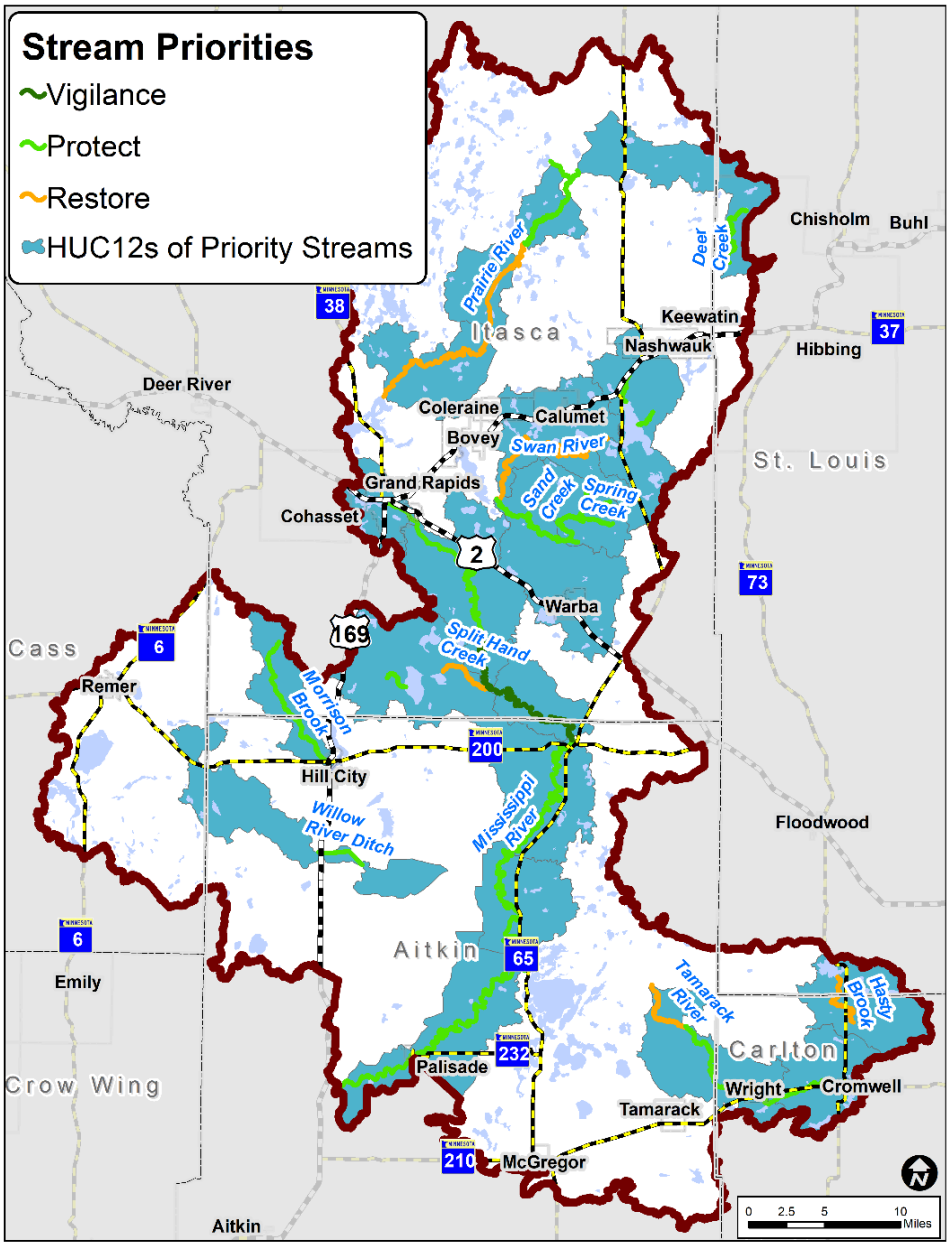


Figure 4.3. Priority streams in the UM-GR Watershed.

Streams & Rivers Goal

Why It Matters

Many of the *E. coli*-impaired streams are barely impaired and have some component of natural sources such as beavers and birds. Therefore, the focus of the streams and rivers goal is to improve and protect the riparian corridors of the streams. Improvement projects can include vegetative buffers, cedar revetments, tree planting, cattle fencing, gully stabilization, and projects to reconnect streams to the floodplain and allow for fish passage.

Issue Addressed

- Riparian alteration and loss of connectivity.

The TSS impairment in the Mississippi River is challenging to improve, as it is mostly due to the instability of the Glacial Lake Aitkin soils (Figure 4.1). The main focus for the Mississippi River is to permanently protect the land in the riparian corridor and stabilize the riparian areas of its tributaries.

Work Already Done

From 2004-2022 (source: MPCA Healthier Watersheds)

- Two miles of livestock pipeline.
- 12 livestock watering facilities.
- Seven miles of streambank and shoreline protection.

Short-Term Goals

- Protect or enhance one mile of priority streams.

Metric: length of riparian enhancement or protection, cattle fencing.

Long-Term Goals

- Riparian areas are vegetated and protected from human and livestock impacts, hopefully leading to de-listing of impairments.

Implementation

Actions to address the streams and rivers goal and issue are described in the targeted implementation table on the following page. Actions were brainstormed at the topic meeting and further developed based on what was achievable with available funding, identified as actions in the WRAPS report, and adopted by neighboring watershed plans.

The targeted implementation schedule includes:

- What: Action name, outcome, and program.
- Where: Rather than implementing the action anywhere in the watershed, a specific area or resource is targeted for more effective implementation.
- Who: Agencies that will be involved in the action are listed and the lead(s) are indicated.
- When: The estimated time of implementation is indicated. Many actions are annual and will continue throughout implementation. Others have a targeted biennium.
- Cost: The funding source and the estimated 10-year cost are listed.
    - Baseline + WBIF indicates funding from local county and SWCDs sources plus WBIF.
    - Other indicates outside and partner funding sources such as the Outdoor Heritage Fund, NRCS, DNR, MPCA, etc.

The 'Outcome' column lists the trackable output of the action, i.e. number of acres or projects. If the outcome says 'per year' it is annual, otherwise the number is the 10-year outcome. Implementation will focus on the targeted areas in the 'Where' column. A variety of factors may influence how work will be done in practice, and actions in non-priority areas may be considered on a case-by-case basis.

Some actions apply to multiple goals and issues, called "Overlapping Issues". They are included in all relevant action tables, but the cost column contains a resource icon when an action is in more than one table (preventing estimating the same cost multiple times). The estimated cost of the action is listed in the implementation schedule of that resource section.

Implementation of each action will occur through one of four programs, described below and indicated through the icon in the 'Program' column of the targeted implementation schedule. Further detail on implementation programs is described in Section 11.

Fix It

Constructed Environmental Enhancements are actions that involve installation or construction.

Manage It

Planned Landscape Management actions manage the soil, forest, cropland, and water resources.

Keep It

Protected Lands Maintenance actions include permanent landscape protection.

Know It

Data Collection & Outreach actions involve gathering information or education and outreach to the public.

Streams & Rivers Targeted Implementation Table

What			Where	Who	When					Cost	
Action	Output	Program	Targeted Resources	Responsibility (Bold = Lead)	2024-2025	2026-2027	2028-2029	2030-2031	2032-2033	Funding Source	10-Year Estimated Cost
Riparian Enhancement *Stabilize gullies, capture upslope water, soft armor, reconnect floodplain, cedar revetments.*	0.25 miles		Priority Areas, Figure 4.3	**SWCDs**, DNR, MHB			❖	❖	❖	Baseline +WBIF	$660,000
Livestock Exclusion Fencing *Livestock exclusion fencing away from streams and provide alternative water source.*	0.75 miles		Priority Areas, Figure 4.3	**NRCS, SWCDs**, MDA	❖	❖	❖	❖	❖	Baseline +WBIF	$40,600
Fish Passage *Replace culverts and remove beaver dams that are impeding fish passage.*	2 barriers replaced		Priority Areas, Figure 4.3	**SWCDs, DNR**, Counties, Townships			❖	❖	❖	Other	$1,000,000
Culvert Inventory	Complete inventory		Priority Areas, Figure 4.3	**Townships, DNR, Counties,** SWCDs			❖	❖	❖	WBIF + Other	$50,000
Stream Restoration *Restore channelized streams, ideally following natural channel design principles and reconnecting streams to the floodplain.*	1 project		Priority Areas, Figure 4.3	**DNR**, **SWCDs**	❖	❖	❖	❖	❖	Other	$500,000
Dam Management *Partner with USACE to manage water levels and reduce erosion, request ACOE update ROPE study, explore dam modification.*	Annual meeting with USACE		Mississippi River	**DNR**, **ACOE**, Counties, SWCDs		❖	❖	❖	❖	Other	Unknown
Buffer Law *Enforce buffer to ensure all drainage systems have riparian vegetation.*	Maintain compliance		Drainage systems	**Counties, SWCDs**	❖	❖	❖	❖	❖	Baseline	$738,000*
Riparian Inventory *Identify erosion-prone areas using drones or LiDAR.*	2 streams studied		Priority Areas, Figure 4.3	**SWCDs, DNR**			❖	❖	❖	Baseline +WBIF	$20,000
Outreach Program • *Create materials (mailings, social media postings) to reach out to snowmobile / ATV groups on trail crossings, and landowners on easements.* • *River clean ups.*	Develop and implement outreach program		Watershed-wide	**SWCDs**, Counties, MHB	❖	❖	❖	❖	❖	Baseline +WBIF	$167,000**

What			Where	Who	When					Cost	
Action	Output	Program	Targeted Resources	Responsibility (Bold = Lead)	2024-2025	2026-2027	2028-2029	2030-2031	2032-2033	Funding Source	10-Year Estimated Cost
Overlapping Actions											
Chloride Management *Reduce chloride application where possible, Smart Salting training, use brine, contractor training.*	All major cities stormwater employees attend smart salting training		Near cities	**Cities, MPCA,** Townships, businesses, Counties, SWCDs	❖	❖	❖	❖	❖	Baseline +WBIF	See Stormwater Section
Shoreline Ordinance *Implement shoreline ordinance.*	Continue program		All streams. Mississippi River	**Counties, Cities,** SWCDs, MHB	❖	❖	❖	❖	❖	Baseline +WBIF	See Lake Section
Forest and Land Protection *SFIA, easements, and acquisitions on land at risk of deforestation, near lakes, and where groundwater is at risk.*	8,162 acres		Priority Areas, Figure 4.3, Mississippi River	**SWCDs, DNR**, BWSR, TPL, MN Land Trust, Northern Waters Land Trust, Mississippi Headwaters Board, Counties	❖	❖	❖	❖	❖	Other	See Forest Section
Wetland Enhancement *Restore hydrological connectivity of ditched systems (peatlands, floodplains), increasing water storage.*	50 acres		See Wetland section	**Counties**, SWCDs, DNR	❖	❖	❖	❖	❖	Baseline +WBIF	See Wetlands Section

*Regulatory Program costs are an even portion of the total Planning & Zoning budget for the counties in the watershed.
**Outreach Program costs are an even portion of the total Outreach Program estimate for the watershed.

FARMS

SECTION 5. FARMS

Introduction

Compared to other parts of Minnesota, farming is a relatively small land use in the UM-GR Watershed. Most farmland is hay or pastureland with some cultivated crops. The MPCA regulates feedlots. Feedlots are designated by the number of animal units and proximity to a shoreland area. One animal unit is equivalent to the amount of manure produced by a 1,000-pound steer. There are over 30 registered feedlots in the watershed, and most are beef operations. There are an unknown number of small, unregistered animal operations.

BMPs help protect lakes and streams, while also protecting animal health. Many farms in the watershed are already implementing practices that protect water quality. However, the MPCA has listed six streams as impaired for *Escherichia coli*, or *E. coli* bacteria. *E. coli* is an indicator of fecal material in surface waters. Based on proximity of animal operations to streams, farms were listed as a possible source for the bacteria, along with septic systems and stormwater runoff in municipalities.

Farm Issues

A diverse group of farm experts plus the UM-GR Watershed Advisory Committee gathered in a topic-focused meeting in fall of 2023 to discuss issues and future management efforts related to farms in the watershed. To illustrate the diversity of viewpoints, at the beginning of the farm meeting, the experts and Advisory Committee members were asked what comes to mind when they think about the watershed's farms. The responses were assembled to create a word cloud (Figure 5.1).

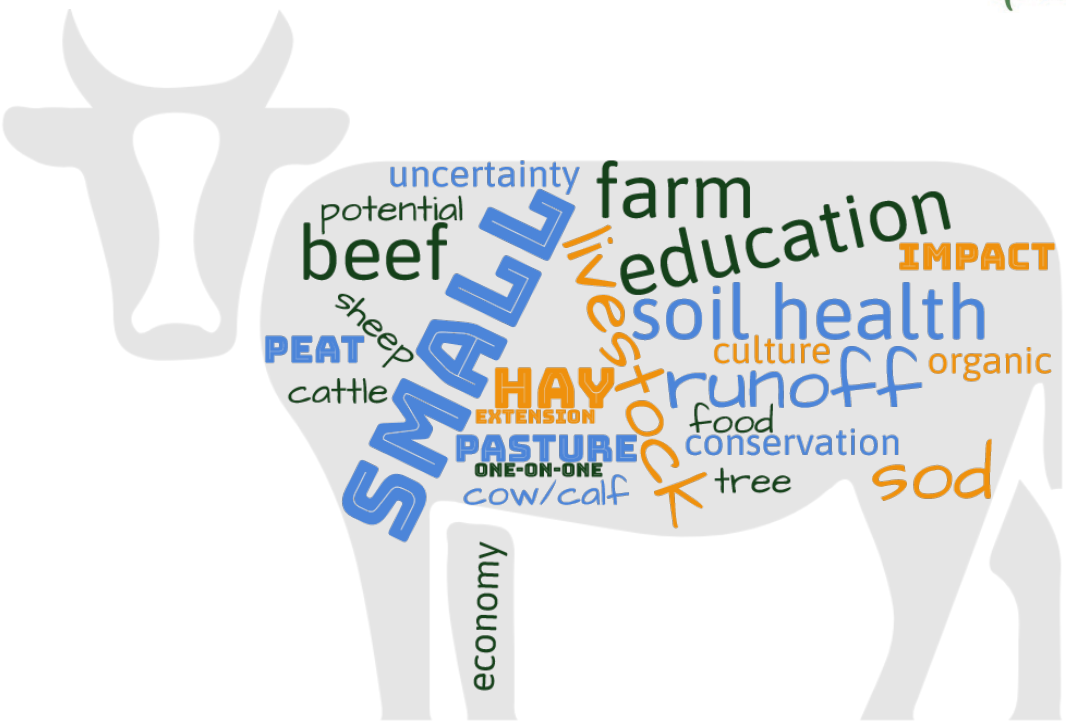


Figure 5.1. Word cloud depicting the diversity of responses to the question, "When you think of the UM-GR Watershed's farms, what comes to mind?"

To help understand what issues and opportunities surround farms in the watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the priority farm issues for the UM-GR Watershed.

The farms topic meeting attendees then brainstormed issues for farms in the watershed. The brainstormed list was either grouped with the compiled themes or new themes were created (Table 5.1). The group then agreed on a final list of issue themes.

Table 5.1. Farm issue statements developed at the Farm Topic Meeting.

#	Draft Issue Statement	References
1	**Soil Health** is important for agricultural productivity, efficiency and climate resilience.	Public, BWSR
2	**Livestock access** to streams contributes to streambank erosion, nutrients and bacteria in streams.	Aitkin, Carlton, Itasca and St. Louis counties, Public, WRAPS
3	**Agricultural runoff** (fertilizer, pesticides, manure) increases nutrients, sediment, and bacteria in streams and groundwater.	WRAPS, Public

In January of 2024, the Steering and Advisory committees convened and developed the final issue statements from the draft issues developed at the topic meetings. The farm issue statements were condensed into one statement:

Agricultural runoff and livestock access increases erosion, nutrients, sediment, and bacteria in streams and groundwater.

While the soil health draft issue statement was left out of the final statement, it is important to note that actions addressing agricultural runoff and livestock access often directly improve soil health.

The group brainstormed a list of possible actions to address the priority issue along with ways success might be measured relative to a goal. Actions to address the farm issue are summarized in this section's targeted implementation schedule. Measurable goals are also summarized in the following pages.

Emerging Concerns

Emerging concerns are issues in the watershed that lack detailed information for addressing them and measuring progress but may affect the resources in the watershed in the future.

Precipitation Patterns
Climate variability is altering weather patterns in the UM-GR Watershed (DNR 2024). Specifically, the watershed is receiving heavier and more frequent precipitation in the fall and winter, which were less common in previous decades. The timing of rainfall can be particularly impactful in agricultural systems: rainfall during fallow periods can increase soil erosion due to lack of soil cover, as well as reduced buffers along waterways. Monitoring precipitation patterns and finding solutions such as increased use of perennial buffers or cover crops to minimize the impact of irregular precipitation patterns will be necessary to maintain water quality along agricultural fields (Roop 2024).

Agricultural Chemicals
Chemical use, such as herbicides and pesticides are extremely common in agriculture and can impact water quality. Specifically, pesticides and herbicides can contaminate drinking water supplies through runoff for wildlife and humans. They can also contaminate surface water bodies that impact fish habitat. While not directly addressed in this plan, pesticide and herbicide BMPs can help best protect waterways from chemical application. Integrating chemical application BMPs with other outreach/education actions on agricultural lands will help best preserve water quality.

Local Concerns

Local concerns are issues or topics of interest specific to this watershed that are also outside the scope of the plan and local water managers but are important considerations to water and land management.

Small Agricultural Operations

Depending on the number of animal units, not all feedlots require permitting in Minnesota (MPCA 2024). These permits require operating conditions that help minimize the environmental impacts of feedlots. However, smaller animal operations are not as strictly regulated and may require additional consideration for manure management practices to best mitigate the impacts of livestock on water quality. Working with local agricultural groups to find solutions that work for small agricultural operations such as cattle fencing, watering systems, and prescribed grazing can help protect water quality moving forward.

Resource Prioritization

The UM-GR Watershed spans over 1.3 million acres, so targeting implementation actions to specific areas is necessary for achieving measurable change in the next 10 years. The Steering Committee and topic meeting attendees discussed how to prioritize resources, and used the following datasets to arrive at the priority areas shown in Figure 5.2:

- Bacteria impairments
- Percent of agricultural land by subwatershed (HUC12s). The more agricultural land the more opportunities for projects.

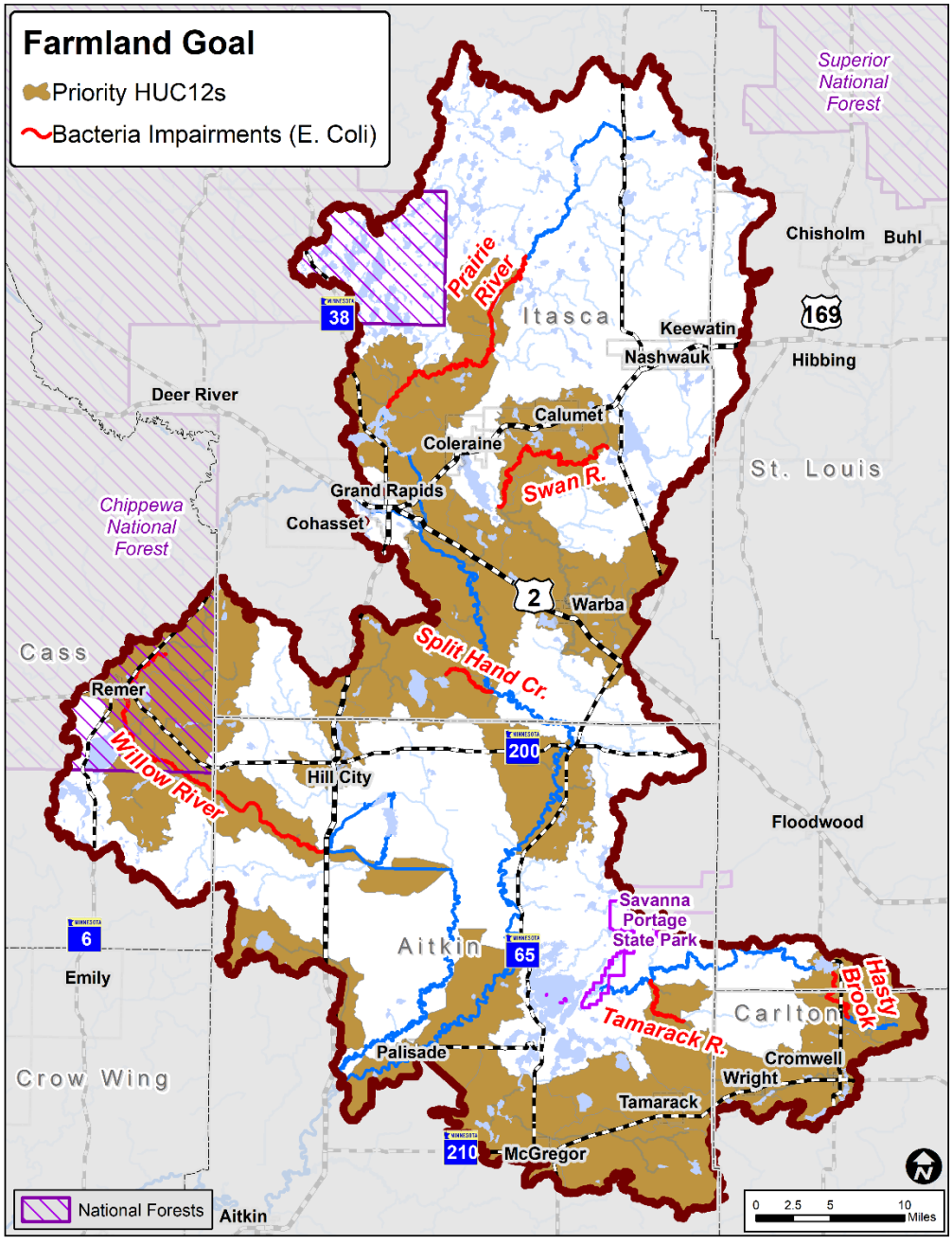


Figure 5.2: Priority locations for addressing farm issues in the UM-GR Watershed.

Farm Goal

Why It Matters

While cropland and pasture are not a large portion of this watershed (4%), the subwatersheds with farmland can be a source of nutrients, sediment, and bacteria to surface waters. Nutrients (nitrogen and phosphorus) are necessary for crops to grow but excess loads may arrive in surface water via runoff or bound to sediment, where nutrients decrease water quality and can cause algal blooms.

Issues Addressed

- Agricultural Runoff and Livestock Access.

Preventing nutrient loading from agricultural lands can be achieved by implementation of conservation practices and structural BMPs such as cover crops, filter strips, pasture management, prescribed grazing, and nutrient management plans.

Current data on BMPs show that 7% of the crop and pastureland in the watershed already have BMPs. The short-term farm goal is to implement an additional 3,659 acres of agricultural BMPs, which is 7% of the crop and pastureland in the watershed, bringing the total coverage to 14%.

Work Already Done

From 2004-2022 (source: MPCA Healthier Watersheds)

- 2,352 acres of cover crops and no till.
- 668 acres of prescribed grazing.
- 814 acres of MAWQCP.
- 72 acres of Conservation Reserve Program (CRP).

Short-Term Goals

- Implement 3,659 acres of agricultural BMPs.

Metric: acres of agricultural BMPs, pollutant reductions.

Long-Term Goals

- Continued annual implementation of BMPs on agricultural land, contributing to clean water, food, and air.

Secondary Benefits (Appendix C, D)

- 80 metric tons of carbon sequestration.
- 25 acre-feet of water storage in the soil.
- 175 lbs of phosphorus and 44 tons of sediment at the watershed outlet

Implementation

Actions to address the farm goal and issue are described in the targeted implementation table on the following page. Actions were brainstormed at the topic meeting and further developed based on what was achievable with available funding, identified as actions in the WRAPS report, and adopted by neighboring watershed plans.

The targeted implementation schedule includes:

- What: Action name, outcome, and program.
- Where: Rather than implementing the action anywhere in the watershed, a specific area or resource is targeted for more effective implementation.
- Who: Agencies that will be involved in the action are listed and the lead(s) are indicated.
- When: The estimated time of implementation is indicated. Many actions are annual and will continue throughout implementation. Others have a targeted biennium.
- Cost: The funding source and the estimated 10-year cost are listed.
    - Baseline + WBIF indicates funding from local county and SWCDs sources plus WBIF.
    - Other indicates outside and partner funding sources such as the Outdoor Heritage Fund, NRCS, DNR, MPCA, etc.

The 'Outcome' column lists the trackable output of the action, i.e., number of acres or projects. If the outcome says 'per year' it is annual, otherwise the number is the 10-year outcome. Implementation will focus on the targeted areas in the 'Where' column. A variety of factors may influence how work will be done in practice, and actions in non-priority areas may be considered on a case-by-case basis.

Some actions apply to multiple goals and issues, called "Overlapping Actions". They are included in all relevant action tables, but the cost column contains a resource icon when an action is in more than one table (preventing estimating the same cost multiple times). The estimated cost of the action is listed in the implementation schedule of that resource section.

Implementation of each action will occur through one of four programs, described below and indicated through the icon in the 'Program' column of the targeted implementation schedule. Further detail on implementation programs is described in Section 11.

Fix It

Constructed Environmental Enhancements are actions that involve installation or construction.

Manage It

Planned Landscape Management actions manage the soil, forest, cropland, and water resources, including ordinances.

Keep It

Protected Lands Maintenance actions include permanent landscape protection.

Know It

Data Collection & Outreach actions involve gathering information or education and outreach to the public.

Farms Targeted Implementation Schedule

What			Where	Who	When					Cost	
Action	Outcome	Program	Targeted Resources	Responsibility (Bold = Lead)	2024-2025	2026-2027	2028-2029	2030-2031	2032-2033	Funding Source	10-Year Estimated Cost
Agricultural Land Management Practices *Cost share and technical assistance for cover crops, no-till, and management of: nutrients, irrigation, manure, and pasture, etc.*	3,659 acres		Priority areas, Figure 5.2	**SWCDs, NRCS**, BWSR, MDA,	❖	❖	❖	❖	❖	Baseline +WBIF, Other	$550,000
Agricultural Water Quality Certification *Enroll farms.*	Enroll 2 farms per year		Priority areas, Figure 5.2	**MDA**, SWCDs, NRCS	❖	❖	❖	❖	❖	Other	$200,000
Feedlot Ordinance *Implement feedlot ordinance and evaluate potential CAFO ordinance.*	Continue program		All streams	**MPCA, Counties**, SWCDs	❖	❖	❖	❖	❖	Baseline +WBIF, Other	$738,000*
Bacteria Reduction Projects *Waste pit closures, feedlot BMPs.*	1 project per year		*E.coli* impairments	**NRCS, SWCDs**, MDA	❖	❖	❖	❖	❖	Baseline +WBIF, Other	$500,000
Data Collection *Microbial Source Tracking for bacteria sources, conduct windshield survey to identify manure issues, ground-truth E.coli sources, identify barriers to adoption of conservation practices.*	2 studies completed		Priority areas, Figure 5.2	**SWCDs**, **MPCA**, NRCS		❖	❖	❖		Baseline +WBIF	$20,000
Outreach Program • *Build relationships with farmers and encourage adoption of soil health practices through workshops and facilitated discussions.* • *Support new farmers.* • *Peer to peer collaboration.* • *Organic farming.* • *Education on backyard chickens, hobby farms, micro farms, 4H.*	Two workshops per year		Priority areas, Figure 5.2	**SWCDs, NRCS**, UMN Extension	❖	❖	❖	❖	❖	Baseline +WBIF	$167,000**

What			Where	Who	When					Cost	
Action	Outcome	Program	Targeted Resources	Responsibility (Bold = Lead)	2024-2025	2026-2027	2028-2029	2030-2031	2032-2033	Funding Source	10-Year Estimated Cost
Overlapping Actions											
Ditch Maintenance *ditch authorities continue ditch maintenance and repair.*	As petitioned		Drainage systems	**County**, SWCDs, DNR	❖	❖	❖	❖	❖	Other	 See Wetlands Topic Section
Ditch Abandonment *explore abandoning ditches that are not providing benefits.*	Explore opportunities		Drainage systems	**County**, SWCDs, DNR			❖	❖		Other	 See Wetlands Topic Section

*Regulatory Program costs are an even portion of the total Planning & Zoning budget for the counties in the watershed.
**Outreach Program costs are an even portion of the total Outreach Program estimate for the watershed.


FORESTS

SECTION 6. FORESTS

Introduction

Forests are an important resource for the UM-GR Watershed. Forests not only provide valuable habitat for a variety of species, but they also help protect lakes, rivers, streams, and groundwater. Forests help filter and slow the flow of rainwater, allowing it to soak into the ground rather than run off the land. This prevents pollutants from being washed into lakes, rivers, and streams. Over 50% of the watershed is forested or woody wetlands. Research has shown that when 75% of a watershed or lakeshed (smaller area draining to a lake) is forested, lake quality is generally good.

There is a variety of forest ownership in the watershed including state and federal forests, state parks, county land, private industrial land, and private ownership. Of these, most forests are privately owned. Forests are considered protected when they are managed for forest health and are protected from conversion to other land use types. Generally, publicly owned forests are considered protected. Privately owned forests can also be protected by conservation easements and the SFIA which is a covenant on the land for a set number of years. Landowners can be encouraged to keep their land forested by a 2C tax designation if the landowner has a woodland stewardship plan. Generally, wetland forests are considered protected because they are less likely to be converted due to their soil types.

Forest Issues

A diverse group of forest experts plus the UM-GR Watershed Advisory Committee gathered in a topic-focused meeting in fall of 2023 to discuss issues and future management efforts related to forests in the watershed. To illustrate the diversity of viewpoints, at the beginning of the forest meeting, the experts and Advisory Committee members were asked what comes to mind when they think about the watershed's forests. The responses were assembled to create a word cloud (Figure 6.1).

Figure 6.1. Word cloud depicting the diversity of responses to the question, "When you think of the UM-GR Watershed's forests, what comes to mind?"

To help understand what issues and opportunities surround forests in the watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the priority forest issues for the UM-GR Watershed.

The forest meeting attendees then brainstormed issues for forests in the watershed. The brainstormed list was grouped with the compiled themes of new themes were created. The group then agreed on a final list of four themes (Table 6.1).

Table 6.1. Forest issue statements developed at the Forest Topic Meeting.

#	Draft Issue Statement	References
1	Forests that protect water quality for lakes, rivers, streams, wetlands and drinking water are at **risk of conversion** to other land use types such as agriculture or development.	WRAPS, Aitkin, Carlton and Itasca County Water Plan, Public Kickoff Meeting, BWSR and DNR Letters, Topic Meeting
2	**Forest health** is vulnerable to climate variability, pests, and invasive species which can affect forest diversity and productivity.	Public Kickoff Meeting, DNR Letter, Topic Meeting
3	**BMPs** are needed to protect forests and water quality before, during and following harvests.	WRAPS, Carlton County Water Plan, Public Kickoff Meeting, DNR Letter
4	Patchwork forest ownership makes **coordinated forest management** and protection difficult	Topic Meeting

Each participant ranked their top two issues for forests, and the top two priorities overall were:

- **Risk of conversion** (19)
- **Forest health** (16)

The group felt that best management practices and coordinated forest management could be incorporated as actions in the plan. Protection and restoration of peatlands and riparian forests were discussed in wetland and river meetings.

In January, the Steering and Advisory committees convened and developed the final issue statements from the draft issues developed at the topic meetings. The forest issue statements were condensed into two statements:

Sufficient protection is needed for outstanding resources and sensitive species (i.e., trout, cisco, wild rice, forests) to maintain water quality, native species, wildlife, and plant communities.

Forest health is vulnerable to climate variability, pests, and invasive species which can affect forest diversity and productivity.

The 'sufficient protection' issue statement was created for forests, lakes, rivers and streams, and wetlands. It covers the 'risk of conversion' draft issue statement.

The group brainstormed a list of possible actions to address the priority issues along with ways success might be measured relative to a goal. Actions to address the issues related to forests are summarized in this section's targeted implementation schedule. Measurable goals are also summarized in the following pages.

Emerging Concerns

Emerging concerns are issues in the watershed that lack detailed information for addressing them and measuring progress but may affect the resources in the watershed in the future.

Forest Loss and Biodiversity
Forests provide environmental, social, and economic services to residents in the UM-GR Watershed. Climate variability will continue to create challenges for forest management. These challenges include altered species composition, increased disturbance from extreme weather, biodiversity loss, wildfire, and invasive species (MFRC 2020). While forest health management is included in this plan, dealing with emerging biodiversity and forest loss due to climate change will be a challenge, and the extent of these issues may not be fully known. Planting more resilient species and working with local foresters will be essential to minimize the impacts and maintain this precious resource in the UM-GR Watershed.

Forests Pests and Invasive Species
Forests pests and invasive species like Emerald ash borer and Eastern larch beetle are a potential threat to the forest of the UM-GR. Invasive species harm forest health and reduce biodiversity within forests. With warming temperatures and changing species composition in forests, unknown pests and other invasive species are likely to appear in UM-GR forests. Vigilant management and monitoring of potential pests should continue in the coming decades and potentially be included in updates to this plan.

Local Concerns

Local concerns are issues or topics of interest specific to this watershed that are also outside the scope of the plan and local water managers but are important considerations to water and land management.

Forest Parcelization
In recent decades, development pressure has caused parcelization (or the division of woodlands into smaller parcels) to increase in Northern Minnesota. To meet housing demands, large parcels are divided for development. Parcelization harms forest health, forest habitat, water quality, and economic resources (Block-Torgerson et al. 2010). Plan partners should assist to protect and maintain forests in the UM-GR watershed, which will help meet the desired conditions for water quality and forest health.

Resource Prioritization

The UM-GR Watershed spans over 1.3 million acres, so targeting implementation actions to specific areas is necessary for achieving measurable change in 10 years. The Steering Committee and topic meeting participants discussed how to prioritize resources, and used the maps developed during the Landscape Stewardship Plan (LSP) to arrive at the priority areas for forest protection Figure 6.2 and forest management in Figure 6.3.

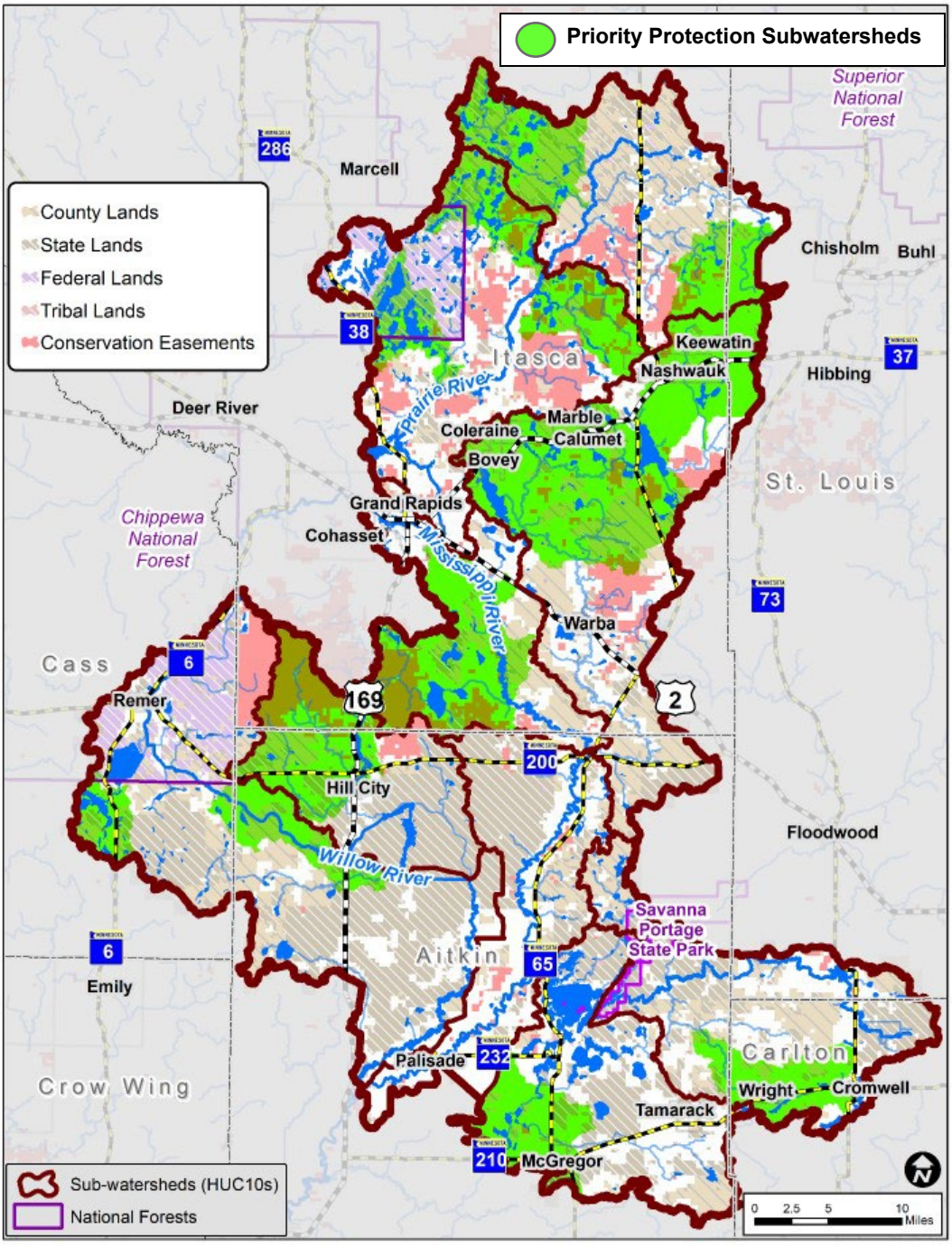


Figure 6.2. Priority minor watersheds for Private Forest Protection.

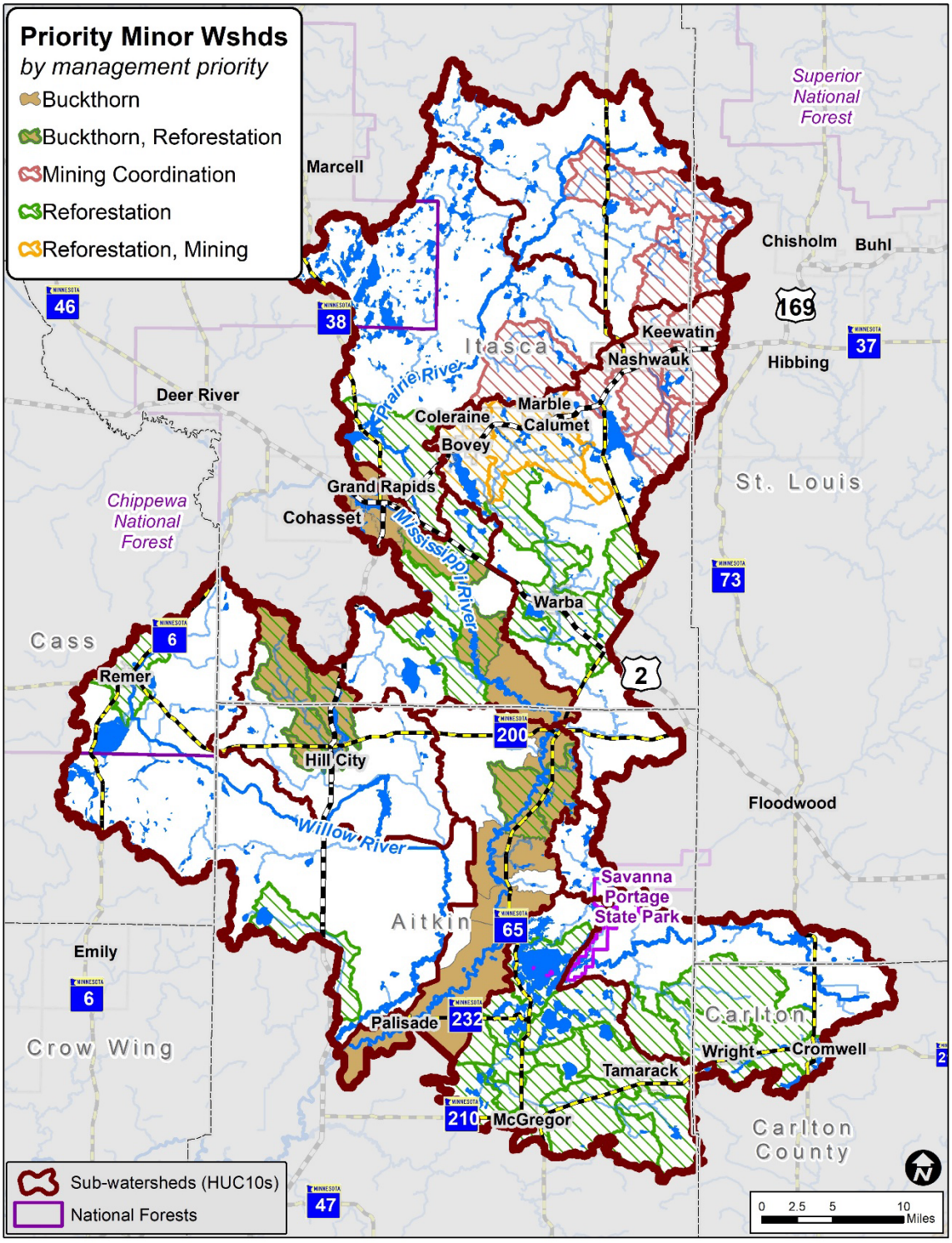


Figure 6.3. Priority minor watersheds for private forest management.

Forests Goal

Why It Matters

50% of the UM-GR Watershed is forest land or woody wetlands, which protects water quality and provides habitat, carbon storage, and offers economic and recreational opportunities. Much of the historical white pines were logged, through which stream hydrology was altered to move trees downstream. Timber harvesting is still done in the watershed but is now done with forest management in mind. Harvesting and reforesting creates young forests, which are important habitat for birds and other species. It also serves as a tool to manage invasive species such as eastern spruce budworm and eastern larch beetle.

Issues Addressed

- Sufficient Protection
- Forest Health

Keeping forest land forested is a major component of protecting the high-quality water resources found in the UM-GR Watershed. Forests keep soil in place, store water, reduce overland flow, and filter contaminants prior to runoff reaching surface waters. Privately owned forest land could be converted into other land uses that do not provide the same ecosystem benefits as forests. The short-term goal focuses on protection of existing forests, through adoption of forest stewardship plans and enrolling acres of forest into programs such as SFIA which provides payments to landowners to manage their forest.

Work Already Done

- 74% of the watershed is protected.
- 94 forest management plans from 2021-2023 (local data).

Short-Term Goals

- Implement 8,162 acres of forest protection (10% progress towards LSP Goal).
- Implement 36,000 acres of forest management.

Metric: acres of forest stewardship plans, SFIA, easements, and acquisitions.

Long-Term Goals

- 81,620 acres of forest protection (LSP Goal).

Secondary Benefits (Appendix C)

- 631,350 metric tons of carbon storage.
- 750 – 1,350 acre-feet of protected water storage.

Implementation

Actions to address the forest goal and issues are described in the targeted implementation table on the following page. Actions were brainstormed at the topic meeting and further developed based on what was achievable with available funding, identified as actions in the WRAPS report, and adopted by neighboring watershed plans.

The targeted implementation schedule includes:

- What: Action name, outcome, and program.
- Where: Rather than implementing the action anywhere in the watershed, a specific area or resource is targeted for more effective implementation.
- Who: Agencies that will be involved in the action are listed and the lead(s) are indicated.
- When: The estimated time of implementation is indicated. Many actions are annual and will continue throughout implementation. Others have a targeted biennium.
- Cost: The funding source and the estimated 10-year cost are listed.
    - Baseline + WBIF indicates funding from local county and SWCDs sources plus WBIF.
    - Other indicates outside and partner funding sources such as the Outdoor Heritage Fund, NRCS, DNR, MPCA, etc.

The 'Outcome' column lists the trackable output of the action, i.e. number of acres or projects. If the outcome says 'per year' it is annual, otherwise the number is the 10-year outcome. Implementation will focus on the targeted areas in the 'Where' column. A variety of factors may influence how work will be done in practice, and actions in non-priority areas may be considered on a case-by-case basis.

Implementation of each action will occur through one of four programs, described below and indicated through the icon in the 'Program' column of the targeted implementation schedule. Further detail on implementation programs is described in Section 11.

Fix It

Constructed Environmental Enhancements are actions that involve installation or construction.

Manage It

Planned Landscape Management actions manage the soil, forest, cropland, and water resources.

Keep It

Protected Lands Maintenance actions include permanent landscape protection.

Know It

Data Collection & Outreach actions involve gathering information or education and outreach to the public.

Forest Targeted Implementation Schedule

What			Where	Who	When					Cost	
Action	Output	Program	Targeted Resources	Responsibility (**Bold** = Lead)	2025-2026	2027-2028	20292030	2031-2032	2033-2034	Funding Source	10-Year Estimated Cost
Forest and Land Protection *SFIA, easements, and acquisitions on land at risk of deforestation, near lakes, and where groundwater is at risk.*	8,162 acres		Priority Areas, Figure 6.2	**SWCDs, DNR**, BWSR, TNC, TPL, MN Land Trust, NWLT, MHB, Counties	❖	❖	❖	❖	❖	Other	$9,084,000
Forest Stewardship Plans *Plans for lakeshores, small parcels, and priority areas.*	36,000 acres; 300 plans		Priority Areas, Figure 6.3	**SWCDs, DNR, Forest Consultants,** TNC, BWSR, MHB	❖	❖	❖	❖	❖	Baseline +WBIF	$540,000
Forest Health Management *Increase tree diversity, climate assisted migration, timber stand improvement, reforestation and tree planting on idle farms, reduce herbicide use, Firewise program, brush management, forest BMPs.*	1,000 acres		Priority Areas, Figure 6.3	**SWCDs, DNR, Counties**, NRCS, BWSR, MN Timber/ Logging Association	❖	❖	❖	❖	❖	Other	$500,000
Terrestrial Species Management *Invasive species prevention and management, noxious weeds program.*	Continue current program		Priority Areas, Figure 6.3	**SWCDs**, DNR, Counties, NRCS	❖	❖	❖	❖	❖	Baseline +WBIF	Included in staff time
Data Collection *Use drone to survey forest health and identify project opportunities.*	Drone survey completed		Priority Areas, Figure 6.2 & Figure 6.3	**SWCDs**, Counties		❖	❖	❖	❖	Baseline +WBIF	$20,000
Outreach Program • *Provide education and outreach workshops/classes to forest landowners on: Invasive species, healthy and unhealthy forests, specifically for small parcels.* • *Training for service providers and realtors.* • *Forest harvest BMPs.* • *Explore development of small tract parcel management program.*	Implement Outreach Program		Priority Areas, Figure 6.2 & Figure 6.3	**SWCDs**, Itasca Master Woodlands Owners, COLA	❖	❖	❖	❖	❖	Baseline +WBIF	$167,000**

**Outreach Program costs are an even portion of the total Outreach Program estimate for the watershed.

WETLANDS

SECTION 7. WETLANDS

Introduction

Wetlands are an important resource for the UM-GR Watershed. This watershed has open water wetlands, peatlands, and forested wetlands. Most wetlands in the watershed are healthy, providing a variety of benefits such as habitat, protection from floods, groundwater recharge and water quality protection. The watershed has abundant peatlands (photo above). In addition to unique biodiversity, peatlands also hold large amounts of carbon when they are healthy and functioning.

The WRAPS report identifies ditched wetlands and peatlands as probable contributors to water quality issues in downstream streams, adversely impacting aquatic ecosystems. Ditching increases the speed of water flowing off the land, which results in streambank erosion, leading to poor habitat. Lakes downstream of ditched wetlands may also be impacted by releases of phosphorus, contributing to declining lake water quality. This watershed has high amounts of ditching, especially in the central and southern portions of the watershed. Trenching of wetlands occurred in the early 1900s where no stream channel existed. These ditching efforts were to facilitate farming and logging. In many cases, the ditching efforts failed to produce soil dry enough for agriculture.

Wetland Issues

To help understand what issues and opportunities surround wetlands in the watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the priority wetland issues for the UM-GR Watershed.

A diverse group of wetland experts plus the UM-GR Watershed Advisory Committee gathered to brainstorm issues for wetlands in the watershed. The brainstormed list was grouped with the compiled themes of new themes were created. The group then agreed on a final list of five themes (Table 7.1).

Table 7.1. Wetland issue statements developed at the Wetland Topic Meeting

#	Draft Issue Statement	References
1	**Wetland loss** due to development and land use change can increase flooding and impact infrastructure.	Carlton, Cass, Itasca, St. Louis, Public
2	**Wetland health and function** is impacted by invasive species, ditching, recreation, and beavers.	Aitkin, Public
3	**Protection** of critical wetland and peatland habitats is needed to maintain biodiversity, and store water and carbon.	Carlton, Cass, Itasca, St. Louis, Public
4	Historic straightening of natural watercourses impacts **water quality**, aquatic life, and flooding/hydrology.	WRAPS, Public, MPCA, BWSR, DNR
5	**Inadequate drainage** of lands impacts crop productivity and flooding.	AC Meeting

Each participant ranked their top two issues for wetlands, and the top two priorities overall were:

- **Wetland health and function** (17 votes)
- **Water quality** (13 votes)

A closely ranked third issue was identified as **Maintain Drainage** (11 votes) and will also be included in the actions.

In January, the Steering and Advisory committees convened and developed the final issue statements from the draft issues developed at the topic meetings. The wetland issue statements were condensed into three statements:

Sufficient protection is needed for outstanding resources and sensitive species (i.e., trout, cisco, wild rice, forests) to maintain water quality, native species, wildlife, and plant communities.

Wetland health and function is impacted by invasive species, ditching, recreation, and beavers.

Historic **straightening of natural watercourses** impacts water quality, aquatic life, and flooding.

The 'sufficient protection' issue statement was created for forests, lakes, rivers and streams, and wetlands. While maintaining drainage did not make the final issue list, it will be addressed through actions to address ditching.

The group brainstormed a list of possible actions to address the priority issues along with ways success might be measured relative to a goal. Actions to address the issues related to

wetlands are summarized in this section's targeted implementation schedule. Measurable goals are also summarized on the following pages.

Local Concerns

Local concerns are issues or topics of interest specific to this watershed that are outside the scope of the plan and local water managers but are important considerations to water and land management.

Mining Impacts

As discussed in the Lakes Section, mining can have a significant impact on surface water quality when not managed properly. This is true about wetlands as well: discharge and dewatering from mines in the UM-GR Watershed area have the potential to impact wetland health, including the direct loss of habitat, sulfate loading, and damages from land cover changes (Knutsen, 2014). Working with local stakeholders and agencies to reduce the environmental impacts of mining will be important moving forward.

Invasive Species

Wetlands in the UM-GR Watershed are contending with invasive terrestrial and aquatic species. Phragmites, an invasive perennial reed grass, have become more common in UM-GR wetlands with climate change. Phragmites quickly spread and outcompete native plants and deny fish and wildlife their necessary habitat (UMN 2024). They are especially difficult to manage as they can be challenging to distinguish from native Phragmites, which are important species for wetlands. Additionally, terrestrial invasive species, like emerald ash borer (EAB), have recently been found in areas with ash swamps. Diligence in managing invasive species that will continue to appear with climate change is essential in managing wetland health.

Wetlands in the watershed

Resource Prioritization

The UM-GR Watershed spans over 1.3 million acres, so targeting implementation actions to specific areas is needed to make measurable change in 10 years. The Steering Committee and topic meeting attendees discussed how to prioritize resources, and used the following datasets to arrive at the priority subwatersheds for wetland/peatland management and enhancement shown in Figure 7.1:

- Altered watercourses
- Drainage systems
- Peatlands

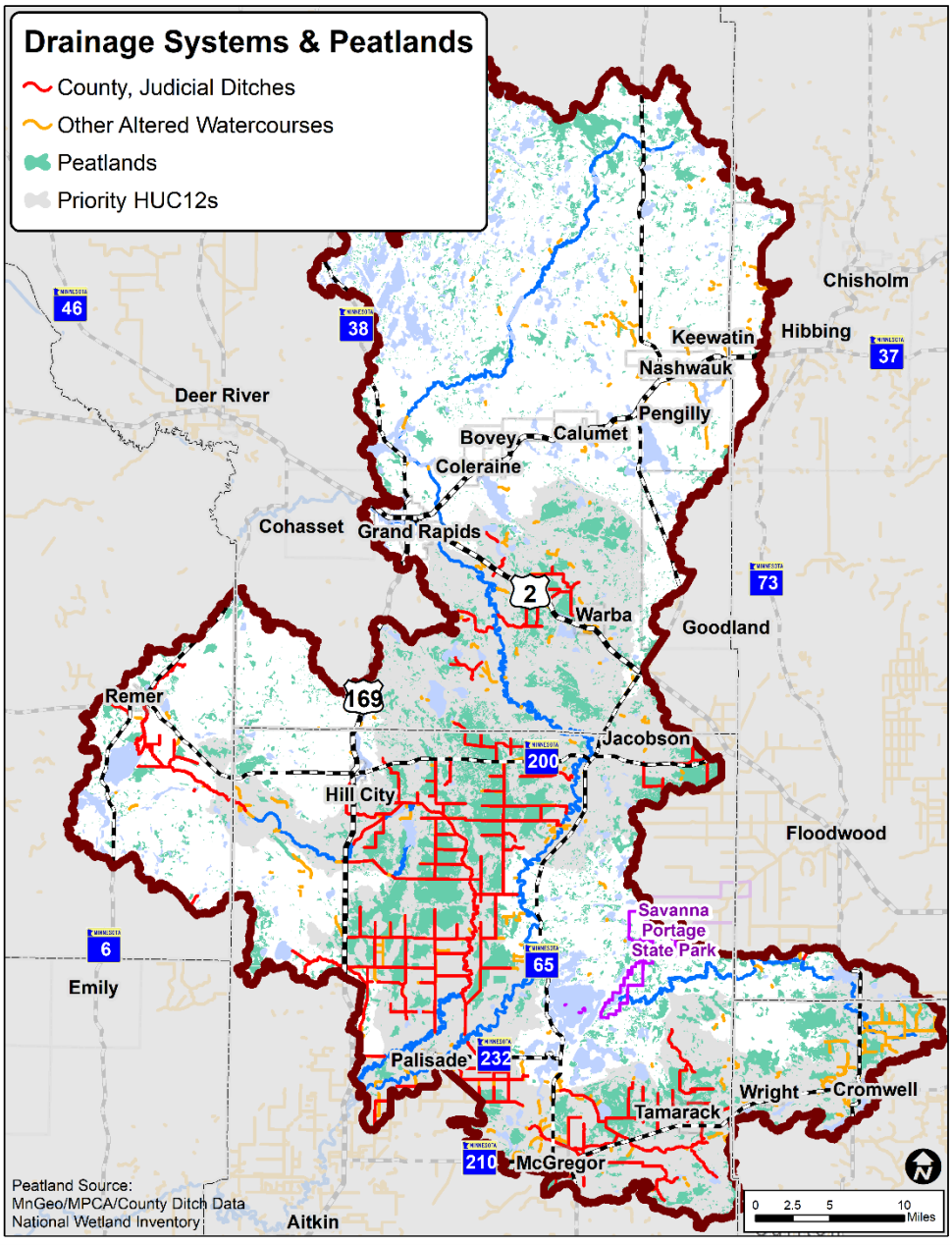


Figure 7.1. Peatlands, ditches, and altered watercourses in the UM-GR Watershed.

Wetlands Goal

Why It Matters

Almost half (45%) of the watershed is covered in woody and emergent herbaceous wetlands. Wetlands provide numerous ecosystem benefits, including storing water and reducing peak streamflow and flooding, removing pollutants from entering downstream waters, and providing excellent habitat. Historically, many wetlands were drained and ditched to improve the land for agriculture before the importance of wetlands were understood. Recently, there has been a focus on restoring wetlands and preventing new loss of wetlands. Restoring wetlands and improving water storage on the landscape reduces overland flow and peak flow in streams, which reduces bank erosion and the resulting phosphorus and sediment loading. Adding storage to the landscape also provides additional groundwater recharge.

Issues Addressed

- Wetland health and function
- Straightening of natural watercourses

Peatland is a term for a type of wetland found throughout the watershed characterized by accumulation of decaying plant matter while saturated. Peatlands are very valuable as they store 30% of the world's carbon but only cover 3% of the planet. They also provide unique habitat for plants and wildlife. A substantial amount of ditching has been done in the UM-GR Watershed. When peatlands are drained, they become a carbon source rather than a carbon sink. Restoring peatland is a future priority for the UM-GR Watershed.

Work Already Done

- Carlton SWCD discussed ditch decommissioning projects with the county, MPCA, and DNR
- Administering WCA

Short-Term Goals

- Maintain and enhance wetlands and peatlands.
- Explore feasibility of a peatland restoration project.

Metric: Acres of peatland exploration, implement Wetland Conservation Act (WCA), encourage wetland banking credits.

Long-Term Goals

- Implement a peatland restoration project.

Implementation Actions

Actions to address the wetland goal and issues are described in the targeted implementation table on the following page. Actions were brainstormed at the topic meeting and further developed based on what was achievable with available funding, identified as actions in the WRAPS report, and adopted by neighboring watershed plans.

The targeted implementation schedule includes:

- What: Action name, outcome, and program.
- Where: Rather than implementing the action anywhere in the watershed, a specific area or resource is targeted for more effective implementation.
- Who: Agencies that will be involved in the action are listed and the lead(s) are indicated.
- When: The estimated time of implementation is indicated. Many actions are annual and will continue throughout implementation. Others have a targeted biennium.
- Cost: The funding source and the estimated 10-year cost are listed.
    - Baseline + WBIF indicates funding from local county and SWCDs sources plus WBIF.
    - Other indicates outside and partner funding sources such as the Outdoor Heritage Fund, NRCS, DNR, MPCA, etc.

The 'Outcome' column lists the trackable output of the action, i.e. number of acres or projects. If the outcome says 'per year' it is annual, otherwise the number is the 10-year outcome. Implementation will focus on the targeted areas in the 'Where' column. A variety of factors may influence how work will be done in practice, and actions in non-priority areas may be considered on a case-by-case basis.

Some actions apply to multiple goals and issues, called "Overlapping Actions". They are included in all relevant action tables, but the cost column contains a resource icon when an action is in more than one table (preventing estimating the same cost multiple times). The estimated cost of the action is listed in the implementation schedule of that resource section.

Implementation of each action will occur through one of four programs, described below and indicated through the icon in the 'Program' column of the targeted implementation schedule. Further detail on implementation programs is described in Section 11.

Fix It

Constructed Environmental Enhancements are actions that involve installation or construction.

Manage It

Planned Landscape Management actions manage the soil, forest, cropland, and water resources.

Keep It

Protected Lands Maintenance actions include permanent landscape protection.

Know It

Data Collection & Outreach actions involve gathering information or education and outreach to the public.

Wetland Targeted Implementation Schedule

What			Where	Who	When					Cost	
Action	Output	Program	Targeted Resources	Responsibility (Bold = Lead)	2024-2025	2026-2027	2028-2029	2030-2031	2032-2033	Funding Source	10-Year Estimated Cost
Wetland Conservation Act *Continue enforcement of WCA and ordinances to protect wetlands.*	Continue program		Figure 7.1	**DNR, BWSR, SWCDs, Counties**	❖	❖	❖	❖	❖	Baseline +WBIF	$167,000**
Wetland Restoration/Enhancement *Restore hydrological connectivity of ditched systems (peatlands, floodplains), increasing water storage.*	50 acres		Figure 7.1	**Counties**, SWCDs, DNR		❖	❖	❖	❖	Baseline +WBIF + Other	$25,000
Wetland Banks *Encourage and maintain wetland baanking.*	Maintain access to wetland bank service area		Figure 7.1	**Counties, SWCDs, BWSR**	❖	❖	❖	❖	❖	Baseline +WBIF*** + Other	Included in staff time
Drainage Maintenance *Ditch authorities continue ditch maintenance and repair.*	As petitioned		Figure 7.1	**County**, SWCDs, DNR	❖	❖	❖	❖	❖	Other	NA
Drainage System Abandonment *Explore abandoning ditches that are not providing benefits.*	Explore opportunities		Figure 7.1	**County**, SWCDs, DNR			❖	❖	❖	Other	NA
Data Collection *Evaluate potential locations for water storage and peatland restoration projects.*	1 study completed		Figure 7.1	**SWCDs**, Counties			❖	❖	❖	Baseline +WBIF	$20,000
Outreach Program *Educate landowners on wetland regulations and benefits of establishing wetland banks.*	Implement Outreach Program		Figure 7.1	**SWCDs**, Counties, DNR	❖	❖	❖	❖	❖	Baseline +WBIF	$167,000**
Overlapping Actions											
Terrestrial Species Management *Invasive species prevention and management, noxious weeds program.*	Continue current program		Priority Forest Areas	**SWCDs**, DNR, Counties, NRCS	❖	❖	❖	❖	❖	Baseline +WBIF	 See Forest Topic Section

*Regulatory Program costs are an even portion of the total Planning & Zoning budget for the counties in the watershed.

**Outreach Program costs are an even portion of the total Outreach Program estimate for the watershed.

***Any project that contributes to or otherwise is used to replace wetlands impacted under the WCA per MN Rules 8420 is ineligible for WBIF.

STORMWATER

SECTION 8. STORMWATER

Introduction

Although much of the watershed is covered with forests and wetlands, there are 16 incorporated cities near lakes and streams. In these areas, managing stormwater is an important consideration. Stormwater BMPs help protect property and natural resources by reducing flood risks and flood damage and filtering pollutants before they are washed to lakes and streams. Stormwater management also helps protect groundwater. However, stormwater planning, designs and construction can be expensive.

The largest city in the watershed is Grand Rapids with a population of over 11,500 people. This city has a municipal separate storm sewer system (MS4), and it is required to satisfy the requirements of the MS4 permit. This permit is designed to reduce the amount of pollution entering lakes and streams using best management practices. Although no other cities in the watershed are required to have an MS4 permit, many are implementing practices to protect their nearby lakes and streams. Outside of cities, most development in the watershed is found along lakeshores. Stormwater management is not only important to protect surface water, but also drinking water in vulnerable DWSMAs.

Stormwater Issues

A diverse group of stormwater experts plus the UM-GR Watershed Advisory Committee gathered in a topic-focused meeting in fall of 2023 to discuss issues and future management efforts related to stormwater in the watershed. To illustrate the diversity of viewpoints, at the beginning of the stormwater meeting, experts and Advisory Committee members were asked what comes to mind when they think about the watershed's stormwater. The responses were assembled to create a word cloud (Figure 8.1).

Figure 8.1. Word cloud depicting the diversity of responses to the question, "when you think of the UM-GR Watershed's stormwater, what comes to mind?"

To help understand what issues and opportunities surround stormwater in the watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the priority stormwater issues for the UM-GR Watershed.

The stormwater meeting attendees then brainstormed issues for stormwater management in the watershed. The brainstormed list was either grouped with the compiled themes or new themes were created. The group then agreed on a final list of three issue themes (Table 8-1).

Table 8.1. Stormwater issue statements developed at the Stormwater Topic Meeting.

#	Draft Issue Statement	References
1	**Stormwater runoff** from developed areas delivers sediment, nutrients, and bacteria to lakes, streams, and wetlands.	Carlton & Itasca Counties, DNR & MPCA Comment Letters, Public
2	**De-icing and dust control chlorides** can negatively impact lakes, streams, and wetlands.	Aitkin County, Public, MPCA Comment Letter
3	**Flooding** can cause sewage overflows and communities need assistance preparing for future flood events.	Carlton & Itasca Counties

Since the concerns focused on three themes, it was determined that further narrowing of issues was not necessary and the group agreed that these three themes would be the top priorities for stormwater concerns.

In January, the Steering and Advisory committees convened and developed the final issue statements from the draft issues developed at the topic meetings. The stormwater issue statements were condensed into one statement:

> **Stormwater runoff** from developed areas delivers sediment, nutrients, chloride, and bacteria to lakes, streams, and wetlands.

The 'deicing and dust control chlorides' draft issue statement is covered by the final 'stormwater runoff' statement. The 'flooding' draft issue statement did not make the final issue statement, however, BMPs implemented to address the stormwater runoff quality often also affect quantity and reduce peak runoff flows (i.e., rain gardens). Additionally, flooding is addressed in the wetlands goal.

The group brainstormed a list of possible actions to address the priority issues along with ways success might be measured relative to a goal. Actions to address the issues related to stormwater are summarized in this section's targeted implementation schedule. Measurable goals are also summarized in the following pages.

Emerging Concerns

Emerging concerns are issues in the watershed that lack detailed information for addressing them and measuring progress but may affect the resources in the watershed in the future.

Aging Stormwater Ponds

Stormwater ponds require maintenance. As they age, they lose their ability sequester pollutants from runoff and can re-release phosphorous into water, causing algae growth (UMN 2022). Dredging is required when ponds hit capacity or are filled with sediment or other organic material. The UM-GR Watershed has several aging stormwater ponds that will require careful maintenance moving forward. If not maintained, their benefits for water quality will be reduced.

A stormwater pond near a housing development

Resource Prioritization

The UM-GR Watershed spans over 1.3 million acres, so targeting implementation actions to specific areas is necessary to make measurable change in 10 years. The Steering Committee/topic meeting discussed how to prioritize resources, and used the following datasets to arrive at the priority areas shown in Figure 8.2:

- Developed land
- Cities
- E911 Address Point Density

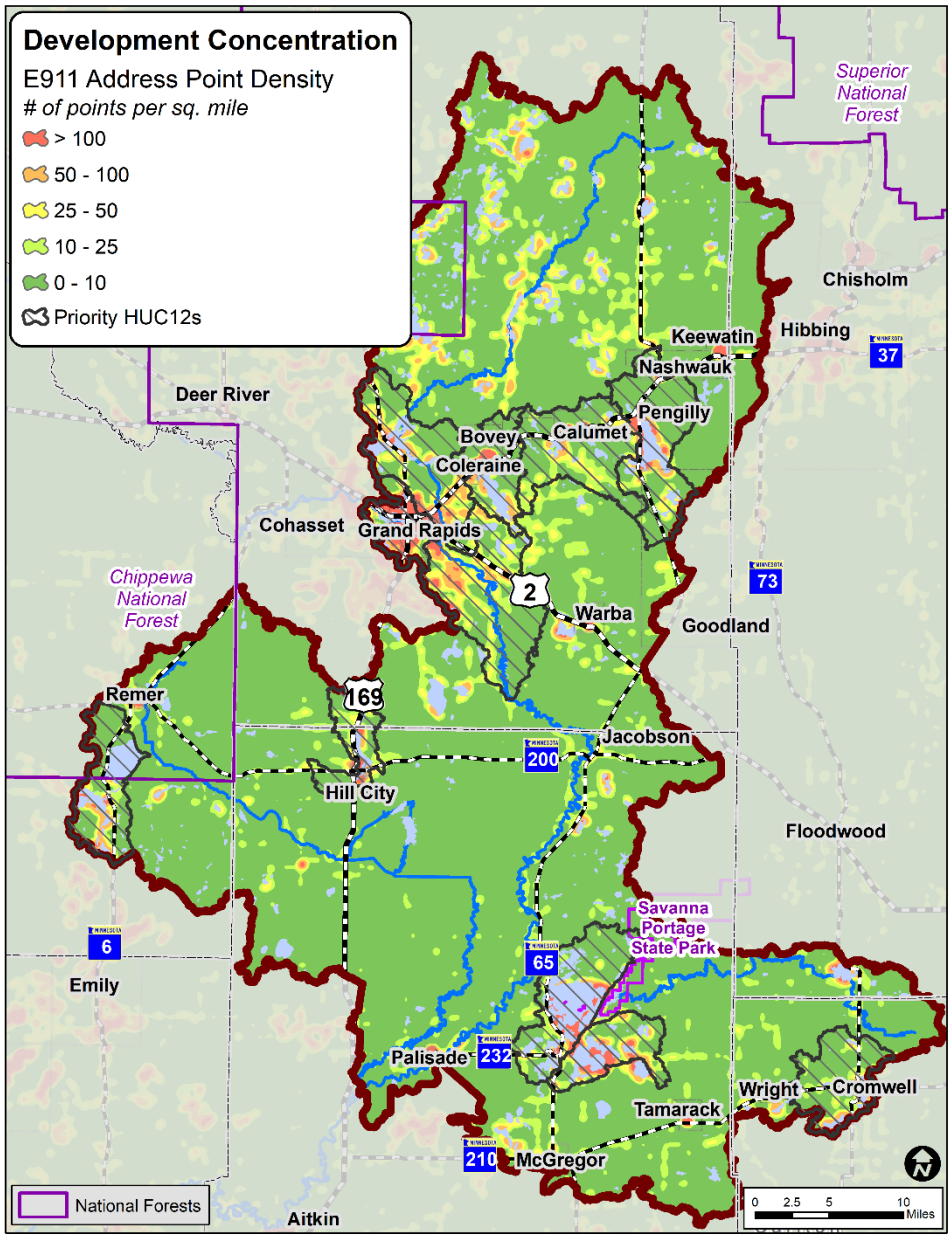


Figure 8.2. E911 address density.

Stormwater Goal

Why It Matters

When it rains in a forest or wetland, the precipitation is infiltrated in the soil until storage capacity is reached, then begins to flow over the land. However, in developed areas, precipitation falls on pavement (known as impervious surface) and does not infiltrate. Instead, it runs off, picking up urban pollutants such as road salts, oil and grease from cars, animal waste, and more on its way over roads and into storm drains where it discharges into receiving waterbodies. Many people are unaware that stormwater is not treated, merely collected and discharged into receiving waterbodies. Therefore, it is vital to minimize stormwater contamination and allow for infiltration practices where possible.

Issues Addressed

- Stormwater Runoff
- Nutrients (lakes topic)

There are 16 cities near surface water in UM-GR Watershed, but only Grand Rapids is regulated as an MS4. Many actions can help improve stormwater quality, including education and outreach efforts. Resident actions such as reducing fertilizer application to yards, picking up dog waste, cleaning road drains of debris, smart salting, and more are all ways to improve water quality. Constructed BMPs such as filter strips, green infrastructure, and rain gardens directly target stormwater runoff.

Work Already Done

- Seven cities already have stormwater retrofit analysis completed:
  - Bovey
  - Cohasset
  - Coleraine
  - Cromwell
  - Grand Rapids
  - La Prairie
  - Palisade

Short-Term Goals

- Complete stormwater retrofit analysis for 3 communities: Remer, Warba, and Pengilly.
- Implement 5 stormwater projects in the priority areas in Figure 8.2.

Metric: Stormwater management plans and studies, pollutant reductions and water storage.

Long-Term Goal

- All cities have stormwater management plans and retrofit analysis completed.

Implementation

Actions to address the stormwater goals and issues are described in the targeted implementation table on the following page. Actions were brainstormed at the topic meeting and further developed based on what was achievable with available funding, identified as actions in the WRAPS report, and adopted by neighboring watershed plans.

The targeted implementation schedule includes:

- What: Action name, outcome, and program.
- Where: Rather than implementing the action anywhere in the watershed, a specific area or resources are targeted for more effective implementation.
- Who: Agencies that will be involved in the action are listed and the lead(s) are indicated.
- When: The estimated time of implementation is indicated. Many actions are annual and will continue throughout implementation. Others have a targeted biennium.
- Cost: The funding source and the estimated 10-year cost are listed:
    - Baseline + WBIF indicates funding from local county and SWCDs sources plus WBIF.
    - Other indicates outside and partner funding sources such as the Outdoor Heritage Fund, NRCS, DNR, MPCA, etc.

The 'Outcome' column lists the trackable output of the action, i.e. number of acres or projects. If the outcome says 'per year' it is annual, otherwise the number is the 10-year outcome. Implementation will focus on the targeted areas in the 'Where' column. A variety of factors may influence how work will be done in practice, and actions in non-priority areas may be considered on a case-by-case basis.

Some actions apply to multiple goals and issues, called "Overlapping Actions". They are included in all relevant action tables, but the cost column contains a resource icon when an action is in more than one table (preventing estimating the same cost multiple times). The estimated cost of the action is listed in the implementation schedule of that resource section.

Implementation of each action will occur through one of four programs, described below and indicated through the icon in the 'Program' column of the targeted implementation schedule. Further detail on implementation programs is described in Section 11.

Fix It

Constructed Environmental Enhancements are actions that involve installation or construction.

Manage It

Planned Landscape Management actions manage the soil, forest, cropland, and water resources, including ordinances.

Keep It

Protected Lands Maintenance actions include permanent landscape protection.

Know It

Data Collection & Outreach actions involve gathering information or education and outreach to the public.

Stormwater Targeted Implementation Schedule

What			Where	Who	When					Cost	
Action	Outcome	Program	Targeted Resources	Responsibility (Bold = Lead)	2025-2026	2027-2028	2029-2030	2031-2032	2033-2034	Funding Source	10-Year Estimated Cost
Stormwater Studies *Partner with counties for stormwater retrofit analysis and plans.*	3 analyses		Remer, Pengilly, Warba	**Counties, Cities**, MPCA, MHB		❖	❖			Baseline +WBIF	$150,000
Stormwater Ordinances *Review ordinances, compare impervious surface / lot coverage between municipalities and counties.*	Continue enforcement		Watershed-wide	**Counties, Cities,** SWCDs	❖	❖	❖	❖	❖	Baseline +WBIF	$738,000*
Partner with Road Authorities *Ensure stormwater management along roads and ditches, during construction work.*	Annual meeting		Watershed-wide	**Counties**, **Road Authorities**, **SWCDs,** MnDOT, Cities, Townships	❖	❖	❖	❖	❖	Baseline +WBIF	Included in staff time
Street Sweeping *Enhanced sweeping and clearing of gutters in small cities and near surface water.*	Street sweeping program continued		cities	**Cities, SWCDs,** Counties, MPCA, Road Authorities	❖	❖	❖	❖	❖	Baseline +WBIF	$200,000
Urban Stormwater Projects *Stormwater retention basins, treatment facilities, biofiltration, rain barrels, green infrastructure.*	5 projects		Figure 8.2	**Cities, SWCDs,** MHB, BWSR, MPCA	Coleraine, Bovey		Pengilly, Warba			Baseline +WBIF	$500,000
Chloride Management *Reduce chloride application where possible, Smart Salting training, use brine, chloride plans.*	Implement program		cities and roads	**Cities, MPCA, SWCDs**, Townships, businesses, Counties,	❖	❖	❖	❖	❖	Baseline +WBIF	$200,000
Construction Site Management and Development BMPs *Manage stormwater during construction through enforcement of stormwater permits, training of staff, require stormwater BMPs with development permits, review stormwater ordinances, encourage MIDs.*	Continue current program		Watershed-wide	**Cities, Counties,** MPCA	❖	❖	❖	❖	❖	Baseline +WBIF	Included in staff time

What			Where	Who	When					Cost	
Action	Outcome	Program	Targeted Resources	Responsibility (Bold = Lead)	2025-2026	2027-2028	2029-2030	2031-2032	2033-2034	Funding Source	10-Year Estimated Cost
Data Collection *Inventory of ditches and ephemeral streams that are unregulated for stormwater events with erosion from stream/ditch banks.*	Data collected to target implementation		Figure 8.2	**SWCDs**, Cities, Counties, DNR			❖	❖	❖	Baseline +WBIF	$20,000
Outreach Program *Outreach to residents on stormwater impacts, yard cleanup, salt use.*	Implement Outreach Program		Watershed-wide	**SWCDs**, Cities, Counties	❖	❖	❖	❖	❖	Baseline +WBIF	$167,000**
Overlapping Actions											
Near-shore Stormwater BMPs *Rain gardens, technical assistance.*	40 lbs phosphorus		Priority Lakes	**Cities, Counties, SWCDs**, Lake Associations	❖	❖	❖	❖	❖	Baseline +WBIF	See Lakes Topic Section

*Regulatory Program costs are an even portion of the total Planning & Zoning budget for the counties in the watershed.
**Outreach Program costs are an even portion of the total Outreach Program estimate for the watershed.

Stormwater Project Status

The Steering Committee, Advisory Committee, and Stormwater Subject Experts put together information on the status of stormwater studies and projects in each city in the watershed. Pengilly, Remer, and Warba need Retrofit Analyses. The cities with Retrofit Analyses completed are a priority for implementing stormwater projects.

Community	County	Population (2022)	Retrofit Analysis Completed	Drain to Surface Water	Notes
Priority Cities that Drain to Surface Water					
Big Sandy & Minnewawa	Aitkin	N/A	Not necessary	Big Sandy and Minnewawa	These areas need large stormwater projects
Bovey	Itasca	813	Yes, 2021	Trout Lake	This would be TSA funded
Coleraine	Itasca	1,989	Yes, 2018	Trout Lake	
Cromwell	Carlton	244	Yes, 2020	Upper & Lower Island, Tamarack River	Funding through 319 Funding with help from BWSR grant
Grand Rapids	Itasca	11,268	Yes, 2014, 2018	Mississippi R, Forest L, Hale L,	
Hill City	Aitkin	959	Working on it in 2024	Hill Lake, Hill River	Study in-progress as of 2024
La Prairie	Itasca	665	Yes, 2015	Mississippi R., Prairie R.	A partial study was done, needs more information
McGregor	Aitkin	384	later	Drains to Sandy River	
Palisade	Aitkin	166	Yes, 2015	Mississippi River	Could use more information, should connect with MnDOT
Pengilly	Itasca	270	**NEED**	Swan Lake	
Remer	Cass	401	**NEED**	Willow River to the east	
Warba	Itasca	173	**NEED**	Swan River	MnDOT will do construction in 2027
Wright	Carlton	167	later	Tamarack River	Tamarack River is east of town
Secondary Priorities because they do not drain to surface water					
Taconite	Itasca	645	No	Unknown	
Calumet	Itasca	325	No	Unknown	
Keewatin	Itasca	975	No	Unknown	
Marble	Itasca	611	No	Unknown	
Nashwauk	Itasca	961	No	Unknown	
Tamarack	Aitkin	60	No	No	


GROUNDWATER

SECTION 9. GROUNDWATER

Introduction

According to the MDH, all residents in the watershed get their drinking water from groundwater supplies, whether their water comes from private wells or public water supplies. The soil above groundwater supplies can provide protection from pollution at the surface. Some soils are less protective than others, making some groundwater supplies more vulnerable. There are over 4,000 private wells according to the Minnesota Well Index, and over 800 of those wells are in a highly vulnerable setting. The highest density of private wells is surrounding the city of Grand Rapids and Big Sandy Lake.

Arsenic levels above the Safe Drinking Water Act standards have been measured in private wells throughout the watershed. Arsenic naturally occurs in some soils and can dissolve into groundwater. While the Environmental Protection Agency (EPA) allows up to 10 micrograms per liter of arsenic in community water systems, any amount of arsenic increases the risk of cancer. There are home water treatment systems available to remove arsenic from well water.

Some private wells also had high levels of nitrates. High nitrate levels can have health impacts, especially to babies under six months and people with certain health conditions. According to the MDH, well water that tests above 3 milligrams per liter can be caused by fertilizer runoff, wastewater, landfills, animal feedlots, septic systems, or urban drainage.

Within the watershed, there are 18 DWSMAs. A DWSMA is an area surrounding a public supply well that contributes groundwater to that well in a 10-year travel time. Three communities are at very high risk for contamination to their DWSMA. These communities are Grand Rapids, Coleraine, and Remer. There are 231 public water suppliers. A community public water supply is a water supply system that serves at least 25 people or 15 service connections year-round. Examples are small municipalities and mobile home parks. Within the watershed, 32 public water supplies are in a highly vulnerable setting.

Groundwater Issues

A diverse group of groundwater experts plus the UM-GR Watershed Advisory Committee gathered in a topic-focused meeting in fall of 2023 to discuss issues and future management efforts related to groundwater in the watershed. To illustrate the diversity of viewpoints, at the beginning of the groundwater meeting, the experts and Advisory Committee members were asked what comes to mind when they think about the watershed's groundwater. The responses were assembled to create a word cloud (Figure 9.1).

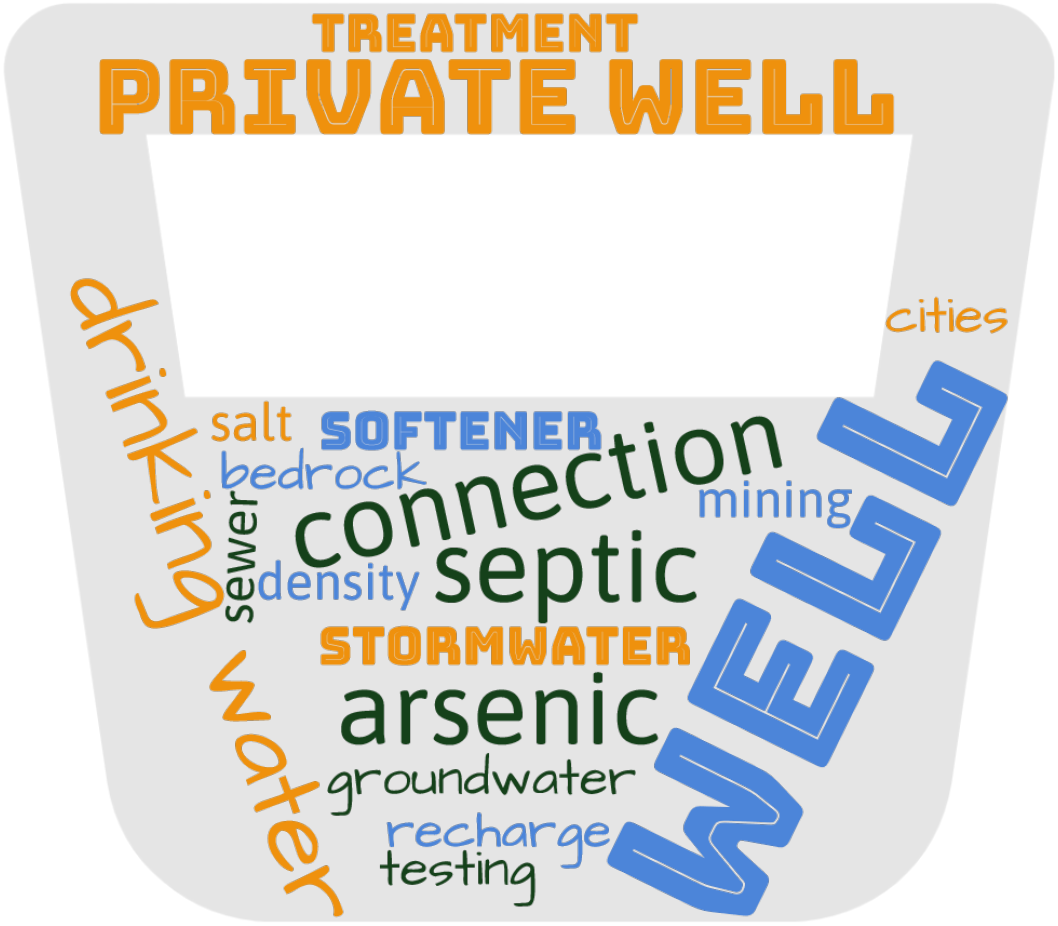


Figure 9.1. Word cloud depicting the diversity of responses to the question, "When you think of the UM-GR Watershed's groundwater, what comes to mind?"

To help understand what issues and opportunities surround groundwater in the watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the priority groundwater issues for the UM-GR Watershed.

The groundwater meeting attendees then brainstormed issues for groundwater in the watershed. The brainstormed list was either grouped with the compiled themes or new themes were created. The group then agreed on a final list of issue themes.

Table 9.1. Groundwater issue statements developed at the Groundwater Topic Meeting

#	Draft Issue Statement	References
1	**Groundwater quality and quantity needs protection** from contamination due to activities on the land and environmental conditions.	Carlton, Itasca and St. Louis Counties, Public, MDH
2	More **testing and screening** are needed to track groundwater and drinking water safety and quality.	Aitkin, Carlton, Cass, Itasca and St. Louis counties, Public, MDH

In January, the Advisory Committee convened and developed the final issue statements from the draft issues developed at the topic meetings. The groundwater issue statements were not changed from the draft statements, and are:

Groundwater quality and quantity needs protection from contamination due to activities on the land and environmental conditions.

More **testing and screening** are needed to track groundwater and drinking water safety and quality.

The group brainstormed a list of possible actions to address the priority issues along with ways success might be measured relative to a goal. Actions to address the issues related to groundwater are summarized in this section's targeted implementation schedule. Measurable goals are also summarized in the following pages.

Emerging Concerns

Emerging concerns are issues in the watershed that lack detailed information for addressing them and measuring progress but may affect the resources in the watershed in the future.

Contaminants of Emerging Concern

Per- and polyfluoroalkyl substances (commonly referred to as PFAS) is a classification of thousands of manmade chemicals used in firefighting foam, carpeting, cookware, food wrappings, cosmetics, and more. These chemicals eventually enter into the environment and do not degrade, earning the nickname 'forever chemicals'. Growing research into the effects of PFAS has found concerning implications for human life and the environment. Minnesota began testing for PFAS in 2004 and has since issued fish consumption advisories for Perfluorooctanesulfonic Acid (PFOS), a type of PFAS. PFAS chemicals are still being made, and protection against their adverse impacts will be a challenge. Mining, sulfate, and PFAS contamination were discussed as issues affecting groundwater during the topic meeting, but these are larger, more complex issues that LGUs involved in the plan do not have jurisdiction over.

Exploratory Borings

Throughout the UM-GR Watershed there are exploratory ground borings, concentrated heavily in the Mesabi Range and near Tamarack. These exploratory borings may be used as

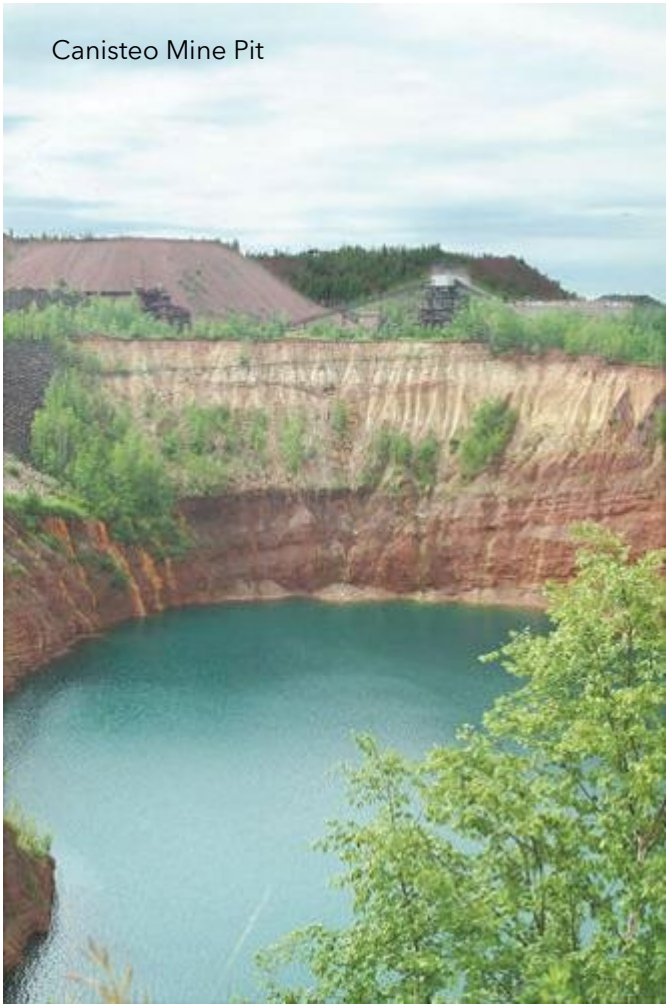
wells and are sometimes discovered during ditch cleaning. They can be for mining exploration, scientific investigation, or other environmental monitoring. When left unsealed or improperly sealed, these boring can be a conduit to the aquifer and potentially contaminate groundwater. Identification and sealing of these exploratory wells should be considered as they continue to age. Mineral exploration borings are regulated by the DNR, and sealing is required (MN Statue 103I.601 and MN Rules Chapter 4727).

Local Concerns

Local concerns are issues or topics of interest specific to this watershed that are also outside the scope of the plan and local water managers but are important considerations to water and land management.

Mining

Mineral extraction was an additional issue discussed during the topic meeting and is recognized as an important local issue affecting groundwater. Mining has taken place in the Mesabi Iron Range since the late 1800s, first for iron ore and more recently for taconite. Mining has altered both surface water and groundwater hydrology. Open pit mines are dewatered during mining. When mining is complete, the pits fill with surface water and groundwater if it is below the water table. Mine pits are a sink for groundwater during mining and they begin to fill with water. As water levels rise in the former mine pits, they can become a source for groundwater, raising the local water table elevation. The exposure of groundwater to mining materials and the surface can be a source of contaminants and warm the temperature of the groundwater. DNR manages the hydrologic impacts of mining.



Canisteo Mine Pit

Resource Prioritization

The UMGR spans over 1.3 million acres, so targeting implementation actions to specific areas is necessary to achieve measurable change where needed. The Steering Committee and topic meeting participants discussed how to prioritize resources, and used the following dataset to evaluate qualities and risks:

- Nitrate and arsenic concentrations in drinking water
- Pollution Sensitivity to near-surface materials
- Private Well Density
- Groundwater Provinces
- DWSMAs

The final priority areas were determined to be highly vulnerable DWSMAs and surface water sources (Figure 9.2). Sealing unused wells and testing/screening wells is a priority watershed wide.

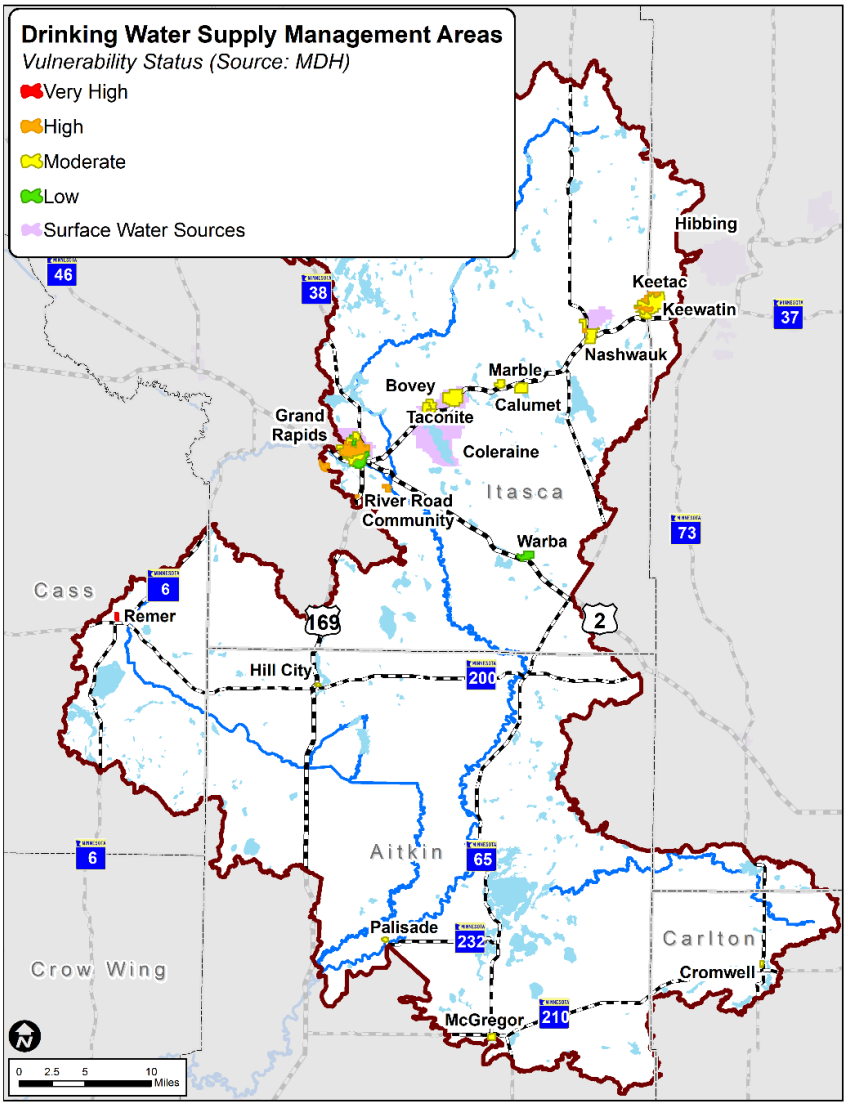


Figure 9.2. DWSMA vulnerability.

Groundwater Goal

Why It Matters

All residents in the watershed use groundwater as their drinking water source. Most drinking water aquifers in the watershed are buried sand and gravel. There are 18 DWSMAs in the watershed, three of which are rated as a very high risk for groundwater contamination (Figure 9.2). Generally, most of the watershed has a moderate, low, or very low pollution sensitivity, with some high sensitivities scattered throughout.

Issue Addressed

- Groundwater quality and quantity needs protection
- More testing and screening is needed

Groundwater contamination can occur through pollutants such as fertilizer, pesticides, or chloride in surface water which infiltrates into groundwater, or through a direct connection into aquifers such as unsealed wells. Chloride and arsenic are present UM-GR Watershed contaminants. Chloride in Minnesota is most commonly from road salt application, while arsenic is naturally occurring due to the geology of the region. Arsenic is a carcinogen, and arsenic reduction units are needed to remove the arsenic from drinking water in homes that detect it. Besides chloride and arsenic, iron, manganese, and nitrate were detected in groundwater in the watershed. While nitrate levels surpassed the standard in a few wells, overall, they pose less of a threat in this watershed in comparison to more agricultural watersheds.

Work Already Done

From 2004-2022 (source: MPCA Healthier Watersheds)

- Four unused wells sealed.
- 61 septic system improvements.

Short-Term Goal

- Seal 50 unused wells (5/year).

Metric: wells sealed, DWSMA protection.

Long-Term Goals

- All abandoned wells sealed and DWSMA land protected.

Implementation

Actions to address the groundwater goal and issues are described in the targeted implementation table on the following page. Actions were brainstormed at the topic meeting and further developed based on what was achievable with available funding, identified as actions in the WRAPS report, and adopted by neighboring watershed plans.

The targeted implementation schedule includes:

- What: Action name, outcome, and program.
- Where: Rather than implementing the action anywhere in the watershed, a specific area or resource is targeted for more effective implementation.
- Who: Agencies that will be involved in the action are listed and the lead(s) are indicated.
- When: The estimated time of implementation is indicated. Many actions are annual and will continue throughout implementation. Others have a targeted biennium.
- Cost: The funding source and the estimated 10-year cost are listed.
    - Baseline + WBIF indicates funding from local county and SWCDs sources plus WBIF.
    - Other indicates outside and partner funding sources such as the Outdoor Heritage Fund, NRCS, DNR, MPCA

The 'Outcome' column lists the trackable output of the action, i.e. number of acres or projects. If the outcome says 'per year' it is annual, otherwise the number is the 10-year outcome. Implementation will focus on the targeted areas in the 'Where' column. A variety of factors may influence how work will be done in practice, and actions in non-priority areas may be considered on a case-by-case basis.

Some actions apply to multiple goals and issues, shown as "Overlapping Actions". They are included in all relevant action tables, but the cost column contains a resource icon when an action is in more than one table (preventing estimating the same cost multiple times). The estimated cost of the action is listed in the implementation schedule of that resource section.

Implementation of each action will occur through one of four programs, described below and indicated through the icon in the 'Program' column of the targeted implementation schedule. Further detail on implementation programs is described in Section 11.

Fix It

Constructed Environmental Enhancements are actions that involve installation or construction.

Manage It

Planned Landscape Management actions manage the soil, forest, cropland, and water resources, including ordinances.

Keep It

Protected Lands Maintenance actions include permanent landscape protection.

Know It

Data Collection & Outreach actions involve gathering information or education and outreach to the public.

Groundwater Targeted Implementation Schedule

What			Where	Who	When					Cost	
Action	Outcome	Program	Targeted Resources	Responsibility (Bold = Lead)	2024-2025	2026-2027	2028-2029	2030-2031	2032-2033	Funding Source	10-Year Estimated Cost
Seal Abandoned Wells	50 wells sealed		Watershed-wide	**MDH, SWCDs, Counties**, NRCS	❖	❖	❖	❖	❖	Baseline +WBIF	$50,000
DWSMA Protection *RIM easements.*	5 acres		Figure 9.2	**Cities, MDH, SWCDs, BWSR**		❖	❖	❖	❖	Other	$5,565
County Geologic Atlas *Complete atlas and educate on its use.*	Atlas completed		Itasca County	**Counties**, SWCD, MDH		❖	❖			Other	NA
Water Treatment *Improve water treatment to reduce the need for water softening which is a source of chloride.*	5 treatment facilities evaluated		Watershed-wide	**MDH, Counties,** Cities		❖	❖	❖	❖	Baseline +WBIF	Part of staff time
Testing & Screening *Increase private well testing through education on the availability of testing and the guidelines for testing for hardness, arsenic, nitrate, and bacteria.*	4 screening clinics per year		Watershed-wide	**SWCDs**, MDH, Counties,	❖	❖	❖	❖	❖	Baseline +WBIF	Part of outreach below
Outreach Program *Educate watershed residents on septic maintenance, water softeners, and groundwater protection.*	One workshop per year		Watershed-wide	**SWCDs**, Counties, MDH	❖	❖	❖	❖	❖	Baseline +WBIF	$167,000**
Overlapping Actions											
Subsurface Sewage Treatment Systems *Replace non-compliant systems.*	4 upgrades per year		Watershed-wide	**Counties, MPCA,** SWCDs, UMN Extension	❖	❖	❖	❖	❖	Baseline +WBIF	See Lakes Section
Bacteria Reduction Projects *Livestock exclusion from streams, waste pit closures, feedlot BMPs.*	1 project per year		*E.coli* impairments	**NRCS, SWCDs,** Counties	❖	❖	❖	❖	❖	Baseline +WBIF	See Farms Section
Forest and Land Protection *SFIA, easements, and acquisitions on land at risk of deforestation, near lakes, and where groundwater is at risk.*	8,162 acres		See forests section	**SWCDs, DNR**, BWSR, TNC, TPL, MN Land Trust, NWLT, MHB, Counties	❖	❖	❖	❖	❖	Other	See Forests Section

**Outreach Program costs are an even portion of the total Outreach Program estimate for the watershed.

PLAN PROGRAMS

SECTION 10.
PLAN IMPLEMENTATION PROGRAMS

Introduction

Implementation of the actions in the topic sections will occur through four programs: Planned Landscape Management ("Manage It"), Constructed Environmental Enhancements ("Fix It"), Protected Lands Maintenance ("Keep It"), and Data Collection and Outreach ("Know It"). In the UM-GR, the balanced is tipped toward "Manage It" (Figure 10.1)

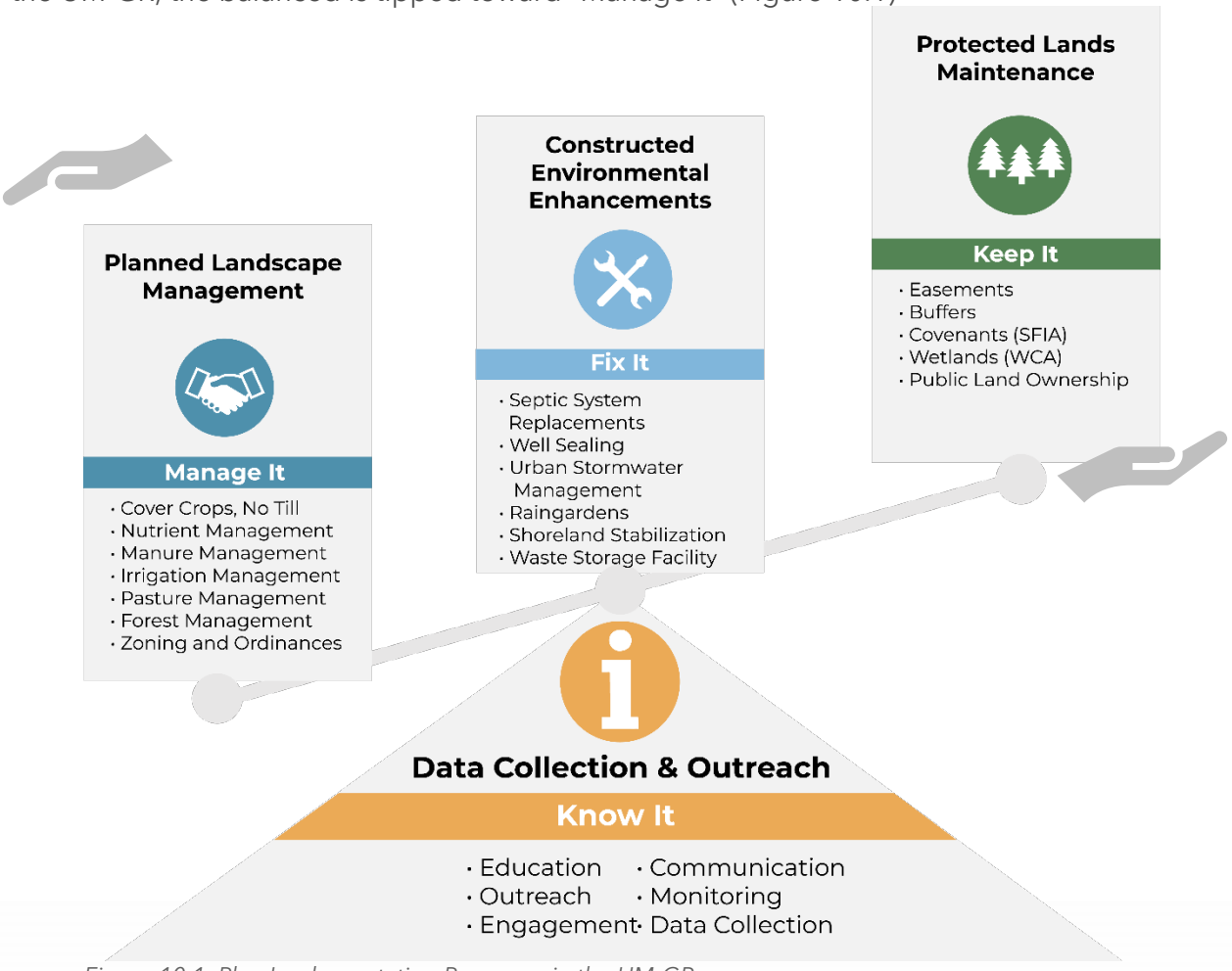


Figure 10.1. Plan Implementation Programs in the UM-GR.

Planned Landscape Management

Planned Landscape Management (MANAGE IT) deals with the continuous management of the landscape, which includes forests, cropland and soil health practices, and regulatory ordinances.

Private Forest Management

Forest Stewardship Plans

Landowners can manage their forest through the DNR Forest Stewardship Program Woodland Stewardship Plans. Trained foresters assist in developing plans to create wildlife habitat, increase environmental benefits, or harvest timber. Plans are prepared by a DNR approved writer, which could include SWCD staff or private foresters.

2C Delegation

Landowners with a DNR Woodland Stewardship Plan are eligible for 2C classification, which is a Minnesota State program to reduce the tax rate for at least 20 acres of forest.

SFIA

This description is included in the Protection section on page 93.

CRP

CRP is administered by the Farm Services Agency (FSA) of the United States Department of Agriculture (USDA). It is a voluntary program that partners with agricultural producers to ensure environmentally sensitive land is not farmed or ranched but used for conservation. CRP participants plant long-term species to control soil erosion, improve water quality, and develop habitat. FSA then provides participants with rental payments and cost-share. The contracts last 10-15 years.

Cost-Share and Incentive Programs

Oftentimes, a landowner may want to implement a conservation project but is limited by the cost. Cost-share programs are available through SWCDs and state agencies for many actions such as agricultural conservation practices and forest enhancement. Cost-share can be used for structural BMPs as well, including lakeshore restorations and well sealing.

Incentive programs provide payments to landowners to do a certain action. They are often used to take sensitive land out of production to protect vulnerable habitats. Access control payments are available to encourage producers to limit livestock access to streams.

UM-GR Comprehensive Plans

This CWMP will involve multiple counties, each with their own water, land, and forest management plans. CWMPs through the 1W1P program are replacing county-level watershed planning, but most recent county water plans are listed on the next page.

Water Plans

- Aitkin County Water Management Plan (2009)
- Cass County Local Water Management Plan (2017)
- Carlton County Comprehensive Local Water Management Plan (2010)
- Itasca County Local Water Management Plan (2022)
- St. Louis County Comprehensive Water Management Plan (2010)

Land Use Plans

- Aitkin County Comprehensive Land Use Management Plan (n.d.)
- Cass County Comprehensive Plan (2021)
- Carlton County Community-Based Comprehensive Plan (2001)
- Itasca County Comprehensive Land Use Plan (2013)
- St. Louis County Comprehensive Land Use Plan (2019)
- Mississippi Headwaters Board Comprehensive Plan (2019)

Forest Plans

- Aitkin County Tactical Forest Management Plan (2021)
- Cass County Forest Resources Management Plan (2021)
- Carlton County Tax Forfeited Land Management Plan (n.d.)
- Itasca County Forest Management Plan (2019)

Regulatory Programs

Aggregate Management

The MPCA oversees hazardous waste licenses, air permits, stormwater and wastewater management, and storage tanks.

- *Regulations: Minnesota Statutes 298.75, 394.25*

Bluffland Protection

Minnesota protects bluffs through structure setbacks through shoreland management programs and the Wild and Scenic Rivers Program. Each UM-GR county has an ordinance regulating removal of vegetation on bluffs and steep slopes. Aitkin, Calton, and Cass require a permit to do so, while Itasca bans intensive clearing and St. Louis County only requires a sediment control plan.

Buffer Law- see page 93

Construction Soil Erosion

Temporary erosion control during construction limits the amount of sediment lost during water and wind erosion during constriction. It is required for development greater than one acre under MPCA permits and should be done for any size project. Examples include erosion control blankets, rock entrances, and silt fences.

- *Regulations: Minnesota Rules, chapter 7090*

Feedlots
The collection, transportation, storage, and land application of manure is regulated by MPCA but frequently delegated to counties. No counties in the UM-GR are delegated by the MPCA to administer the feedlot program. Aitkin, Carlton, Itasca, and St. Louis Counties have additional rules in their ordinances about feedlots in shoreland areas.

- *Regulations: Minnesota Rules Chapter 7020*

Groundwater Use
The DNR administers groundwater appropriation permits when over 10,000 gallons of water per day or 1 million gallons per year are withdrawn. The DNR manages permit applications, but SWCDs, counties, and municipalities are welcome to comment on permit applications.

- *Regulations: Minnesota Statute 103G for appropriation; 103H, 1989 Groundwater Act*

Groundwater Protection Rule
The MDA administers the Groundwater Protection Rule, which went into effect in 2019. Part 1 of the rule restricts nitrogen fertilizer application in the fall and on frozen soils, including Aitkin, Carlton and Cass Counties. Part 2 does not apply in the UM-GR.

- *Regulations: Minnesota Statute 14.16*

Hazard Management
Hazard mitigation includes actions taken to reduce or eliminate risks to life or property, from both natural events and human-caused accidents. Adaption to climate change is an aspect of hazard mitigation, as extreme weather events worsen. Counties are preparing for train derailments or oil spills as an example of anthropogenic hazards. Each UM-GR county has a hazard mitigation plan.

- *Regulations: Minnesota Statute, chapter 12*

Invasive Species
Aquatic and terrestrial invasive species can wreak havoc on ecosystems and make recreation undesirable. Preventing the spread of invasive species is a DNR, SWCD, and county effort. Permits are required to transport lake water, AIS, and to treat invasives. UM-GR Counties and Aitkin SWCD educate the public and prevent the spread of invasive species.

- *Regulations: Minnesota Statute 84D*

Noxious Weed Law
Noxious weeds are plants deemed to be a threat to public health, the environment, roads, crops, or livestock. The noxious weed list is updated every three years and will be updated in 2026. Minnesota's noxious weed law requires landowners to eradicate prohibited species. The law is administered by the MDA which delegates a county inspector.

- *Regulations: Minnesota Statutes 18.75-18.91*

Drainage
Minnesota's network of public ditches is regulated under Statute 103E. Counties are the local Drainage Authorities and manage subsurface and open ditches for the benefit of landowners. Drainage system work includes ditch establishment, improvement, re-routing, repairs, and impoundments.

- *Regulations: Minnesota Statute 103E*

Shoreland Management

Each UM-GR county has a shoreland ordinance approved by the DNR. St. Louis County has increased protection around trout streams. A vegetative buffer around shoreland slows water runoff entering the waterbody, reducing erosion and captures pollutants. Each county's shoreland ordinance has rules about vegetative removal along shoreland, with Aitkin and Carlton Counties requiring a permit. Table 10.1 shows the differences between counties in shoreland ordinances.

- *Regulations: Minnesota Statute 103F and Minnesota Rules 6120.2500-3900*

Table 10.1 Shoreline Ordinances for different lake classifications in UM-GR counties.

	General Development	Recreational Development	Natural Environment
Definition	Generally large, deep lakes with high levels and mixes of existing development. These lakes often are extensively used for recreation and are heavily developed around the shore.	Generally medium-sized lakes often characterized by moderate levels of recreational use and existing development. Development consists mainly of seasonal and year-round residences and recreationally oriented commercial uses.	Generally small, shallow lakes. They often have adjacent lands with substantial constraints for development such as wetlands and unsuitable soils. These lakes usually do not have much existing development or recreational use.
Minimum Frontage and Lot Width	Aitkin, Cass, Carlton: 100 ft Itasca: 150 ft	Aitkin, Cass, Carlton: 150 ft Itasca: 200 ft	Aitkin, Cass, Carlton: 200 ft Itasca: 200 or 300 ft*
Minimum Lot Area	Aitkin, Carlton: 20,000 ft^2 Cass: 37,500 ft^2 Itasca: 32,670 ft2	Aitkin, Carlton: 40,000 ft^2 Cass: 50,000 ft^2 Itasca: 65,340 or 87,120 ft^2*	Aitkin, Carlton: 80,000 ft^2 Cass: 100,000 ft^2 Itasca: 87,120-130,680 ft^2*
Minimum Setback from OHWL	All counties: 75 ft	All counties: 100 ft**	Aitkin, Cass, Carlton: 150 ft Itasca: 100 or 200 ft*

*Itasca requirements differ based on lot acreage.

**Cass County also requires a permit for vegetative alteration in the setback zone, which is only allows in recreational development lake lots

Stormwater Management

The MS4 general permit is intended to reduce the pollutant load reaching downstream waterbodies from large cities. Grand Rapids is an MS4 community in the UM-GR, but each UM-GR county has a stormwater ordinance that would apply to smaller cities.

- *Regulations: Minnesota state rule Minn. R. 7090*

Subsurface Sewage Treatment Systems

SSTS programs are mandated by state statute to protect public health and the environment. All UM-GR counties have an SSTS Point-of-Sale inspection ordinance except Calton County. Carlton only requires inspection in shoreland areas (1,000 ft from lakes, 300 ft from streams). Cities and townships may have their own programs but must be as strict as the county. Low-interest loans and low-income grants are available from SWCDs or counties.

- *Regulations: Minnesota Statutes 115.55 and 115.56; Minnesota Rules Chapters 7080, 7081, 7082, and 7083*

Waste Management

Each county has a Solid Waste Management Plan approved by MPCA. Solid waste management includes mixed municipal waste, industrial waste, and recycling. Hazardous waste regulation is overseen by MPCA, and counties have a hazardous waste facility available to residents.

- *Regulations: Minnesota Statutes 115.55; Minnesota Rules Chapters 7001, 7035, 7045, 7150, 7151, 9215, and 9220*

Wellhead Protection

MDH administers the Wellhead Protection Program, which seeks to prevent public drinking water supply contamination by identifying recharge areas and managing that land. The program has expanded to include Source Water Protection to further protect drinking water. Wellhead Protection is administered at the city level.

- *Regulations: Minnesota Statutes, chapter 103I; Minnesota Rules, chapter 4720; Federal Safe Drinking Water Act, US Code, Title 42, Chapter 6A, Subchapter XII, Part E, Section 300j-13; Minnesota Rules, chapter 4725*

Wetland Conservation Act- See page 93

Minnesota Agriculture Water Quality Certification Program

Minnesota Agriculture Water Quality Certification Program (MAWQCP) is a voluntary program for farmers who implement conservation practices. Farms are certified through MDA and are in compliance with new water quality rules for the next 10 years. Enrolled farms are eligible for technical and financial assistance for implementation of conservation practices. MDA found that farms enrolled in MAWQCP had better financial outcomes than those not enrolled (MDA, 2022).

Protected Lands Maintenance

Protected Land Maintenance (KEEP IT) includes programs that offer permanent landscape protection. This can include SFIA, easements, aquatic management areas, and public land ownership.

Conservation Easements

Conservation easements are voluntary legal agreements between a landowner and the state or federal government, in which land use and development is limited to conserve natural habitat and ecosystem benefits. Minnesota easements must last at least 20 years and include Reinvest in Minnesota (RIM) and Conservation Reserve Enhancement Program (CREP). Easement agreements are tailored to the specific partner entity, including BWSR, DNR, MHB, MN Land Trust, or The Nature Conservancy (TNC).

Land Acquisition

Land acquired by the state can become Wildlife Management Areas (WMAs), Aquatic Management Areas (AMAs), or Scientific and Natural Areas (SNAs), which protect critical habitat and provide land for recreation while regulating use. AMAs are used for fish spawning and WMAs are locations for hunting. County boards approve new land acquisitions.

SFIA

SFIA provides annual incentive payments to landowners with a covenant to keep their land forested. Each acre results in a payment and the covenant lasts for 8, 20, or 50 years. Many landowners who chose an 8-year covenant renew it to 50 years.

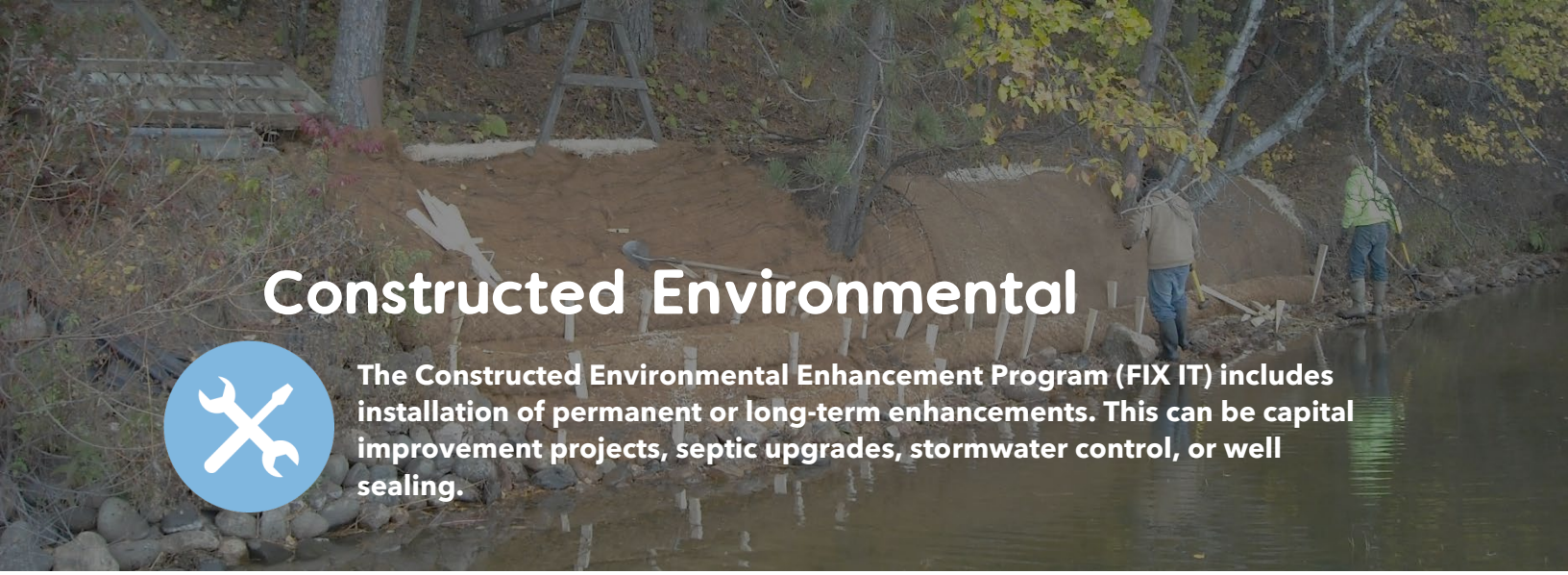
Wetlands

Wetlands are protected with a goal of no net loss by the WCA. The WCA prohibits draining, filling, or excavating wetlands unless certain conditions are met. Wetlands can be replaced through purchase of credits or creating or restoring a wetland or equivalent public value. UM-GR Counties enforce the WCA, and UM-GR SWCDs work to restore wetlands.

- *Regulations: Minnesota Rules, part 8420.0105*

Buffers

In 2015, Minnesota Buffer Law began requiring a minimum of 30 ft of vegetative buffers along public waters and 16.5 ft along public ditches. Buffer Law is regulated by BWSR and administered at the county level. Counties are responsible for buffer enforcement while SWCDs conduct compliance checks and assist landowners.



Constructed Environmental

The Constructed Environmental Enhancement Program (FIX IT) includes installation of permanent or long-term enhancements. This can be capital improvement projects, septic upgrades, stormwater control, or well sealing.

Low-interest loans

Low-interest loans are available for septic system replacement and small community wastewater treatment systems.

Cost-share

Cost-share is available for Planned Landscape Management and Constructed Environmental Enhancements. Actions that are potentially eligible for cost-share include livestock fencing, shoreline enhancements, and well sealing.

Capital Improvements

Capital Improvement Projects (CIPs) are large expensive projects and are built to last at least 25 years. They are large investments for the construction, repair, retrofit, or increased utility of infrastructure, facilities, or an environmental feature. CIPs often require feasibility studies prior to design and construction and a significant investment. They involve collaboration among public and private organizations and are often opportunities to access state or federal grant funds. Examples of CIPs in this watershed could include urban stormwater management projects and stream barrier modifications.

Operations and Maintenance

CIPs need to be maintained by the owner throughout its lifespan. The inspection, operation, and maintenance of CIPs is the responsibility of the owner to maintain its function. Operation and maintenance of CIPs, impoundments, public ditches, and natural watercourses will continue through plan implementation.

Data Collection and Outreach

Education and Outreach

Both education and outreach efforts will be essential for plan implementation. Many actions listed in each section depend on landowner participation. Implementation is voluntary, but can be encouraged through outreach efforts via social media, mailings, workshops, etc. Effective outreach efforts can be targeted to the population in relevant areas. Outreach efforts can take years to build enough trust to adopt conservation practices. Site visits, demonstrations, and technical assistance can be useful at this stage. If a landowner is on-board with plan actions, cost-share and incentives can assist in implementation.

As demonstrated in the public kick-off meeting, UM-GR residents care about the resources in their watershed. Often, the public is not aware of an issue, or is unsure how it affects them or what can be done about it. Outreach and education efforts including the following can help watershed residents improve water quality and support plan implementation.

Lakes

- Education and outreach to lakeshore landowners, realtors, contractors, and resorts on lake topics.
- Score your shore.
- Partner with lake associations, Coalition of Lake Associations (COLAs), and watershed groups.
- Expand Lakeshore Stewards Program and Lake Advisors Program.
- Explore development of an incentive program.
- Coordinate outreach between groups to gain efficiency.
- Outreach to snowmobile groups about winter stewardship.

Streams

- Create materials (mailings, social media posts) to reach out to snowmobile/ATV groups on trail crossings, and to landowners on easements and stewardship.
- River clean-ups.
- Outreach on recreational opportunities (public water access, state water trails).

Wetlands

- Educate landowners on wetland regulations (WCA) and benefits of establishing wetland banks.

Stormwater

- Outreach to residents and municipalities on stormwater impacts, yard clean-up, and salt use.

Farms

- Build relationships with farmers and encourage adoption of soil health practices through workshops and facilitated discussions.
- Support new farmers.
- Peer to peer collaboration.
- Organic farming.
- Education on backyard chickens, hobby farms, micro-farms, 4H, and farmers markets.
- Partner with University of Minnesota (UMN) Extension on ag-related outreach.
- Promote Minnesota Ag Water Quality Certification

Forests

- Provide education and outreach workshops/classes to forest landowners on invasive species and healthy and unhealthy forests, with a focus on small parcels.
- Training for service providers and realtors.
- Forest harvest BMPs.
- Explore development of a small tract parcel management program.
- Utilize United States Forest Service (USFS) North Central Forest Research Station data for outreach and local management.
- Leverage private foresters in promoting forestry programs to landowners.

Groundwater

- Educate watershed residents on septic maintenance, water softeners, and groundwater protection.

Research, Data, and Monitoring

Data collection, studies and inventories, and monitoring are essential for understanding current conditions, finding issues, and tracking action progress. Currently, water quality monitoring is done by multiple organizations (Table 10.2). Collecting data helps determine the condition of surface water, groundwater, streams, and habitat. As these are ongoing efforts, no new staff time or WBIF funds will be used for monitoring.

Table 10.2. Summary of ongoing water quality and quantity monitoring efforts. RS = rivers and streams, L = lakes, W = wetlands, GW = groundwater.

Parameters	MPCA	DNR	MDH	MDA	County & SWCD	Lake Associations & Citizens
Nutrients	**RS, L, W**	**RS, L**		**RS, GW**	**GW**	**RS, L**
Suspended Solids	**RS, L, W**	**RS**		**RS**		**RS**
Productivity	**RS, L**	**RS**				**RS, L**
Pesticides				**RS, L, W, GW**		
Bacteria	**RS, L**		**GW**			
Biology	**RS, L, W**	**RS, L**				

Parameters	MPCA	DNR	MDH	MDA	County & SWCD	Lake Associations & Citizens
Water Level/Flow	**RS, L**	**RS, L**				
Algal Toxins	**L**					
Invasive Species		**RS, L**			**L**	**RS, L**
Fish Contaminants	**RS**	**L**				
Chlorides	**RS, L, W**	**RS**	**RS, L, GW**			
Sulfates	**RS, L, W**	**RS, L**	**RS, L, GW**			

The MPCA does surface water quality monitoring on a 10-year cycle. The UM-GR will be assessed again in 2026 and the WRAPS will be updated. The Watershed Pollutant Load Monitoring Network (WPMLN) provides funding to local partners to assist with long-term intensive water quality monitoring. There are four WPLMN sites in the UM-GR. Additionally, the DNR Cooperative Stream Gaging (CSG) database is a shared collection of monitoring data with DNR, MPCA, United States Geological Survey (USGS), and the National Weather Service (NWS). Surface water monitoring sites are shown in Figure 10.2. Ongoing water quality monitoring and the updated WRAPS will be used during the midpoint evaluation to understand how plan implementation is affecting water quality.

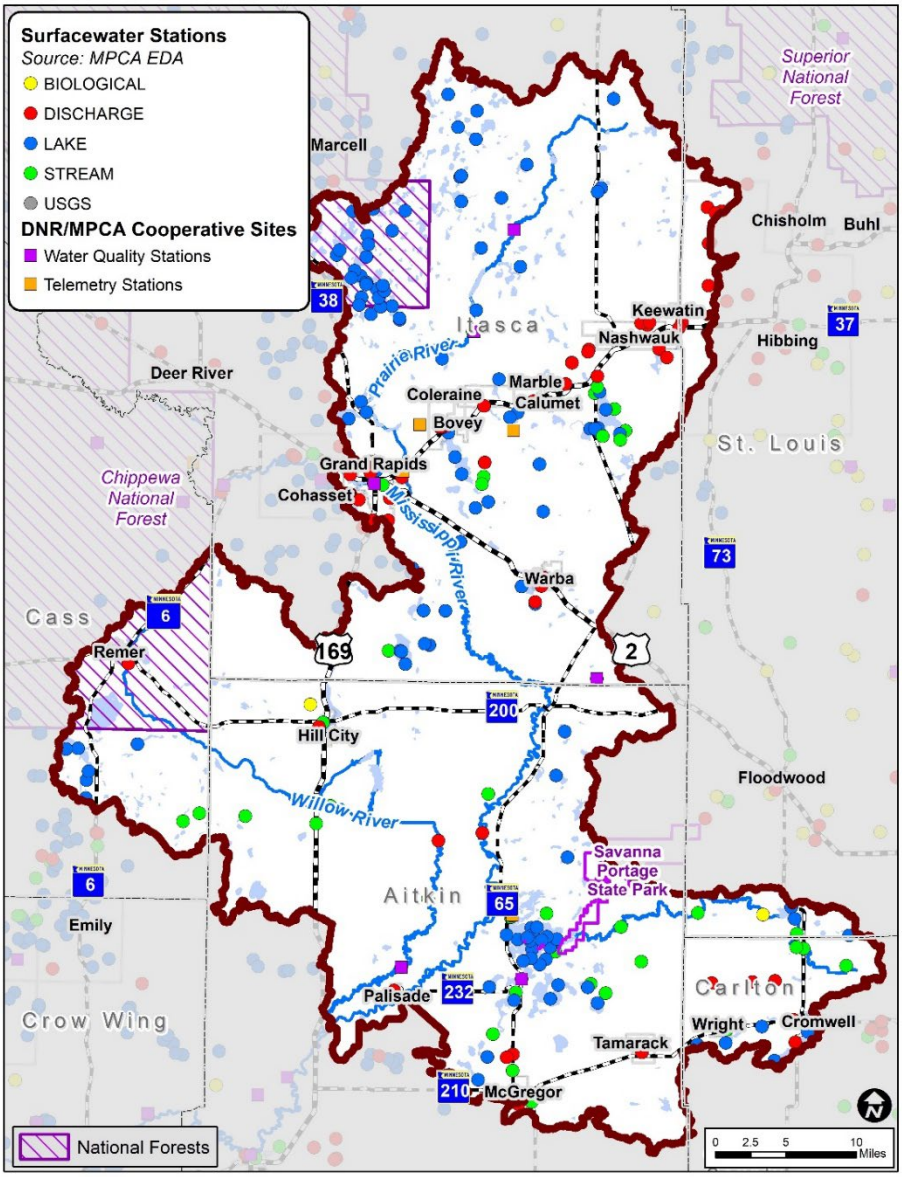


Figure 10.2. Surface water monitoring sites.

Data Gaps

The Advisory Committee brainstormed data gaps in the watershed. These are summarized by topic area below.

Lakes

- Lake-wide septic surveys.
- Impervious Surface Maps.
- Drone surveys of shoreline.
- LiDAR comparisons.
- Compare historical imagery to current.
- Public access surveys.
- Inventory small public access parcels on lakes.

Streams

- Identify erosion-prone areas using drones or LiDAR.
- Compare historical imagery to current.
- Stream and ditch corridor study for potential restoration sites.
- Culvert inventory, specifically in Itasca, Carlton, and Cass Counties.

Wetlands

- Evaluate potential locations for water storage and peatland restoration projects.
- Compare historical imagery to current.

Farms

- Microbial Source Tracking for bacteria.
- Conduct windshield survey to identify manure issues.
- Ground-truth *E. coli* sources.
- Identify barriers to adoption of conservation practices.

Forests

- Use drones to survey forest health and identify project opportunities, LiDAR, and historical imagery.

Stormwater

- Inventory ditches and ephemeral streams that are unregulated for stormwater events and have erosion from stream or ditch banks.

Groundwater

- Increase private well testing through education on the availability of testing and the guidelines for testing for hardness, arsenic, nitrate, and bacteria.
- Complete groundwater atlas for Itasca County and education on its watershed-wide use.

Achieving Plan Goals

Work done through plan programs is meant to improve plan issues and make progress towards short-term goals. Tracking progress is an important part of implementation to ensure work is targeted to priority areas and addressing goals. Progress can be assessed through tracking actions, reflecting, and evaluating success of work done, as well as sharing progress (Table 10.3)

Table 10.3. Ways to achieve plan goals in plan implementation.

Level	Description	UM-GR Application
Tracking	Number of practices installed, acres covered, number of landowners contacted, feet of shoreline	Projects will be tracked and reported in eLINK.
Reflecting	Compare work completed to work planned in implementation schedules	Outputs are listed for each action in Implementation Schedules
Evaluating	Compare what has been achieved with the short-term goals. Use new monitoring data to inform progress and issues.	MPCA WRAPS second cycle will evaluate surface water conditions of the UM-GR in 2026.
Sharing	Maintain support for plan implementation through sharing progress	Midpoint evaluation will occur in 2029-2030

Shoreline restoration project
Credit: Carlton SWCD

Environmental Justice

The MPCA has developed a statewide map showing areas of concern related to environmental justice. It shows where there is a large portion of the population living in poverty, tribal nations, or a where 50% of the population are people of color. About a third of the UM-GR has at least 40% of the population living below 185% of the federal poverty level. The area around Big Sandy Lake is identified as an MPCA environmental justice area due to the presence of the tribal areas (Figure 10.3). Knowledge of environmental justice areas helps plan partners best implement the watershed plan with equity for all.

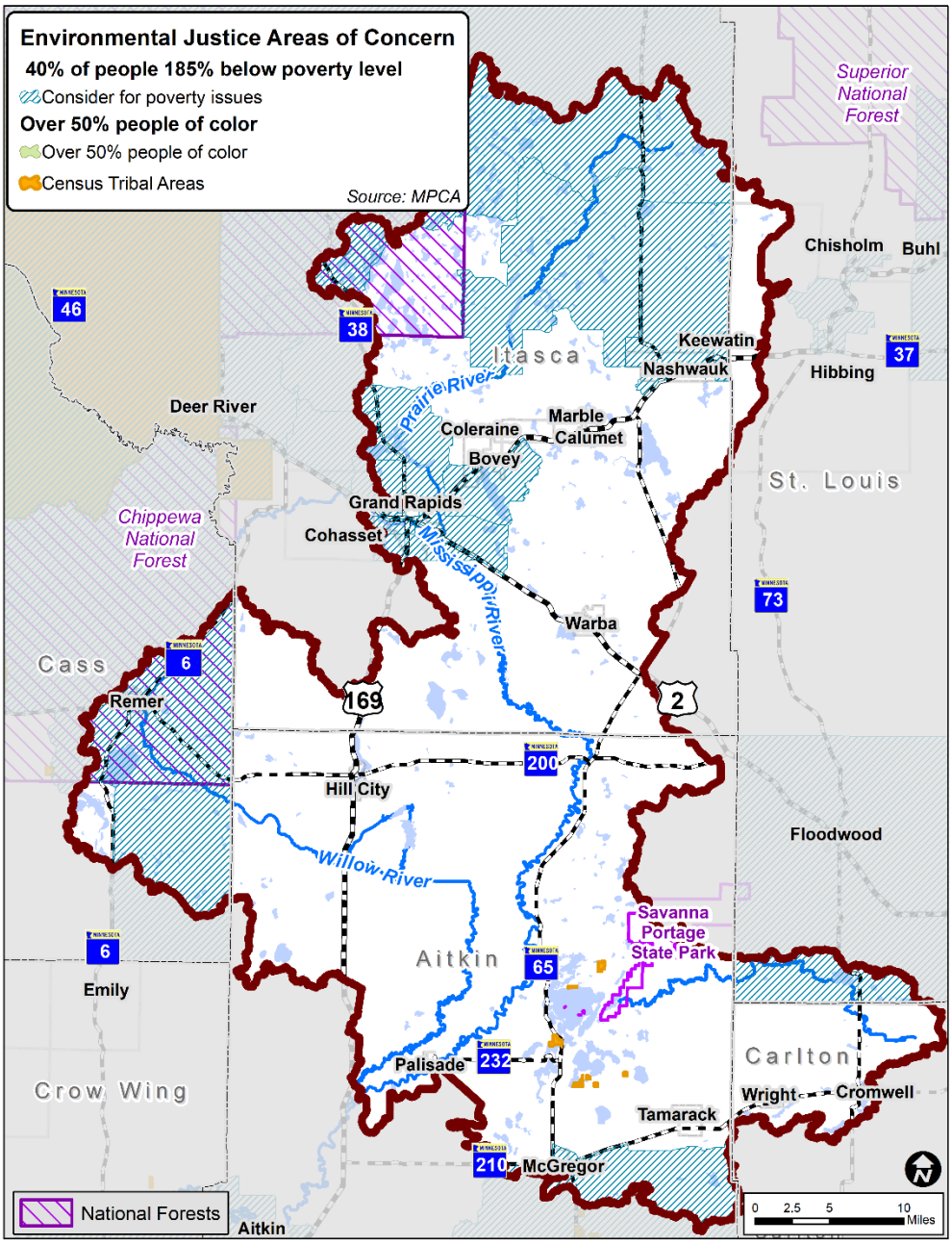


Figure 10.3. Environmental Justice areas in the UM-GR

PLAN ADMIN

SECTION 11.
PLAN ADMINISTRATION

Introduction

The UM-GR Watershed spans five counties in Minnesota: Cass, Aitkin, Itasca, Carlton, and St. Louis (Figure 11.1). This Plan Administration section describes how the plan will be implemented, how the Watershed's partners will work together, how the funding will move between them, and who will handle the administrative duties.

The CWMP will be implemented through an agreement between the eligible parties within the watershed, which may include counties, townships, SWCDs, municipalities, and Tribal governments. Refinements to the implementation agreement will be determined after the plan is approved.

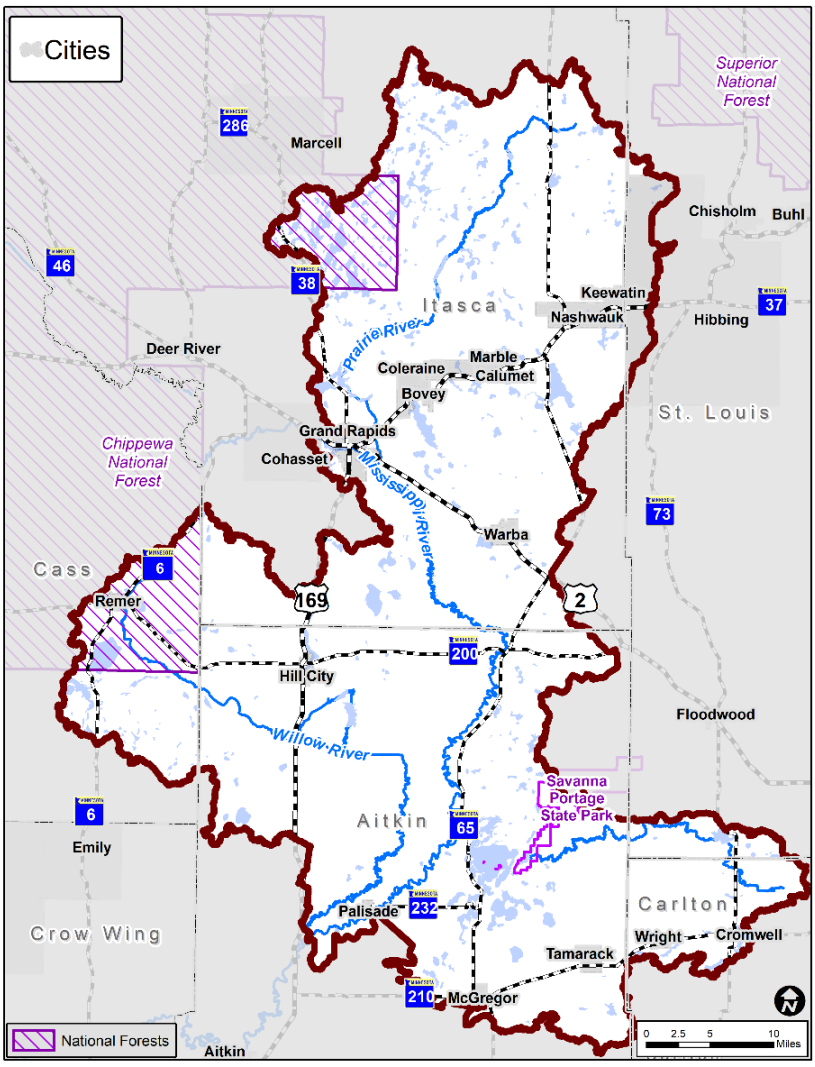


Figure 11.1. Map of county and city jurisdiction in the Watershed.

Decision-Making and Staffing

Implementation of the CWMP will require increased capacity of plan partners, including increased staffing, funding, and coordination from current levels. Successful plan implementation will depend on generating active interest and partnerships within the watershed.

The decision-making and staffing for implementing the CWMP will be conducted based on the concepts outlined in this section of the plan. Presented below are the probable roles and functions related to plan implementation (Table 11.1). Expectations are that the roles of each committee will shift and change during implementation to best meet the needs of the planning partners. Fiscal and administrative duties for plan implementation will be assigned to an LGU through a Policy Committee decision as outlined in the formal agreement. Responsibilities for work planning and serving as the central fiscal agent will be revisited by the Policy Committee on a biennial basis.

Table 11.1. Roles of the CWMP's implementation.

Committee Name	Description	Primary Implementation Role and Functions
Policy Committee	One board member from each JPA entity.	❖ Meet once a year or as needed. ❖ Recommend approval of the biennial work plan by the individual boards of the JPA members. ❖ Review and confirmation of Advisory Committee recommendations. ❖ Review the implementation funds from plan participants to assess implementation progress.
Local Fiscal and Administrative Agent	One of the participating LGUs as decided on by the Policy Committee.	❖ Convene committee meetings. ❖ Prepare and submit grant applications/funding requests. ❖ Research opportunities for collaborative grants. ❖ Report on how funds were used. ❖ Compile results for annual assessment.
Steering Committee	A representative from the staff of each JPA entity and local BWSR Board Conservationist.	❖ Review the status of available implementation funds from plan participants. ❖ Prepare the biennial work plan. ❖ Review opportunities for collaborative grants. ❖ Review annual fiscal reports. ❖ Review annual reports submitted to BWSR. ❖ Prepare plan amendments. ❖ Implement the targeted implementation schedule. ❖ Makes recommendations to the Policy Committee on the biennial work plan.
Advisory Committee	A committee of local stakeholders and state agency representatives appointed by the Policy Committee. Includes Steering Committee members.	❖ Meet once a year or as needed. ❖ Review and provide input for the biennial work plan. ❖ Review and identify collaborative funding opportunities. ❖ Recommendations to Steering Committee on program adjustments. ❖ Assist with execution of the targeted implementation schedule.

Collaboration

Watershed Planning Partners Collaboration

The CWMP's Steering Committee and Policy Committee acknowledge the value of collaboration between planning partners to achieve successful plan implementation. Benefits of successful collaboration include consistent implementation of actions watershed-wide, increased likelihood of funding, and resource efficiencies gained. There is already some collaboration in the watershed (Figure 11.2).

Where possible and feasible, the CWMP's Steering Committee will pursue opportunities for collaboration with fellow planning members to gain program efficiencies, pursue collaborative grants, and provide technical assistance. The CWMP's Steering Committee and Policy Committee will also review similarities and differences in local regulatory administration to identify local successes and identify changes needed in the future to make progress towards goals outlined in this plan.

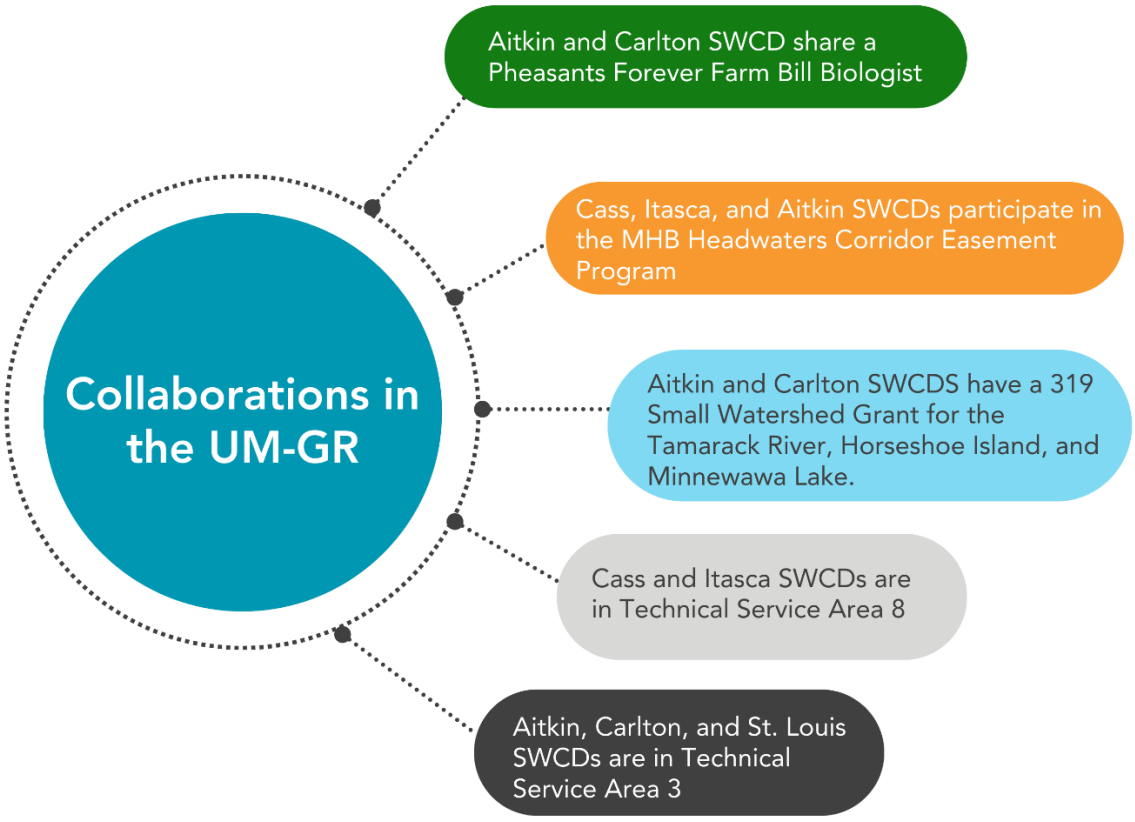


Figure 11.2. Collaborations in the UM-GR.

Collaboration with Other Units of Government

The CWMP's Steering Committee will continue to coordinate and cooperate with other governmental units at all levels. Implementation of the stormwater actions will involve coordinating meetings with municipalities and counties. Coordination with state agencies including BWSR, DNR, MDH, MDA, and the MPCA, will continue as they are experts in many of the topic areas included in this plan, have been participating members of the planning Advisory Committee, and will be members of the implementation Advisory Committee. Cooperation with units of government such as NRCS, municipalities, city councils, township boards, county boards, joint powers boards, and other water management authorities are a practical necessity to facilitate watershed-wide activities. Examples of collaborative programs in the watershed include Environmental Quality Incentives Program (EQIP) (NRCS), CRP (FSA), MAWQCP (MDA), wellhead protection for city DWSMAs (Minnesota Rural Water Association and MDH), Minnesota Forest Resource Council, and WRAPS (MPCA). In addition, many planning efforts related to the Watershed are ongoing through multiple agencies.

CWMP implementation actions and goals were developed through a collaborative process. Some agency goals, objectives, directions, and strategies for resource management within the plan area have not been selected as priority issues. The responsibility for achieving the goals associated with lower priority tier issues remains with the respective agency or organization.

Collaboration with Others

Local support and partnerships will drive the success of final outcomes of the actions prescribed for implementing this plan. Because this plan's focus is voluntary land stewardship practices, collaborations with landowners in the Watershed is of paramount importance. There are many actions in the plan that describe working with individual landowners on personalized forest management plans and providing cost share and technical assistance for implementing agricultural BMPs. Many of the existing collaborations in the Watershed have been involved in the development of this plan and are committed to protecting and enhancing the Watershed's resources. Partners for these collaborations include, but are not limited to 1854 Treaty Authority, American Bird Conservancy, Mille Lacs Band of Ojibwe, Pheasants Forever, Trout Unlimited, UMN Extension, civic groups, individuals, foundations, lake associations, and private businesses. The CWMP's Steering Committee collaborates with these groups for education, outreach, monitoring, and project implementation.

South Island Lake, credit: Carlton SWCD

Funding

The current funding level (baseline) is based on the annual revenue and expenditures for the following counties and SWCDs: Aitkin, Carlton, Cass, and Itasca (Table 11.2). The current level of investment by each local government unit is assumed to remain the same during the CWMP's 10-year time. The current expenditure includes all the state program and conservation delivery grants, including the Natural Resources Block Grant and SWCD Local Capacity Building Grants.

Table 11.2. Baseline funding for the UM-GR.

Funding Level	Annual Local Estimate	Annual State Estimate	Annual Federal Estimate	Annual Total
Baseline	$440,000	$280,000	$0	$720,000

Current programs and funding will not be enough to accomplish all the actions planned in the targeted implementation schedule. BWSR provides non-competitive WBIF with this CWMP from the Clean Water Land and Legacy Amendment. This is estimated to be $1,324,120 per biennium based on the 2024-2025 allocation. This plan will operate using baseline + WBIF funds, with additional partnering/grants set aside as 'Other'.

The success of plan implementation will hinge on reliable non-competitive WBIF being available for plan implementation in addition to competitive state, federal, and private grant dollars. The CWMP's Steering Committee and Policy Committee acknowledge that additional staffing may be necessary to meet plan goals. Because implementation is occurring under a JPA, staff will be hired by existing local government units in the watershed.

Table 11.3. Annual and 10-year funding summary.

Funding Level	Estimated Annual Average	Estimated Plan Total (10-year)
Funding needed to fully implement this plan *Baseline funding=$720,000/year* *2025-2026 WBIF Allocation=$662,000/year* *Additional needed=$511,400/year*	**$1,893,000**	**$18,930,000**
Other *Partners and other agencies, including NRCS, USFWS, USFS, SFIA, LSOHF, MHB, DNR, MPCA, etc.*	$1,485,237	$14,852,371

The total funding can also be broken out by topic area (Figure 11.3). Actions in the Lakes, Stormwater, and Farms topic sections will have the largest amount of WBIF funding directed to them. The CWMP's Steering Committee will pursue funding opportunities collaboratively to implement the activities prescribed in the targeted implementation schedule for each topic area.

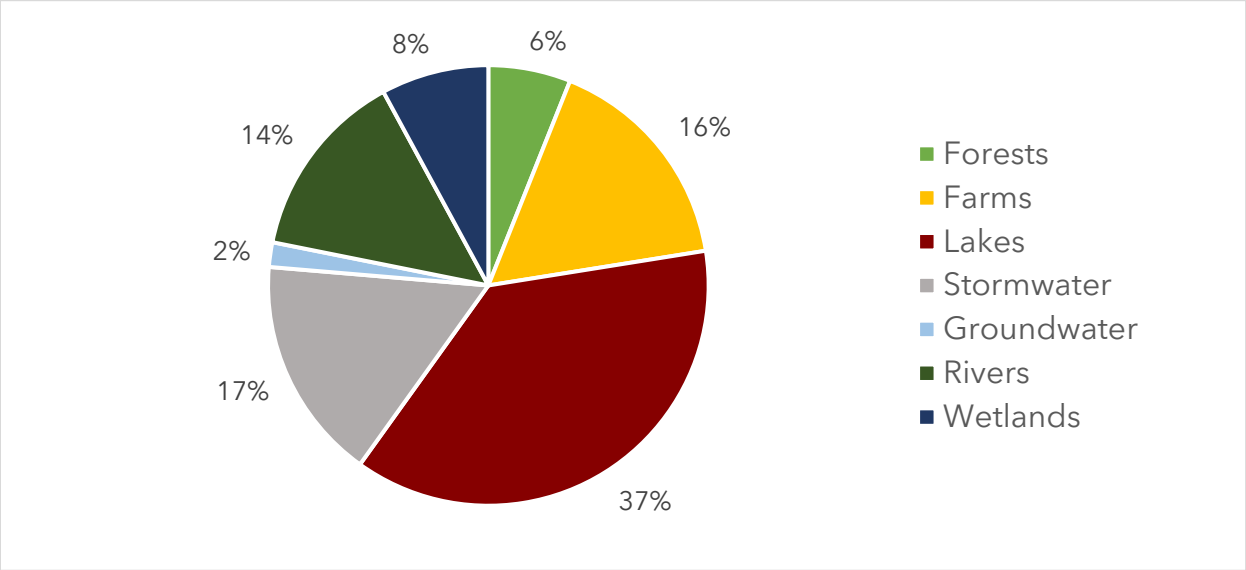


Figure 11.3. Baseline + WBIF funding by topic area.

Local Funding

Funding derived from either the local property tax base or in-kind services of any personnel funded from the local tax base is local revenue. Local funding excludes general operating funds obtained from BWSR, fees for service and grants, or partnership agreements with the federal government or other conservation organizations.

Local funds will be used for locally focused programs where opportunities for state and federal funding are lacking because of misalignment of a program's purpose with state or federal objectives. These funds will also be used for matching grants where statutory authority already exists. Some examples include:

- **Water Planning Authority for Special Projects (Minnesota Statute 103B.355):** Counties have the authority to levy funds for priority projects and assist SWCDs with program implementation.
- **Road Authorities:** Counties can provide limited local funding to assist with the local share of road-stream interface and some floodwater-retention projects.
- **Drainage System Costs (Minnesota Statute 103E):** There are no 103E drainage ditch systems in the watershed.

State Funding

Leadership from the state agencies that are tasked with protection and restoration of Minnesota's water resources came together and agreed on a set of high-level state priorities that align their programs and activities working to reduce nonpoint source pollution. The resulting Nonpoint Priority Funding Plan outlines a criteria-based process to prioritize Clean Water Fund investments. These high-level state priority criteria include:

- restoring those waters that are closest to meeting state water quality standards;
- protecting those high-quality unimpaired waters at the greatest risk of becoming impaired; and

- restoring and protecting water resources for public use and public health, including drinking water.

State funding includes funds derived from the state tax base for state cost-share and regulatory purposes. State funding excludes general operating funds obtained from BWSR, counties, fees for service and grants, or partnership agreements with the federal government or other conservation organizations.

Collaborative Grants

The fiscal agent will apply for collaborative grants on behalf of the CWMP's Policy Committee, which may be competitive or non-competitive. The assumption is that future base support for implementation will be provided to the CWMP as one or more non-competitive WBIF allocations. Where the purpose of an initiative aligns with the objectives of various state, local, non-profit, or private programs, these dollars will be used to help fund the implementation programs described by this plan. Funding sources that are currently available at the time of developing this plan are listed in Table 11.4.

Federal Funding

Federal funding includes all funds derived from the federal tax base. This includes programs such as EQIP administered by NRCS and road project funds through the Federal Highway Administration (FHWA). 319 grant funding is an additional source of federal funding that is sought for UM-GR Watershed projects. Federal funding does not include general operating funds obtained from BWSR, counties, fees for services and grants or partnership agreements with state government or other conservation organizations.

Federal agencies can be engaged following the approval of this plan and prior to implementation, to create an avenue to access federal resources for implementation. Opportunity may exist to leverage state dollars through some form of federal cost-share program. Where the purpose of an implementation program aligns with the objectives of various federal agencies, federal dollars will be used to help fund the implementation programs described by this plan. For example, the NRCS will likely provide support for agricultural BMPs, while the FSA may provide land-retirement program funds such as CRP (Table 11.4).

Other Funding Sources

Foundations, nonprofit organizations, and private contributions (including landowners and corporate entities) will be sought for plan implementation activities. Local foundations may fund education, civic engagement, and other local priority efforts. Several conservation organizations are active in the Watershed, such as TNC, Trout Unlimited, MN Deer Hunters Association, Pheasants Forever, and National Wild Turkey Federation. These organizations acquire funding of their own and may have project dollars and technical assistance that can be leveraged. Major cooperators and funding sources are private landowners who typically contribute 25% of project costs and many donate land, services, or equipment for projects or programs.

Table 11.4. Funding sources available for implementing the CWMP.

Source	Organ-ization	Program/Fund Name	Type of Assistance	Form of Assistance				
State Funding	BWSR	Clean Water Fund	Financial	Grant	●	●	●	●
	BWSR	RIM	Financial	Easement				
	BWSR	Natural Resources Block Grant	Financial	Grant	●	●		
	BWSR	SWCD Local Capacity Service Grants	Financial	Grant	●	●	●	●
	BWSR	Erosion Control & Mgmt Program	Financial	Grant	●	●		●
	DNR	Conservation Partners Legacy	Financial	Grant	●		●	
	DNR	AIS Control	Financial/ Technical	Grant		●		●
	DNR	Woodland Stewardship Program	Financial/ Technical	Cost Share	●			
	DNR	AMA, WMA	Financial	Fee Title Acquisition			●	
	DNR/Dept. Revenue	SFIA	Financial	Incentive payment			●	
	MPCA	Clean Water Partnership	Financial	Grant	●			
	MPCA	State-Revolving Fund	Financial	Grant	●			
	MPCA	Surface Water Assessment Grant	Financial	Grant				●
	MDH	Source Water Protection Grant	Financial	Grant	●	●	●	
	MDA	Nitrate Testing	Technical	Monitoring				●
	MDA	Agricultural BMP Loan Program	Financial	Loan	●	●		
	MDA	MAWQC Program Cost Share	Financial	Cost Share	●			
	LSOHC	Outdoor Heritage Funds	Financial	Grant			●	
	LCCMR	Environmental Trust Fund	Financial	Grant	●		●	
	Legislature	Bonding	Financial	Bond	●			
	MN DOT	County State Aid Highway	Financial	Allocation	●			
	MN DOT	Township Bridge Funds	Financial	Allocation	●			
Federal Funding	FSA	CRP	Financial	Cost Share		●	●	
	FSA	Grassland Reserve Program	Financial	Cost Share	●			
	FHWA	Emergency Relief Program, Federal aid	Financial	Allocation	●			
	NRCS	Conservation Innovation Grant	Financial	Grant	●			
	NRCS	EQIP	Financial	Cost Share	●	●		
	USGS	Stream Gaging Network	Technical	Monitoring				●
	USACE	Planning Assistance	Technical	Planning		●		
	EPA	319 Small Watershed Program	Financial	Grant	●			
	EPA	State Revolving Fund	Financial	Loan	●			
Other	Trout Unlimited		Financial/ Technical	Easement/Cost Share	●			
	TNC		Financial	Easement	●			
	Minnesota Land Trust		Financial	Easement	●			
	Township		Financial	Allocation	●			

Work Planning

This plan envisions collaborative implementation. Biennial work planning will be completed to align the priority issues addressed, the availability of funds, and the roles and responsibilities for implementation. Work planning covers all actions in the plan, not just those using WBIF funds.

Local Work Plan

The CWMP's Steering Committee will be responsible for completing a biennial work plan based on the targeted implementation schedule. Adjustments to the biennial work plan will be made through self-assessments. Local boards will approve the budget. Then the biennial work plan will be presented to the Policy Committee, who is ultimately responsible for its approval. The purpose of these biennial work plans is to obtain BWSR watershed-based implementation funding, maintain collaborative progress towards completing the targeted implementation schedule and reaching the outcomes prescribed in the plan.

Funding Request

The CWMP's Steering Committee will collaboratively develop, review, and submit a watershed-based funding request to the Policy Committee from this plan. This request will be approved by the JPA partners prior to submittal to BWSR. The watershed-based funding request will be developed based on the first biennium priority projects outlined in the targeted implementation schedule and any adjustments made through self-assessments.

Assessment, Evaluation, and Reporting

Accomplishment Assessment

The Steering Committee will provide the Policy Committee with an annual update on the progress of the plan's implementation. For example, any culverts replaced will be tracked so that each year the Steering Committee will report how many additional stream miles were connected in the Watershed. A tracking system will be used to measure progress and will serve as a platform for plan constituents and the public. Tracking these metrics will also make them available for supporting future work plan development, progress evaluation, and reporting.

Partnership Assessment

Biennially, the Steering Committee will review the CWMP's goals and progress toward implementation, including fulfillment of committee purposes and roles, efficiencies in service delivery, collaboration with other units of government, success in securing funding, and progress on implementing plan activities. During this review process, feedback will be solicited from the boards, Policy Committee, Advisory Committee, and partners such as state agencies and non-governmental organizations. This feedback will be presented to the Policy Committee to set the coming biennium's priorities for achieving the plan's goals and to

decide on the direction for grant submittals. Also, this feedback will be documented and incorporated into the midpoint evaluation.

Midpoint Evaluation

Beginning in 2025, this plan will be in effect for ten years. Over the course of the plan's life cycle, progress toward reaching goals and completing the implementation schedule may vary. New issues may emerge as the plan progresses, and/or new monitoring data, models, or research may become available. Therefore, in 2029-2030, a midpoint evaluation will be undertaken, as per the BWSR order approving it, to determine if the current course of actions is sufficient to reach the goals of the plan, or if a change in the course of actions is necessary. At the 10-year mark, and every midpoint after, the plan will be fully re-evaluated.

Reporting

LGUs have several annual reporting requirements. Some of these reporting requirements will remain a responsibility of the LGUs. Reporting related to grants and programs developed collaboratively and administered under this plan will be reported by the plan's fiscal agent (Table 11.1). In addition to annual reporting, the CWMP's Steering Committee will also develop a biennial State of the Watershed Report to present to the Policy Committee. This report will document progress toward reaching goals and completing the targeted implementation schedule and will describe any new emerging issues of priorities. The information needed to biennially update the State of the Watershed Report will be developed through the annual evaluation process.

The fiscal agent is responsible for submitting all required reports and completing annual reporting requirements for the CWMP as required by state law and policy. The Steering Committee will assist in developing the required reports and roles and responsibilities will be defined in the JPA bylaws.

Plan Amendments

The CWMP is effective through 2035 per the BWSR order approving it. Activities described in this plan are voluntary, not prescriptive, and are meant to allow flexibility in implementation. Amendments to this Plan will follow the most current BWSR 1W1P Operating Procedures. This provision for flexibility includes changes to the activities.

During the time this plan is in effect, it is likely that new data giving a better understanding of watershed issues and solutions will be generated. Administrative authorities, state policies, and resource concerns may also change. New information, significant changes to the projects, programs, or funding in the plan, or the potential impact of emerging concerns and issues may require activities to be added to the plan. If revisions are required or requested, the Policy Committee will initiate a plan amendment process following their JPA bylaws.

Formal Agreements

The CWMP's Policy Committee is a coalition of Aitkin County, Aitkin SWCD, Carlton County, Carlton SWCD, Cass SWCD, Itasca County, Itasca SWCD, Mille Lacs Band of Ojibwe, and Salo Township (Figure 11.4). The Policy Committee previously entered into a MOA for planning the 1W1P for the Watershed (see Appendix F). The entities, along with any additional eligible entities, will draft an agreement for purposes of implementing this plan. Implementation will occur through a JPA.

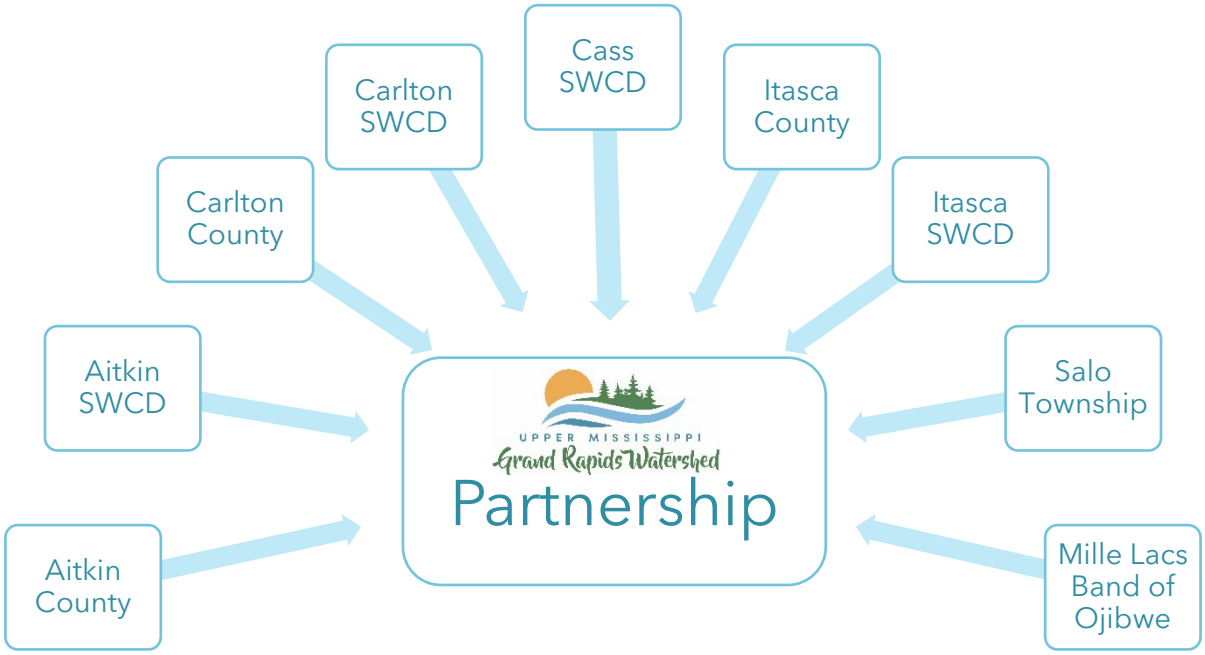


Figure 11.4. Planning and implementation partnership.