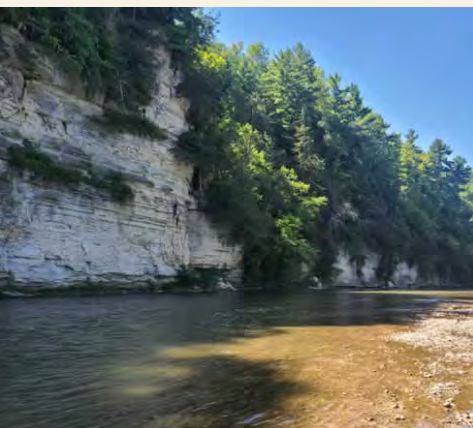
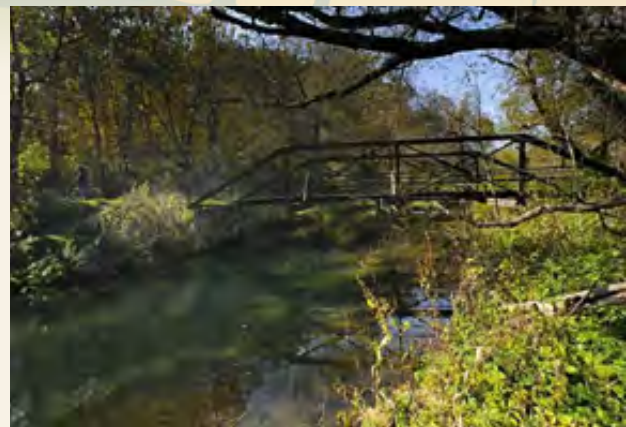
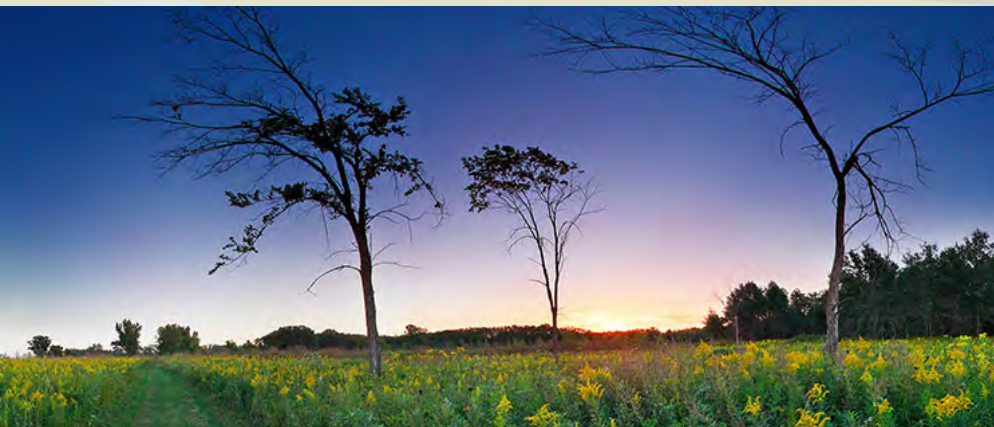




Root River Watershed Comprehensive Watershed Management Plan

For BWSR Approval: September 2026



Plan Acknowledgements

Local Planning Partnership

Dodge County and SWCD

Fillmore County and SWCD

Olmstead County and SWCD

Mower County and SWCD

Winona County and SWCD

Root River SWCD

Crooked Creek Watershed

Houston County



Advisory Committee

MN Dept of Health

MN Dept of Ag

MN Pollution Control Agency

MN Dept Natural Resources

MN Board of Water and Soil Resources

The Nature Conservancy

Trout Unlimited

Pheasants Forever

Houston County

Fillmore County Public Health

Friends of the Root River

Dodge County Environmental Services

MN Agricultural Water Resource Center

SWCD Technical Service Area 7

Ho-Chunk Nation

Niagara Cave

Land Stewardship Project

Root River Local Forestry Team

Local Landowners

U of M Extension

Southeast Regional Landscape Committee of

MN Forest Resources Council

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Acronyms

1W1P	One Watershed, One Plan
AC	Advisory Committee
ACEP	Agricultural Conservation Easement Program
AIS	Aquatic Invasive Species
AMA	Aquatic Management Area
BPA	Bisphenol A
BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
CECs	Contaminants of Emerging Concern
CIG	Conservation Innovation Grant
CIP	Capital Improvement Project
CRP	Conservation Reserve Program
CSP	Conservation Stewardship Program
CWMP	Comprehensive Watershed Management Plan
DNR	Minnesota Department of Natural Resources
DWSMA	Drinking Water Supply Management Area
DWSRF	Drinking Water State Revolving Fund
E. coli	Escherichia coli
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FMA	Flood Migration Assistance
FSA	Farm Service Agency
FWP	Farmable Wetlands Program
GRP	Grassland Reserve Program
HMGP	Hazard Mitigation Grant Program
HSPF	Hydrologic Simulation Program FORTTRAN
HUC	Hydrologic Unit Codes
LFT	Local Forestry Team
LGU	Local Government Unit
LSOHF	Lessard-Sams Outdoor Heritage Fund
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MnDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
NMI	Nutrient Management Initiative
NOAA	National Ocean and Atmospheric Agency
NPDES	National Pollutant Discharge Elimination System





NRBG	Natural Resources Block Grant
NRCS	Natural Resources Conservation Service
NRS	Nutrient Reduction Strategy
OHF	Outdoor Heritage Fund
PC	Policy Committee
PDM	Pre-Disaster Mitigation
PFAS	Per- and Polyfluoroalkyl Substances
PHIP	Pheasant Habitat Improvement Program
PTMApp	Prioritize, Target, and Measure Application
PWG	Planning Work Group
RCPP	Regional Conservation Partnership Program
RRFSP	Root River Field to Stream Partnership
RRW	Root River Watershed
RIM	Reinvest in Minnesota
SELC	Southeast Landscape Committee
SNA	Scientific and Natural Areas
SRF	State Revolving Fund
SSTS	Subsurface Sewage Treatment System
SWAG	Surface Water Assessment Grants
SWCD	Soil and Water Conservation District
SWPP	Source Water Protection Program
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
USFWS	United States Fish and Wildlife Service
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WBIF	Watershed-Based Implementation Funding
WCA	Wetland Conservation Act
WMA	Wildlife Management Areas
WPLMN	Watershed Pollutant Load Monitoring Network
WRAPS	Watershed Restoration and Protection Strategy
WRP	Wetland Reserve Program





Glossary

Key technical and plan terms

Acre-Feet	A measurement of water storage; volume of water needed to cover one acre of land one foot deep in water.
Altered Hydrology	A substantial shift in the local water cycle involving multiple factors such as precipitation, flow volume, flow timing, groundwater input, etc.
CEC	Chemicals prevalent in industry and daily life with possible health and environmental impacts.
CO ₂ -e	Carbon dioxide equivalent. A measure of the cumulative impact of greenhouse gases standardized in terms of the warming potential of carbon dioxide.
Decorah Shale	A thin, clay-rich rock unit that restricts the vertical movement of groundwater in the subsurface. A wetland-woodland ecosystem may be on the surface.
DWSMA	Area on the surface around a public water system.
Easement	A voluntary legal agreement between a landowner and an agency or conservation organization that restricts land activity to protect it.
Environmental justice	The principle that all people have an equal right to healthy air, clean water, and recreational land access.
Feedlots	A confined area for feeding and raising animals.
Glacial till	Dense clay and boulder material deposited in the last glaciation. Present in western extents of the Root River Watershed.
Groundwater / Surface water interaction	Mixing of groundwater and surface water. Typically discussed in terms of risk of surface water introducing contaminants to groundwater.
Headwaters	The beginning of a river.





HUC	Hydrologic Unit Code, indicates scale of watersheds.
Impairment	Surface water not meeting water quality standards for its designated use, as determined by MPCA monitoring.
Infiltration	Process through which water moves from the surface through subsurface soil and rock.
Karst geology	Land with soluble rock that erodes, creating sinkholes, underground streams, caverns.
Leaching	Process of substances moving through soil with water and into groundwater supplies.
Opportunity	An area to improve resource condition(s).
Pathogens	A bacteria or virus that causes disease.
PFAS	Per- and polyfluoroalkyl substances are a group of synthetic chemicals with thousands of household and industrial uses. They have been found throughout the environment and increasing concern is being brought to the potential for health and environmental impacts.
Pollution sensitivity	Areas are assigned a sensitivity to pollution based on the travel time for surface contaminants to travel to a depth of 10 feet. Quicker travel time results in greater sensitivity to pollution.
Recharge	The hydrologic process where surface water resupplies groundwater aquifers through infiltration.
Residence time	Age of groundwater.
Water storage	Surface water that is stored in the landscape, whether in the soil, vegetation, wetlands, impoundments, or stormwater basins. Historic water storage has been lost through drainage of wetlands and land use changes.
Watershed	The area draining to an outlet point of a stream network. Watersheds can occur at different scales, with the smallest drainage areas referred to as catchments. Watersheds have USGS hydrologic unit codes (HUC) from 2 to 12 digits indicating their scale and identity. There are 81 major





watersheds at the HUC-8 scale in Minnesota, including the Root River Watershed.

Wisconsinan Glaciation

The most recent glacial period, which formed the landscape we see today.

Septic Systems

Subsurface sewage treatment systems (SSTS) are septic tanks that store and treat wastewater from individual sites.





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Section 1.

Executive Summary





1. Executive Summary

This Comprehensive Watershed Management Plan (CWMP) presents a roadmap for holistic natural resource implementation efforts within the Root River Watershed (RRW) from 2027 through 2037. This is the second generation of the RRW CWMP. The first plan, active 2015 through 2025, was a pilot plan in the Board of Water and Soil Resources (BWSR) One Watershed, One Plan Program (1W1P).

This CWMP brings local government units together to work towards shared goals and actions in the watershed (Appendix A). Specifically, this CWMP is implemented by the following planning partners:

- Dodge County
- Dodge SWCD
- Fillmore County
- Fillmore SWCD
- Houston County
- Root River SWCD
- Crooked Creek Watershed District
- Mower County
- Mower SWCD
- Olmsted County
- Olmsted SWCD
- Winona County
- Winona County SWCD



Root; River, Lanesboro Chamber of Commerce





The Root River Watershed

The RRW is located within the Driftless Region, a region untouched by the latest Wisconsin Age glaciation. The lack of glaciation results in a porous landscape dotted with disappearing streams, springs, and sinkholes, creating direct connections between surface and groundwater resources. This sets the stage for unique challenges for resource management, but is also the reason for the watershed's rich wildlife habitat, scenic bluff lands, and coldwater trout streams.

The North and South Branches of the Root River begin in the western portion of the watershed, characterized by agriculture and glacial till soils. The Root River meanders through farmland in the west, karst geology and the Decorah shale in the center of the watershed, and into wooded karst bluffs along the Mississippi River.

Section 2 — Land and Water Resources Narrative describes watershed resources, including land use, surface water, groundwater, habitat, climate, and demographics.

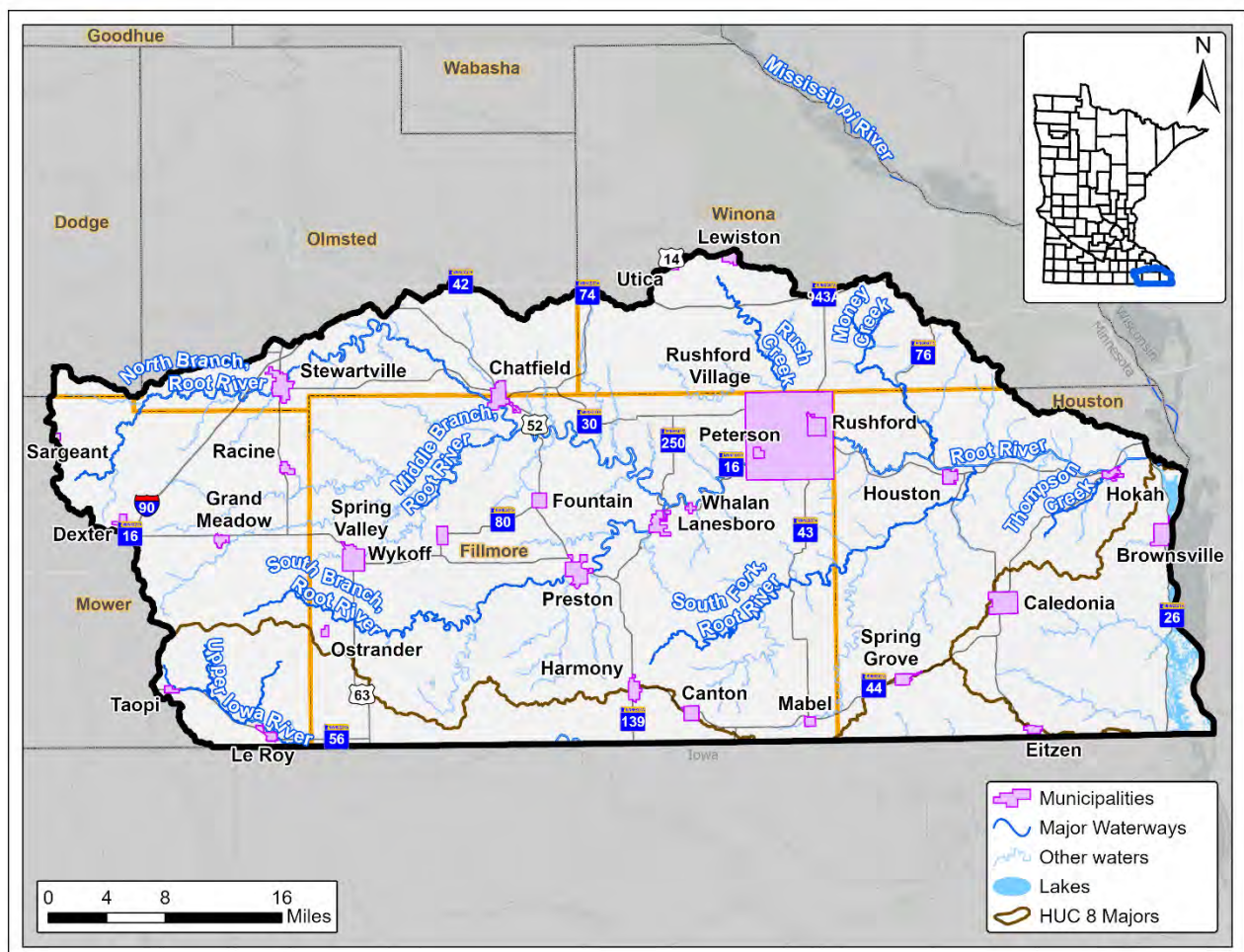


Figure ES-1. Root River Watershed





Resource Management Opportunities

In such a large and diverse watershed rich with natural features, there are many resources that need managing. This plan reframes “issues” that may impact natural resources to be addressed as “opportunities” for better improving or managing resource conditions.

Section 3—Watershed Opportunities summarizes priority opportunities to protect, restore, and improve resources within the Root River Watershed.

This planning process used a combination of planning committee knowledge, priority concern letters from federal and state agencies, existing water plans and reports, and priority issues from the 2016 Root River CWMP to develop a list of potential management opportunities for the watershed (Figure ES-2). These opportunities were evaluated and summarized by local staff to best capture the needs of the watershed and build on the work that has already been done during the lifespan of the initial 2016 Root River CWMP.

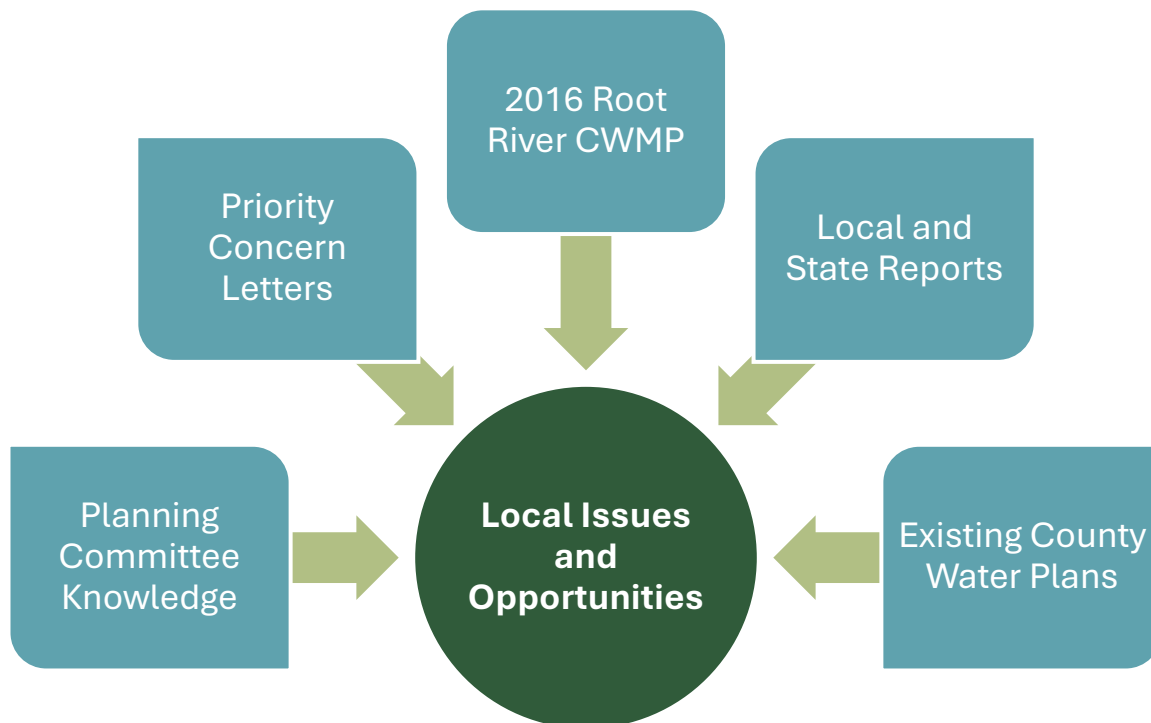


Figure ES-2. Input into developing opportunities





Priority opportunities are assigned as either Priority A (highest) or Priority B. Priority A opportunities are the focus of this CWMP, but opportunities within both priority levels are addressed via goals and actions in the plan.

Six Priority A opportunities are identified and are the primary focus of staff and financial resources during implementation:

- Groundwater Contamination
- Groundwater/ Surface Water Interaction
- Nutrient Management
- Erosion and Sedimentation
- Altered Hydrology and Water Storage
- Soil Health

Four Priority B opportunities are identified. They are important, but have less focus than Priority A issues:

- Bacteria Management
- Pesticide Management
- Channel Erosion
- Habitat Management, Protection and Restoration



Root River, Lanesboro Chamber of Commerce

Planning Lenses

Four planning lenses were identified to consider during plan goal and action development. They are crucial to the RRW and watershed planning, and impact nearly every other priority opportunity characterized.

- Karst Features
- Trout Streams
- Environmental Justice
- Resiliency





Measurable Goals

Goal-setting is an important step in watershed planning for identifying measurable metrics that are ambitious yet achievable to address priority opportunities. For purposes of this plan, both short-term (10-year, Table ES-1) and long-term (desired future condition) goals are set.

10-Year Goals

Short-term goals must have a measurable component. These 10-year goals are planned to be achieved through implementation actions summarized in Section 5.

Desired Future Condition

The Desired Future Condition is a long-term goal that may be descriptive instead of quantifiable. There is no set timeframe.

Table ES-1. RRW 10-Year Goals

Goal Name
10-Year Goal(s)
Nutrient Loading - Reduce total nitrogen loading by 1,811,900 lbs/year (or 6%) - Reduce total phosphorus loading by 79,700 lbs/year (or 6%)
Conduits to Groundwater 110 potential conduits to groundwater managed (100 wells sealed; 10 karst feature projects)
Bacteria Loading 10 bacteria management projects - Technical support for 250 manure or nutrient management plans 200 SSTS upgrades
Stream Management 2,000 linear feet of streambank stabilization or enhancement 2 floodplain restoration projects
Water Storage - Implement 8,900 acre-feet of temporary or permanent water storage on the landscape 100 acres of wetland restoration
Soil Health and Upland Erosion - Implement an additional 22,300 acres of soil health practices - Reduce upland sediment by 100,300 tons/year (or 7%)
Habitat Management, Protection, and Restoration 600 acres of easements or acquisitions 3,750 acres of habitat and forest management





Plan Implementation

Section 5— Targeted Implementation contains actions which address watershed opportunities to achieve plan goals. They are presented within a series of “action tables” that contain details about the action, which entities will implement it, cost, and more.

Priority streams and subwatersheds are identified to help target resource management where efforts are most needed. Priority streams are most vulnerable for becoming impaired. Priority subwatersheds are those areas on the landscape most likely to accrue multiple benefits toward addressing priority opportunities (Figure ES-3). An additional means of targeting on the landscape is through use of planning regions. The RRW is organized into three planning regions: Glacial Till in the west, Karst in the center, and Bluffland Karst in the east.

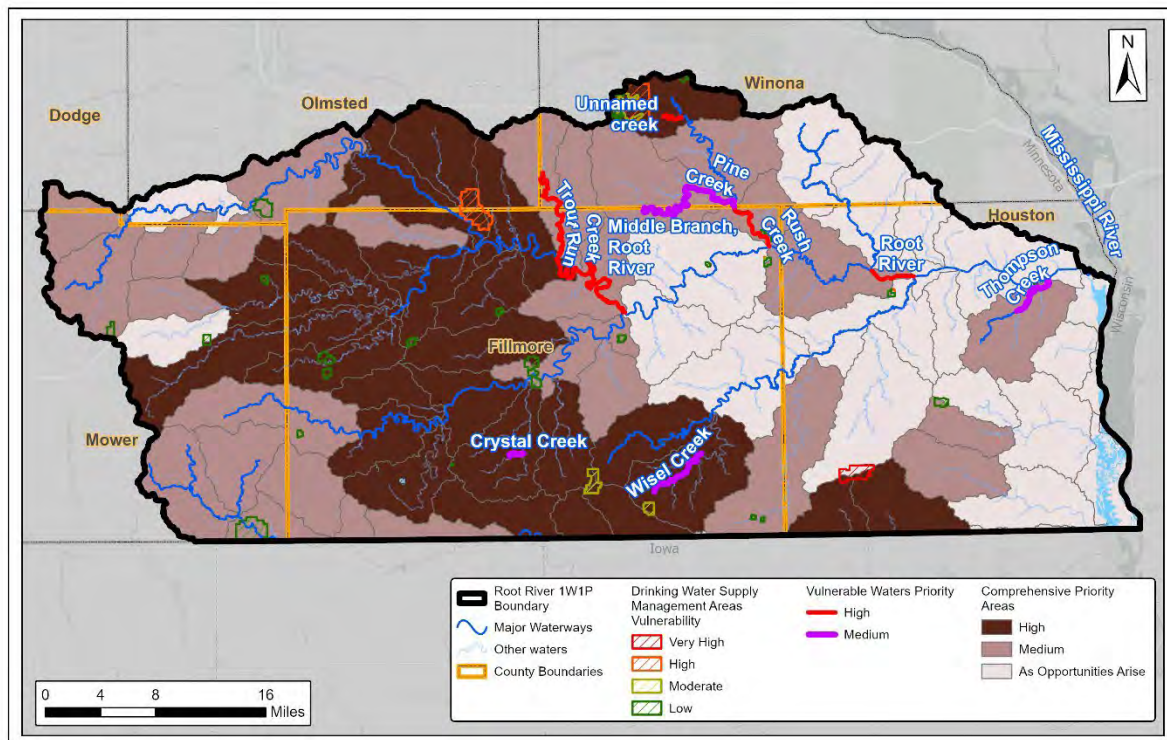


Figure ES-3. Comprehensive priority subwatersheds

Actions were brainstormed by RRW committees. Each action in this plan is presented within an action table and organized within the “implementation program” that will be the funding and administrative mechanism to implement the action. Implementation programs are: Projects, Practices, and Land Management; Public Participation and Engagement; Data Collection and Monitoring; Capital Improvements; and Local Controls.





Action Summary by Plan Program

Actions are activities planned during implementation through one of the five programs. See Table 5-2 through Table 5-8.

Projects, Practices, and Land Management

There are 20 actions in this program. Many actions are set to directly achieve goals. Others not captured in goal metrics include items such as:

- Implementing stormwater projects
- Implementing windbreaks
- Developing pest management plans

Public Participation and Engagement

There are 12 Public Participation and Engagement actions, which include:

- Well testing clinics
- Soil health teams
- Education on fish kills, septic systems, aquatic invasive species, pesticides, and groundwater / surface water interaction

Data Collection and Monitoring

There are nine Data Collection and Monitoring Actions which include:

- Monitoring (ongoing, focus on trends, emerging contaminants, pesticides)
- Inventories (septic systems, sinkholes, unsealed wells, unstable streambanks)
- Feasibility studies
- Identifying funding opportunities

Capital Improvements

Capital Improvement Projects (CIPs) are large projects estimated over \$250,000. A CIP implementation plan is included in the CWMP but with much less detail and certainty than other plan actions.

Local Controls

Local controls include administrative and regulatory efforts such as feedlot program administration and ordinance enforcement. These activities are summarized in Section 6-Implementation Programs.





Plan Administration

Funding

The ten-year local cost for implementing all actions is estimated at \$38,204,900. Partner or federal funding is needed to fully implement all the actions in the plan and meet plan goals.

Table ES-2. 10-Year Implementation Cost

	Local Plan Budget	Partner / Federal	Total Plan Cost
Projects, Practices, and Land Management - Total	\$20,827,700	\$6,308,500	\$27,136,200
Actions WW-1 through WW-17	\$11,820,600	\$6,308,500	\$18,129,100
Technical Assistance	\$9,007,100	N/A	\$9,007,100
Public Participation and Engagement	\$1,140,000	N/A	\$1,140,000
Data Collection and Monitoring	\$2,721,000	N/A	\$2,771,000
CIPs	\$1,158,000	N/A	\$1,158,000
Local Controls	\$4,302,000	N/A	\$4,302,000
Operations and Maintenance	\$589,700	N/A	\$589,700
Plan Administration	\$1,158,000	N/A	\$1,158,000
Total:	\$31,896,400	\$6,308,500	\$38,204,900





Roles

Three committees carry out the coordinated planning, development, and implementation of the Root River CWMP:

- Policy Committee (PC): Comprised of an elected official from each member LGU, this committee has the primary role of making final decisions regarding the watershed plan, work plans, and budgets and their submittal to and approval by BWSR.
- Planning Work Group (PWG): Comprised of local staff from each member LGU, this committee develops grant workplans for Policy Committee approval, biennial budget requests to BWSR, and updates the Policy Committee of implementation progress.
- Advisory Committee (AC): Comprised of state agency staff and local professionals, landowners, or stakeholders, this committee makes recommendations to the Policy Committee regarding identification of priority resources and targeted implementation for protecting and restoring water resources.

Additionally, a local fiscal agent or plan coordinator is responsible for preparing the work plan, reporting, and grant applications.

Amendments

This plan is effective 2027-2037. In that time, implementation partners will make and follow an annual work plan, conduct annual reviews, and perform a mid-point evaluation. New data, information, or a change in local priorities may occur that may lead implementation partners to seek a change in plan content. In this case, a plan amendment may be pursued.





Section 2.

Land and Water

Resources Narrative





2. Land and Water Resources Narrative

From blue-ribbon cold water trout streams to bike trails that wind alongside the river, the natural resources of the Root River Watershed (RRW) set it apart from other watersheds. Positioned in the southeastern corner of the state where Minnesota meets Iowa and Wisconsin, the RRW is located within the “Driftless Area,” a region untouched by the latest Wisconsin Age glaciation. The lack of glaciation results in a porous landscape dotted with disappearing streams, springs, and sinkholes, creating direct connections between surface and groundwater resources. This sets the stage for unique challenges for resource management, but is also the reason for the watershed’s rich wildlife habitat, scenic bluff lands, and coldwater streams.

The Root River Watershed planning area is approximately 1.4 million acres (2,050 square miles), with surface waters draining south into Iowa or east to the Mississippi River (Figure 2-1). For comprehensive planning purposes, the watershed planning area only includes the land on the Minnesota side of the watershed boundary within Dodge, Fillmore, Houston, Mower, Olmsted, and Winona counties.

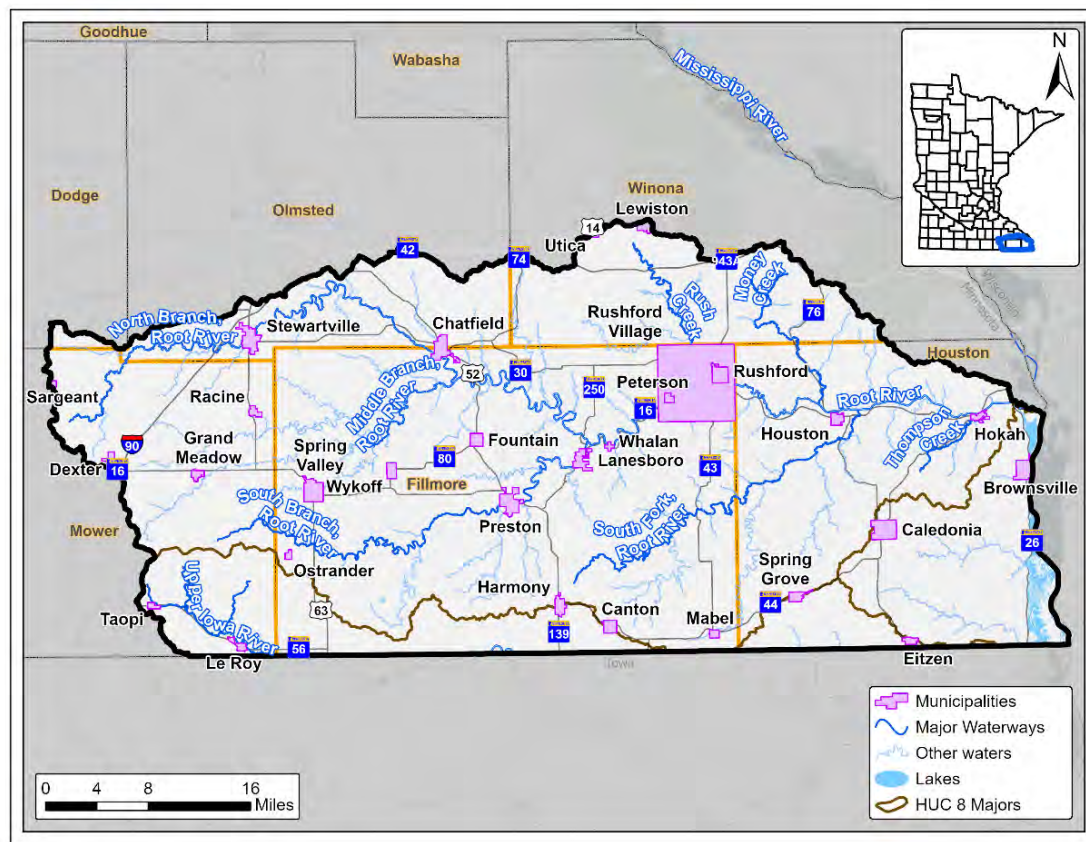


Figure 2-1. General location of the Root River Watershed in Minnesota.





Land Use

Land use in the watershed has changed drastically throughout history. Prior to European settlement in the 1800s, the area was comprised of flat prairie land and deciduous forests (DNR, 2014). With the introduction of settlers to the area, prairie land was converted into agricultural areas and the steeper areas utilized as pasture lands. As cultivation increased, land was further developed to accommodate housing needs.

Presently, land use within the RRW is predominately agricultural with an estimated 55% of the watershed in cultivated crops and 15% in hay and pasture areas for livestock (USGS 2024). The main crops within this area are corn and soybeans (MPCA, 2024a). In addition to a thriving agricultural economy, there are vast opportunities for recreational enjoyment of the watershed with 21% of the land being deciduous forest (Figure 2-2) and 2% of the area as wetland. A full overview of the land use within the watershed can be found in Table 2-1.

Table 2-1. 2024 NLCD percentage by type.

Land Use Category	Percentage
Cultivated Crops	55%
Deciduous Forest	21%
Hay/Pasture	15%
Developed	6%
Wetlands	2%
Open Water	1%
Mixed Forest	Less than 1%
Evergreen Forest	Less than 1%
Barren Land	Less than 1%
Grassland/Herbaceous	Less than 1%
Shrub/Scrub	Less than 1%



Above: Root SWCD; Lower: Fillmore SWCD



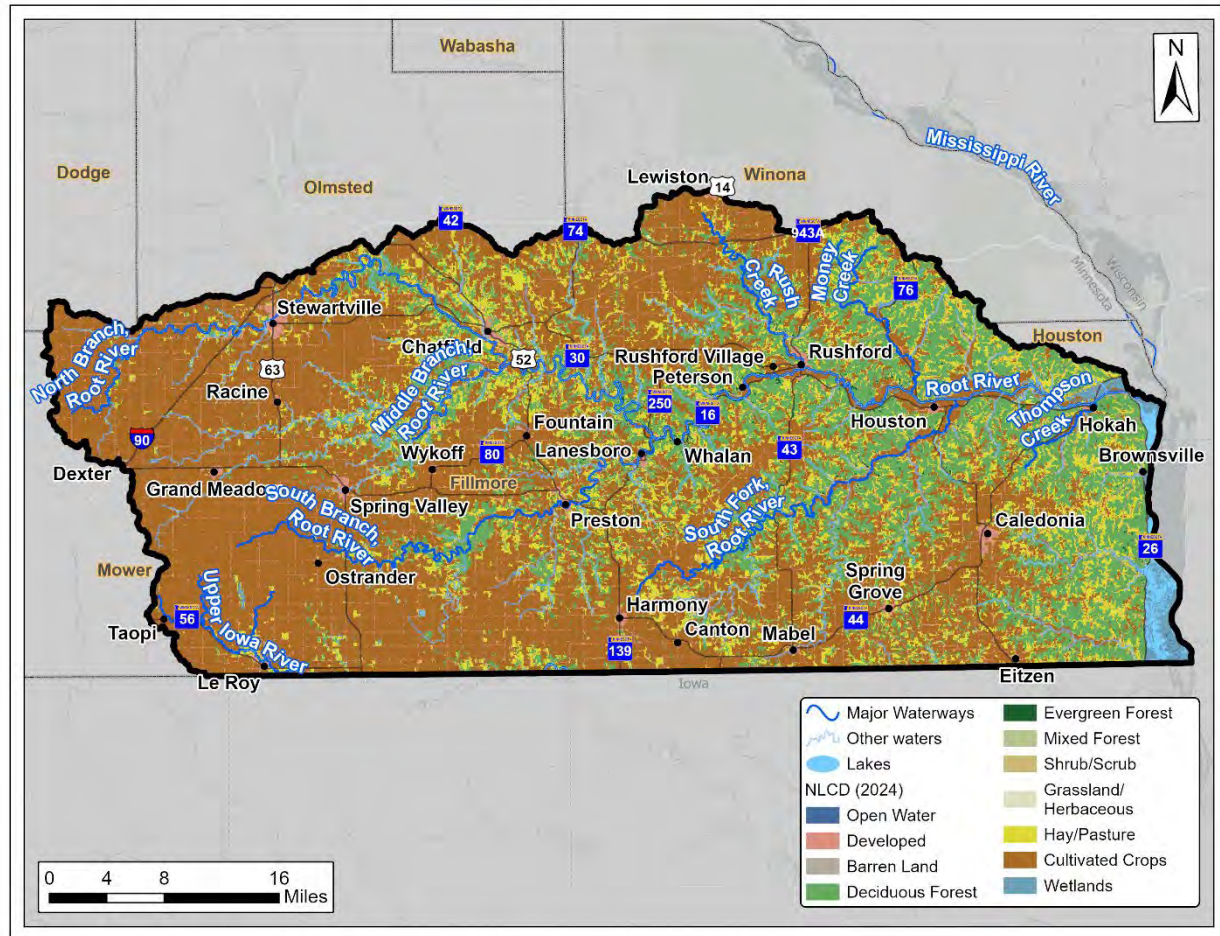


Figure 2-2. NLCD (2024) land use within the Root River Watershed.

Surface Water Resources

Rivers and Streams

The Root River Watershed has multiple river systems that drain primarily to the Mississippi River and more southern streams within the watershed that drain to Iowa. The largest river within the watershed is the Root River. It spans 81 miles across the watershed and is made up of four branches: the North, Middle, South Branch, and South Fork. The Root River begins within an area of high agricultural use and then travels through more forested and karst areas before meeting up with the Mississippi River near Hokah, Minnesota.

Other larger tributaries within the watershed include Money Creek, Rush Creek, and Thompson Creek. These tributaries flow southeast to the Root River which flows to the Mississippi River. Groundwater plays a key role in feeding freshwater into these streams, creating optimal conditions for coldwater trout streams. Thompson Creek, Money Creek, and





Rush Creek are designated trout streams by the Minnesota DNR and are critical for supporting local wildlife and trout (DNR, 2020).

Branches of the Iowa River also begin within the Root River Watershed planning area before making their way through the agricultural land to the Iowa border, flowing through the towns of Taopi and Le Roy along the way.

Due to the geology of this area, there is little capacity to hold surface water. Most of the larger basins in the watershed are from backwater areas of the Mississippi River. Other basins within the watershed are classified as wetlands (USFWS, 2019).

Surface Water Quality

Surface water quality is monitored not only within the watershed but also throughout the state of Minnesota to gauge the health of streams and lakes. Waterbodies and watercourses that do not meet the state standards for water quality are considered impaired. Once impaired, these areas may need additional remediation practices to address the issue. If an impaired lake or stream's quality improves, they can be removed from the impaired waters list.



Fillmore SWCD

The Minnesota Pollution Control Agency (MPCA) releases documents called Watershed Restoration and Protection Strategy (WRAPS) reports that detail monitoring results for watersheds across the state and observed changes in conditions. In 2024, an updated WRAPS report was published for the Root River Watershed. In the report, there were 128 streams assessed for aquatic life and 18 assessed for both aquatic life and recreation. Of the 18 streams assessed for aquatic life and recreation, 17 do not support recreation due to the presence of *Escherichia coli* (*E. coli*) (MPCA, 2024a). Of the 128 streams evaluated for aquatic life, 21 support aquatic life and 37 do not. The majority of aquatic life impairments are due to macroinvertebrate assessments, most fish communities are healthy. Remaining streams for both aquatic life and for aquatic recreation either did not have enough data for a sufficient assessment or had limited support for analysis.

The WRAPS assessment identified 26 new impairments for 21 of the monitored streams. It is worth noting that these additions to the impaired waters list were less due to changes in





water quality and more to do with newly available data. Impairments of concern for the RRW include *E. coli*, biological impairments, nitrates, and turbidity. The WRAPS report analyzed pollutant sources within eight priority HUC-12 subwatersheds: North Fork Bear Creek, South Fork Bear Creek, Spring Valley Creek, Headwaters of South Branch Root River, Upper Money Creek, Mill Creek, Carey Creek, and Riceford Creek.

There were five impaired streams segments that were removed from the impaired waters list for macroinvertebrates and fish impairments. These waterways were the Middle Branch Root River, Pine Creek, and South Branch Root River for macroinvertebrates and Silver Creek for fish (MPCA, 2024a). There are no impaired lakes within the Root River Watershed.

The Root River is also impaired due to mercury in fish tissue. Mercury impairments are dealt with at the state level instead of a watershed level. Minnesota has one statewide Total Maximum Daily Load (TMDL) for mercury which includes the Root River.

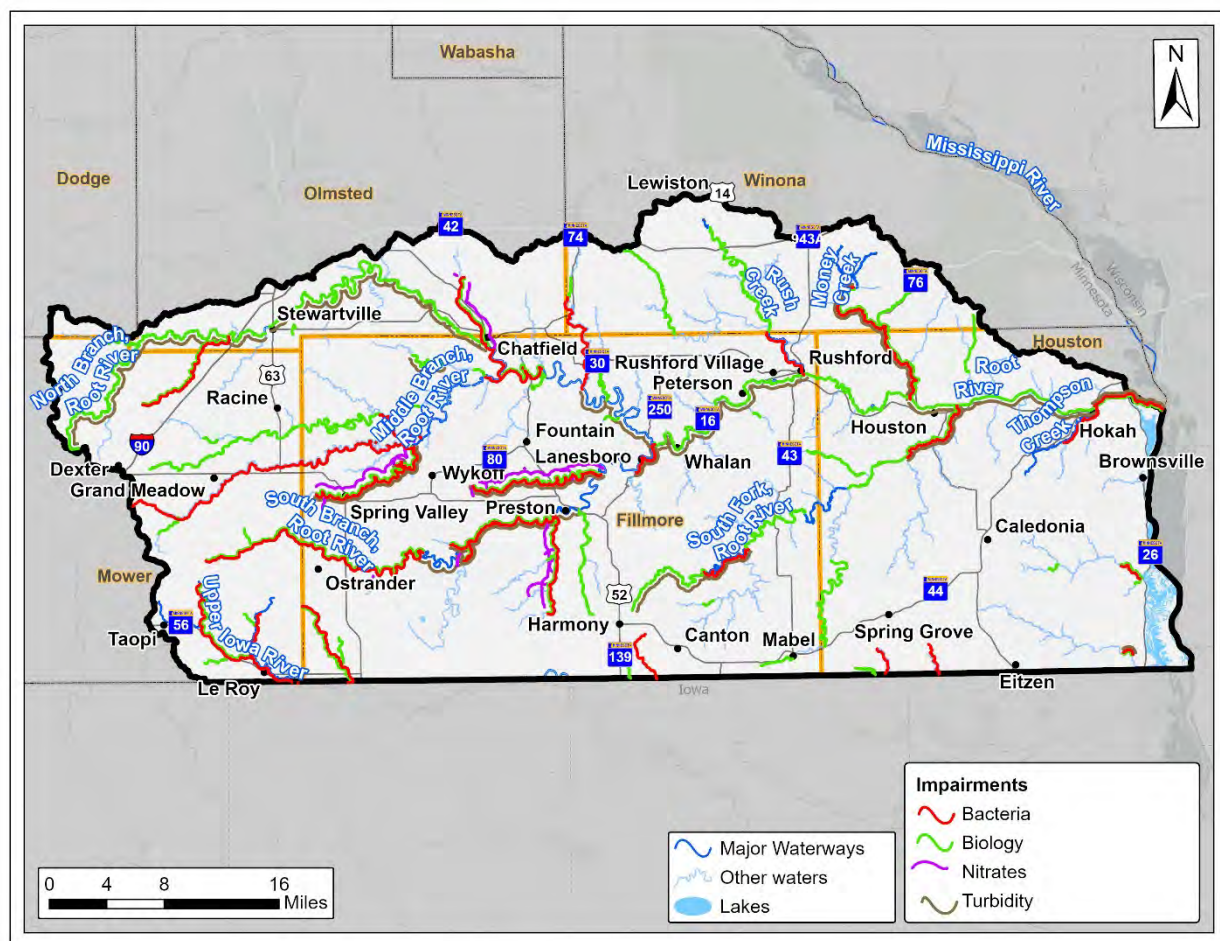


Figure 2-3. Impaired watercourses (MPCA, 2024b) within the Root River Watershed.





Invasive Species

Terrestrial and aquatic invasive species (AIS) have been on the rise within Minnesota, causing issues for native plant and animal populations, habitat, water quality, and recreation. Invasive species that have been identified and are monitored in the watershed include purple loosestrife, buckthorn, wild hemlock, curly leaf pondweed, flowering rush, bighead carp, zebra mussel, silver carp, and others (DNR, 2024).



Purple loosestrife, DNR

Invasive species, if left unmanaged, can outcompete native species. Once introduced, managing or removing invasive species becomes costly and difficult. Planning efforts within the watershed aim to address both aquatic and terrestrial invasive species and proactively manage them before they spread further.

Flooding and Altered Watercourses

The RRW has a history of damaging flooding events. One of the most notable events took place in 2007 when a two-day stretch of rainfall caused the Root River to crest at 28.98 feet (NWPS, 2025). This resulted in large amounts of flooding and damage to infrastructure such as roads, buildings, and railroads as well as streams being washed out and downstream stretches being affected (MPCA, 2012). Flooding events have also taken place more recently, including in the summer of 2024 where the river crested at nearly 23 feet.



Root River Bike Trail after a flood, DNR

During this event, extreme rainfall resulted in a raging river that impacted local infrastructure and washed-out part of the Root River Bike Trail.

Land conversion from natural lands (e.g. wooded, prairie or wetland) to agriculture and urban areas alters hydrology which can result in:

- Decreased the ability of the land to store water
- Reduced infiltration of water





- Increased stormwater runoff
- Increased peak flows
- Increased flooding

The western portion of the watershed has higher amounts of altered hydrology to aid in agricultural production by increasing the efficiency of field drainage. Agricultural drainage is important for growing crops that feed people and support the local economy, but the cumulative effect of drained fields throughout the watershed can increase the rate and amount of water delivered to streams following precipitation.

Within the western part of the watershed where there are higher amounts of ditches and other altered streams, water flows to either the Root River or the Iowa River, carrying runoff pollutants (e.g. excess nutrients and sediment) downstream. Because of the link between altered hydrology and decreasing water quality, special consideration during implementation will aid in mitigating the effects of altered hydrology to protect streams across the watershed (MPCAa, 2024).



Fillmore SWCD

Ground and Drinking Water Resources

The sole source of drinking water for households in the watershed, unless bottled water is purchased, is groundwater. Many of the private wells in the watershed have been shown to have nitrates above the health risk limit of 10 mg/L (MDH, 2025). Because of this, effective resource management is critical to support drinking water sources, as well as surface water quality.

Nitrate contamination of groundwater is a decades-long issue in southeastern Minnesota. Consuming too much nitrate can affect how blood carries oxygen, for which bottle-fed babies and adults with certain health problems are at highest risk. The karst geology of southeastern Minnesota means its groundwater is uniquely susceptible to nitrate leaching from land practices, which can result in problems for private wells and public drinking water





supplies (MPCA, 2025). Karst geology refers to the unique drainage system created under ground as water dissolves limestone. Karst landforms like caves, sinkholes, and springs are prominent throughout the watershed, allowing surface water to make its way into groundwater in hours or days as opposed to weeks or years in non-karst areas. This makes drinking water particularly vulnerable to contamination.

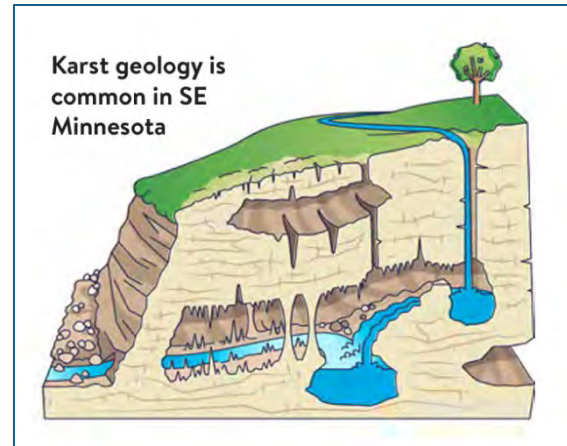


Photo Credit: MPCA, 2025

Karst geology is prominent in the central RRW, and bluffland karst is found in the eastern RRW. Here, layers of shale act as barriers to infiltration and cause groundwater to move sideways and emerge as surface water. Younger groundwater is found in aquifers above shale and older groundwater can be decades or even centuries old. The landscape in west RRW is glacial till, a dense material that slows groundwater recharge.

The Minnesota Department of Agriculture (MDA)'s Root River Field to Stream Partnership monitors and assesses water quality throughout the RRW. RRFSP research has found the residence time (time from the surface to discharge at a spring or well) of groundwater varies from years to decades depending on the geology. Long residence times of some groundwater are an important piece of knowledge for conservation action, as it indicates nitrate contamination from decades ago may continue to increase in groundwater supplies, and the impact of nitrate reduction efforts may not be seen for many years. While much work has been done, and is ongoing, to reduce nitrate leaching loss, data shows that nitrate is still impacting the area's groundwater resources.

RRFSP monitoring in the RRW found that some springs, streams, and wells have an increasing trend in nitrate and some have a decreasing trend. Increasing trends in all sites are more common in the eastern half of the watershed. Additionally, decreasing nitrate concentrations in wells are prevalent in the northwest corner of Fillmore County (Kuehner et al., 2025). Fields still leach nitrogen, particularly those without alternative cropping systems or other nutrient best practices (Kuehner et al., 2020; MDA, 2020).

MDA Root River Field to Stream Partnership

MDA RRFSP is a unique effort to intensively monitor edge-of-field and in-stream water quality to assess the impact of conservation actions at multiple scales.





Many important practices are still needed to both clean up and keep drinking water safe, but reducing the leaching of nitrate over the long-term—stopping the problem at the source—is a crucial part of the solution (MPCA, 2025).

A 2023 U.S. Environmental Protection Agency (EPA) petition prompted Minnesota state agencies to develop a three-phase plan, aimed at reducing nitrate contamination of drinking water supplies. An outcome of that petition is the Southeast Minnesota Nitrate Strategies Collaborative Work Group Report of Recommendations, which outlines recommendations for improving, prioritizing, and implementing strategies to accelerate nitrate prevention and mitigation activities. Work group members created a set of recommendations for addressing nitrate contamination, as summarized below. Many management recommendations contained in this plan were designed to align with these recommendations.

Recommendations



In addition to impacting groundwater, karst geology can also impact surface water. For example, contaminated surface water can enter the groundwater through sinkholes or cracks in the bedrock, contaminating groundwater. From there, the contaminated groundwater can feed back into further downstream surface water streams. In this way, the intimate connections of surface and groundwater in the watershed make managing and protecting water resources challenging (MPCA, 2024a).

About 41% of RRW households obtain their drinking water from private wells and 59% obtain drinking water from community public water supply systems (MDH, 2025). There are 119 non-community public water supply systems within the watershed. Nine of these are non-transient water supplies; for example schools or businesses. There are also 100 transient public water supplies; examples would include campgrounds, restaurants, and orchards. This watershed has many non-community water supplies based upon the recreation and tourism opportunities that exist. Protection of these and resources in Drinking Water Supply





Management Areas (DWSMAs) and wellhead protection areas is critical, especially in areas where there is a high vulnerability for contamination. Within the RRW, there are currently 39 DWSMAs (Figure 2-4) (MDH, 2025). MDH ranks DWSMAs based on how vulnerable the underlying groundwater is to surface contamination. In the RRW, Spring Grove, Utica, Chatfield, and portions of Hokah and Houston DWSMAs are highly vulnerable to contamination.

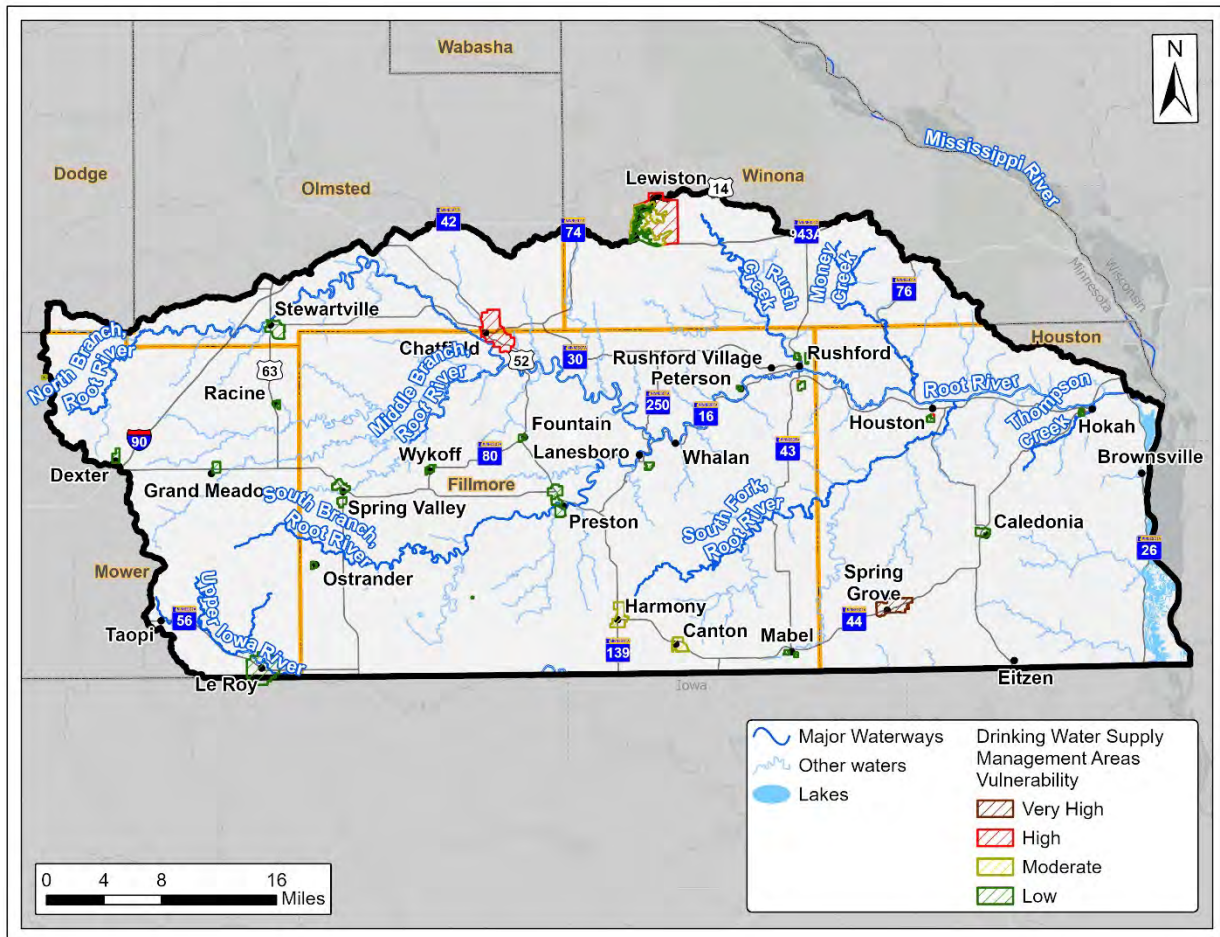


Figure 2-4. Drinking water supply management areas within the Root River Watershed.





Soils and Topography

Soils within the watershed were formed primarily by the deposition of sediments by ice, water, or wind during geological periods of glaciation. A signature of southern Minnesota is the lack of impacts from the most recent Wisconsin glaciation, resulting in the bluffs and varied landscape seen today. The watershed's soils are primarily made up of stratified gravel, windblown silt (loess), and sand. Most of the soils in the watershed are moderately well drained. The RRW is characterized by its steep slopes, deep valleys, and rolling uplands that help to shape its unique identity.



Visit Bluff County

Habitat and Recreation

The Root River Watershed is home to three state parks (Lake Louise State Park, Beaver Creek Valley State Park, and Forestville Mystery Cave State Park) that help bring in visitors and highlight the watershed's natural features. The watershed is also home to the Root River State Trail; a 42-mile paved bike trail that stretches from Fountain to Houston that was constructed on an abandoned railroad. Additionally, the Harmony-Preston Valley State Trail is 22 miles long and connects to the Root River Trail.

In the RRW, 56,000 acres or 4% of the watershed is protected through land management and protection programs (Table 2-2). One type of public lands is Wildlife Management Areas (WMAs). There are 27 WMAs throughout the watershed that help protect wildlife habitat for hunting, trapping, birdwatching, and other activities (DNR, 2025a).

With over 20% of the watershed planning area as forested land, forest management is a collaborative effort between landowners, conservation groups, and state agencies. The Minnesota Forest Resources Council Southeast Landscape Plan identifies habitat loss, invasive species, climate change, land use change, and

Table 2-2. Protected Lands

Protected Land	Acres
Surface Water	400
State Funded Conservation Easements (BWSR)	5,890
State Parks	5,150
State Forest	24,740
Wildlife Management Areas (WMAs)	9,640
Aquatic Management Areas (AMAs)	2,920
Scientific and Natural Areas (SNAs)	1,190
US Fish and Wildlife Service (USFWS) Lands	12,430





urban development as threats to forests. It also highlights the region's unique biodiversity supported by its forests. Forest management also protects water quality and quantity. Forests slow runoff, reducing sediment and nutrients entering surface waters, and promote groundwater recharge.



Lake Louise State Park, DNR



Beaver Creek State Park, DNR



Mystery Cave State Park, DNR

The uniqueness of this area makes it a hotspot for biodiversity and native plant communities. Some plant communities, such as the Iowa golden saxifrage and monita, are only in abundance within the watershed, as they receive moisture through groundwater seeps. Within the Root River Watershed, there are eight federally endangered or threatened species. The eight endangered species include one mammal, three flowering plants, one reptile, two mussels, and one insect.

Climate and Precipitation

Temperatures over a 30-year period (1996-2025) show that, on average, each decade is getting warmer by 0.39°F. The warmest year for the watershed was in 2012 with an average annual temperature of 48.84°F. The coldest year on average was in 1996 with an average annual temperature of 41.28°F.

Average annual precipitation during the 30-year period from 1996-2025 was 36.57 inches per year. The year with the highest amount of annual precipitation was in 2019 with 49.15 inches, and the year with the lowest amount of annual precipitation was in 2003 with 24.84 inches. Overall, for the 30-year period, there was a trend of an increase in precipitation of 1.00 inches per decade (MN DNR, 2025b). Precipitation is increasing in annual totals, but also in intensity. Minnesota is experiencing greater heavy rain events which are more erosive and may cause increased flooding. The National Ocean and Atmospheric Agency (NOAA) provides a national precipitation frequency atlas (Atlas 14, soon to be Atlas 15) that is used for engineering and planning. See Section 3 for discussion of resiliency as a planning lens.





Demographics

The population of the RRW area is roughly 55,800 people (MDH, 2025). The median age is 40 with 23.6% under the age of 18 and 19.6% over 65 years of age. The population in the watershed is 87.5% white, 5.2% Hispanic, 2.7% African American, and 1.8% other ethnicities. The poverty rate is 9.8%, and the median household income is estimated at \$77,500. Just over 93% of watershed residents have a high school diploma and 31% completed post-secondary education (associate's, bachelor's, or graduate degrees) (U.S. Census, 2022). There are approximately 238 acres of Ho-Chunk Nation Off-Reservation Trust Land in the eastern side of the watershed near Hokah.

Looking Ahead

Overall, the population in the Root River Watershed is expected to rise within the next 10 years. Three out of the six counties are projected to have a population increase, but at a slower rate than the statewide growth percentage (which is currently 3.7%). With increasing populations, it is important for planning efforts to prioritize effective management solutions aimed to protect, restore, and maintain the resources within the watershed. Through utilizing data collected from the first 10-year cycle of the Root River Watershed CWMP, this plan can be used as a roadmap for efforts to support continued progress towards reaching cleaner waters and continued enjoyment in the Root River Watershed.





Section 3.

Watershed

Opportunities

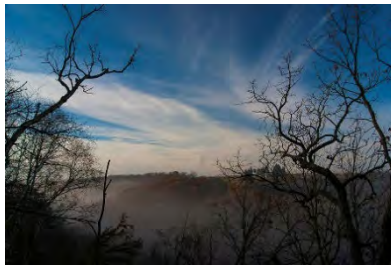




3. Watershed Opportunities

Introduction

Section 2—Land and Water Resources Narrative summarizes the unique natural resources within the Root River Watershed. This section details the process used to identify priority opportunities for managing those resources within the watershed. These priority management “opportunities” will be the focus of this ten-year plan.



This plan section summarizes priority opportunities to protect, restore, and improve resources within the Root River Watershed.

Success from the Previous Plan

Local partners in the watershed will use this plan to continue conservation and engagement work that is already ongoing through implementation of the 2016 Root River CWMP. Examples of ongoing work include implementation of urban and agricultural best management practices (BMPs) and outreach and training initiatives across the watershed. Much of this work was summarized during a 2023 mid-point evaluation of the 2016 Root River CWMP, which summarized implementation work from 2017-2022.

As of the mid-point evaluation (Appendix B), local partners in the Root River Watershed had implemented **nearly 500 best management practices (BMPs)** on the landscape. These BMPs resulted in a reduction of **12,000 tons/year of sediment**, **38,000 lbs/year of nitrogen**, and **14,000 lbs/year of phosphorus**. That’s equivalent to 1,180 dump trucks of sediment, and nutrients found in 6,800 bags of fertilizer! Implementation of BMPs also assists landowners in adopting new management styles, hopefully perpetually.





Project Highlights: Success of the Previous Plan

Project Highlight: Field to Stream Partnership

The Root River Field to Stream Partnership (RRFSP) is a water monitoring effort that relies on local relationships to use in-stream, edge-of-field, tile drainage, and groundwater data collection to lead to conservation action. The RRFSP has led to an understanding of how BMPs impact water quality and accelerated adoption of BMPs.



Project Highlight: Prairie Strips

Multiple prairie strips totaling 45 acres were planted in Mower County. Prairie strips consist of diverse and/or native perennial vegetation located at field edges. They prevent sediment, nutrients, pesticides, and other pollutants from leaving the field. They are also an important pollinator habitat.

Project Highlight: Crooked Creek Flood Control

A 28-foot high earthen dam was constructed in the Crooked Creek subwatershed and is designed to protect from future floods. It also stores water on the landscape, benefitting hydrology and water quality.



Project Highlight: Cover Crops

RRW SWCDs have focused on marketing the benefits of cover crops to producers and have succeeded in increasing the adoption of this practice. Cover crops are planted for seasonal cover and have numerous benefits, including protection from soil erosion, reduced fertilizer needs, improvement in soil organic matter, and increase in soil porosity.





Many significant projects were implemented under the 2016 CWMP. A few examples are highlighted in the project highlights above. These include the continuation of the Field to Stream Partnership, prairie strip implementation in Mower County, the Crooked Creek Flood Control project, and cover crop adoption. In Mower County alone, 45 acres of prairie strips were planted to prevent runoff of sediment, nutrients, pesticides, and other pollutants from the



Field to Stream Partnership

fields. Severe flooding in both 2007 and 2016 impacted infrastructure, crops, residential areas, and aquatic habitat. During the first implementation period a 28-foot-high earthen dam was constructed in the Crooked Creek subwatershed to help protect the area from future floods and contribute to the plan's water storage goal.

This plan will build on the success of the 2016 Root River CWMP. It refocuses and streamlines the plan's previous priority issues to priority management opportunities that are relevant as of 2026.



Root River, DNR





Identifying Opportunities

This plan section introduces the priority resource management opportunities that are the focus of this plan. To identify these priorities, first, an inventory of all management opportunities was needed. This planning process used a combination of planning committee knowledge, priority concern letters from federal and state agencies (Appendix C), existing water plans and reports, and priority issues from the 2016 Root River CWMP to develop a list of potential management opportunities for the watershed (Figure 3-1). These opportunities were evaluated and summarized by local staff to best capture the needs of the watershed and continue work that has already been done during the lifespan of the initial 2016 Root River CWMP.

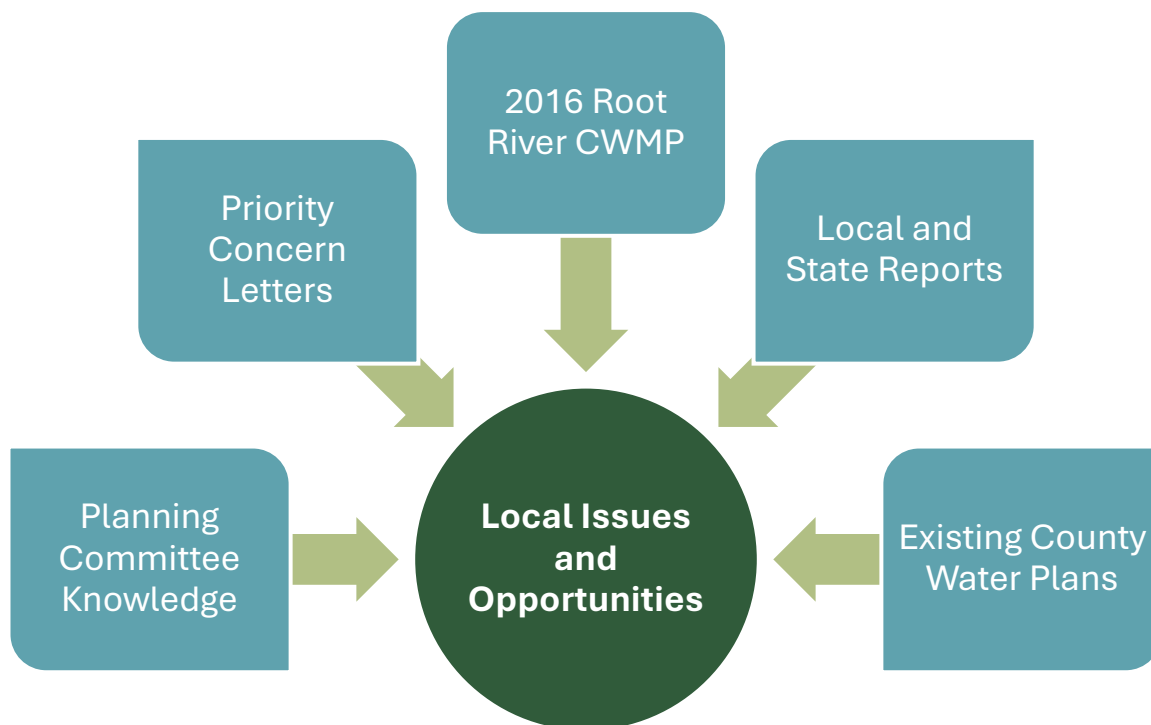


Figure 3-1. Process for inventorying draft list of local issues and opportunities.

Priority Opportunities

Inventoried opportunities were prioritized through a committee voting process using the dot method. Here, members of the Planning Work Group and Advisory Committee voted on the issues they thought should be the focus of implementation efforts. Priority opportunities were assigned as either Priority A or Priority B, as defined below:





- **Priority A** opportunities are the primary focus of staff and financial resources during implementation
- **Priority B** opportunities are important, but have less focus than Priority A issues.

Ultimately, ten opportunities were identified and described as priorities for this plan (Table 3-1). Priority opportunities were organized into one of four resource categories. Although many opportunities either directly or indirectly affect more than one resource category, each opportunity was assigned to the category that it most directly impacts. The resource categories for this plan are Groundwater and Drinking Water, Surface Water, Hydrology and Water Storage, and Land Use and Habitat.



**Groundwater and
Drinking Water**



Surface Water



**Hydrology and
Water Storage**



**Land Use and
Habitat**

Table 3-1 below summarizes the priority opportunities that will be the focus of this plan and of natural resource management efforts over the next 10 years. In the plan sections that follow, these opportunities will be assigned goals and action items.

Table 3-1. Root River Watershed priority opportunities

Resource	Opportunity	Opportunity Description	Priority
 Groundwater and Drinking Water	Groundwater Contamination	Addressing contaminants such as nitrates, bacteria, arsenic, lead, manganese, and pesticides in groundwater creates an opportunity to supply safer drinking water for watershed communities and residents.	A
	Groundwater/Surface Water Interaction	Enhanced management and protection in areas with surface water-groundwater interactions (such as karst and thin-soil regions) is important to reduce groundwater contamination risks.	A





Resource	Opportunity	Opportunity Description	Priority
 Surface Water	Nutrient Management	Managing nutrient levels such as phosphorus and nitrogen in surface waters presents an opportunity to protect aquatic life, enhance recreational uses, and safeguard public health.	A
	Bacteria Management	Implementing strategies to limit bacterial loading, such as E. coli, in surface waters are important to enhance aquatic recreational opportunities.	B
	Pesticide Management	Reducing pesticide levels in surface waters helps protect aquatic ecosystems and reduces risk to public health.	B
	Erosion and Sedimentation	Minimizing erosion and sediment runoff from upland areas is pertinent to enhance surface water clarity, support aquatic life, protect agricultural production, and promote recreation.	A
	Channel Erosion	Identifying opportunities to restore the hydrologic function of channels, drainage systems, and floodplains to reduce sediment loading, protect habitat, and preserve conveyance.	B
 Hydrology and Water Storage	Altered Hydrology and Water Storage	Implementing strategic solutions (such as water storage, infiltration, and floodplain connectivity) to address altered hydrology can reduce flood risk and benefit downstream water quality, infrastructure performance, and recreation.	A
 Land Use and Habitat	Soil Health	Effective management of soil health is important to boost crop yields, support sustainable water resources, and minimize soil loss.	A
	Habitat Management, Protection, and Restoration	Managing, protecting, and restoring natural resource assets such as habitats, forests, wetlands, and biologically significant areas presents an opportunity to enhance water quality, increase water storage, and support ecosystem health and resiliency.	B





Plan Themes

Additional management opportunities and concerns were identified as part of the planning process that are not summarized in Table 3.1. These issues support and help define priority opportunities established in Table 3.1 but are not priorities themselves. Four of these are considered “emerging issues” and four are incorporated as “planning lenses.”

Emerging Issues

“Emerging Issues” are concerns that may affect the resources in the watershed in the future as the plan is implemented. Descriptions for each of the emerging issues in the RRW are provided below.

Chloride

There is increasing concern over chloride contamination of surface water and groundwater. Chloride sources include road salt application, water softeners, and fertilizers (Figure 3-1). Once chloride is in the environment, it does not degrade and is not treated in wastewater treatment plants. One teaspoon of road salt permanently contaminates five gallons of water. In sufficient concentrations, chloride is toxic to aquatic life and vegetation, corrodes infrastructure and vehicles, and impacts drinking water quality.

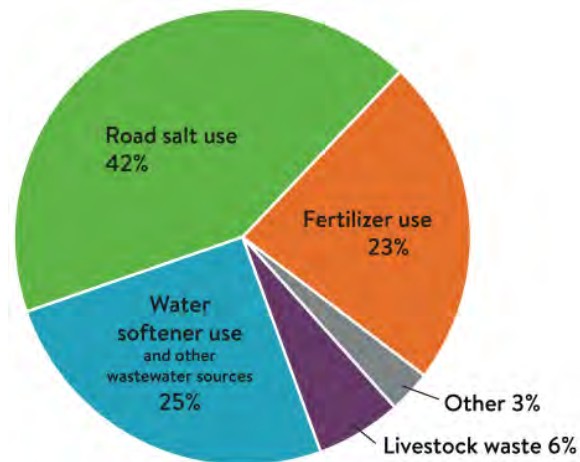


Figure 3-1. Minnesota chloride sources (MPCA)

MPCA has begun occasional monitoring of chloride in surface waters, but it is not a regular parameter in surface water testing. Thus, the scale of the problem is not well understood. MPCA has tested for chloride in a few RRW stream reaches and no streams are impaired. Since chloride is not feasibly treated, the best management strategy is to reduce chloride loading. The State, local governments, and conservation groups promote best practices for reducing salt application and use.





Contaminants of Emerging Concern

Contaminants of emerging concern (CECs) are of growing attention worldwide. CECs include a broad class of chemicals found in personal care, cleaning, industrial, and agricultural products, and medications. Traces of these compounds are being found in the environment. Some CECs have been shown to have adverse effects on aquatic life or humans at certain concentrations, while many others have unknown impacts (Wang et al., 2024).

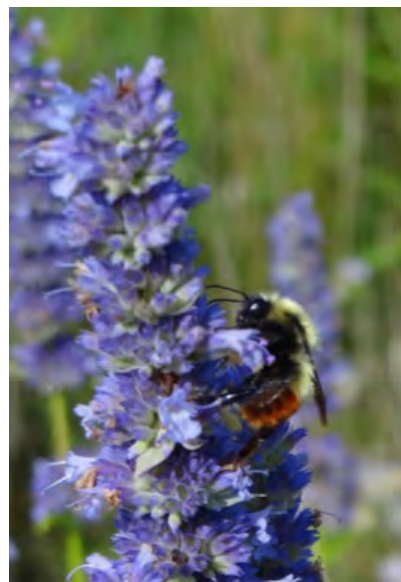
Studies in Minnesota have reported the widespread presence of CECs such as insecticides, pharmaceuticals, detergents, and fire retardants in our lakes and streams. In particular, the pesticide DEET (commonly found in insect repellent), antibiotics, antidepressants, and bisphenol A (BPA) were commonly detected in Minnesota lakes (MPCA, 2021). There is concern over the potential effect these chemicals could have on wildlife and human health.

Planning partners will continue to stay informed about CECs during plan implementation and adjust priorities as needed to reflect new information.

Insecticides

Neonicotinoids (neonics) are a class of insecticides used for agricultural, horticultural, forestry, and urban pest control. They became widespread in the 2000s due to low cost and low toxicity, but numerous studies have since found concerning environmental impacts. Neonics are broad-spectrum and systemic and thus impact pests as well as beneficial species such as pollinating insects, birds, and other wildlife. Populations of bees, moths, butterflies, and beetles have decreased and neonics were linked as a contributor to bee Colony Collapse Disorder. Monitoring of groundwater in Minnesota found shallow springs and karst areas are at a higher risk for neonic contamination of drinking water (Goedjen et al., 2024). MDA monitors for neonics in surface water and more information can be found on the MDA webpage:

<https://www.mda.state.mn.us/neonicotinoid-insecticides>



BWSR





PFAS

The public has been increasingly aware of per- and polyfluoroalkyl substances (PFAS), which are a class of CECs developed for many applications including non-stick cookware, firefighting foam, and stain-resistant fabric. They are called 'forever chemicals' because they persist in the environment without breaking down. They are found throughout the environment and linked to health issues.

Fish Kills

Fish kills within southern Minnesota are a growing concern for local communities, resulting in statewide initiatives and monitoring activities to track and understand what is causing the loss and how it can be prevented. Human activity and the resulting impacts of pollution have been linked to higher rates of fish kills across the state. With the RRW being home to several critical cold water trout streams, understanding the causes of fish kills and working to prevent them will be considered while the Partnership is implementing practices. The Partnership can lean on state agency technical resources and support in addressing and preventing fish kills. MPCA, DNR, MDH, and MDA have tools and guidance documents targeted to southeastern Minnesota (MPCA, 2024c; MDA, 2026).



DNR

Potential Water Use of Data Centers

With the increasing demand for digital services and artificial intelligence, facilities are needed to house large computers and keep them running. Part of the process includes using large quantities of water to keep the computers cool, raising concerns with communities and those who live near potential sites. These new demands have led to the development of new legislation within the state of Minnesota to monitor water use and evaluate the impacts caused by the data centers. During the ten-year lifespan of the CWMP, data centers and their water usage may be considered during the implementation process.





Planning Lens

The planning partnership identified four topics that will have special consideration during the planning process. These topics are karst features, trout streams, environmental justice, and resiliency. These topics fall under multiple priority opportunities, making them challenging to address on their own. Their inclusion in the plan as a “planning lens” helps to ensure that plan goals and actions will directly and indirectly address them.

Karst Features

The unique geology of the RRW is a defining feature of its scenic landscape. However, karst features create some challenges pertaining to water quality and landscape management. Karst features lead to higher rates of interaction between surface and groundwater resources. During implementation, consideration of the karst features is important to effectively manage both surface and groundwater resources.

Trout Streams

As discussed within Section 2—Land and Water Resource Narrative, the RRW is home to an abundance of trout streams that are vital to both recreational and environmental success. There are roughly 1,017 miles of designated trout streams within the RRW. Trout streams will also benefit from many plan efforts, including improvements in surface water and groundwater quality, upstream land protection, connectivity enhancement, and increased infiltration and reduced runoff.

Environmental Justice

The MPCA created a statewide map identifying areas of concern for environmental justice within the state of Minnesota. Environmental justice is the principle that all people have an equal right to healthy air, clean water, and recreational land access. MPCA areas of concern for environmental justice include tribal land, high proportions of English as a second language, poverty, and people of color. In the RRW, on the eastern portion of the watershed near the Mississippi River, there are three areas of tribal land that are a part of the Ho-Chunk Nation. These areas will be considered by the planning partnership during implementation.





Landscape Stewardship Plan

Habitat and land goals and actions were heavily influenced by the RRW Landscape Stewardship Plan. The RRW Local Forestry Team (LFT) has been engaged in landowner, stakeholder, and agency collaboration to protect habitat and manage forests. The LFT provided input during plan development and will be a key partner during implementation.

Resiliency

Section 2—Land and Water Resource Narrative summarizes temperature and precipitation increases within the Root River Watershed according to measured weather data. In addition to overall increasing annual precipitation, there has also been an increase in heavy rain events. These events have implications for agriculture, stream flow, stormwater, and more. One way to build resiliency in the landscape is permanent protection. Protection prevents land conversion to other land uses, reduces fragmented landscapes that support aquatic and terrestrial habitat, increases infiltration (e.g. perennial cover of woodlands, grasses, forbs, etc.), reduces runoff, and sequesters carbon.

The State of Minnesota has developed a Climate Action Framework to address and prepare for challenges associated with a changing climate. BWSR has also developed a climate resiliency toolbox to help local staff identify planning opportunities and resources that will build communities resilient to landscape stressors. The Climate Action Framework and the toolbox are available here, and may be used during plan implementation:

- <https://climate.state.mn.us/minnesotas-climate-action-framework>
- <https://bwsr.state.mn.us/bwsr-climate-resiliency-toolbox>.





Section 4.

Measurable Goals





4. Measurable Goals

Introduction

Goal-setting is an important step in watershed planning for identifying measurable metrics that are ambitious yet achievable to address priority opportunities. For purposes of this plan, both short-term (10-year) and long-term (desired future condition) goals are set.

10-Year Goals

Short-term goals must have a measurable component. These 10-year goals are planned to be achieved through implementation actions summarized in Section 5.

Desired Future Condition

The Desired Future Condition is a long-term goal that may be descriptive instead of quantifiable. There is no set timeframe.

In this plan section there are seven goal frameworks that contain a total of thirteen, 10-year goals:

- Nutrient Loading
- Conduits to Groundwater
- Bacteria Loading
- Stream Management
- Water Storage
- Soil Health and Upland Erosion
- Habitat Management, Protection, and Restoration

Goal frameworks set goals as well as identify which priority opportunities are addressed, list additional benefits of achieving the goal, describe the background of and reason for the goal, and include a map of focus areas related to the goal topic. See Appendix D for geospatial data used to create the focus area maps.



It is acknowledged that management of a pollutant in one goal is likely to also benefit other goals. This is especially true for the RRW, where surface water and groundwater resources are interconnected. Goals are listed here under the goal framework they most directly address, but it is understood that work in an area will have cascading impacts to multiple opportunities and goals.





Priority Streams

Prioritizing resources such as rivers and streams helps to focus implementation efforts. Nine streams were identified in the WRAPS report as priorities for protection as they are nearly impaired. These streams will be a focus during implementation (see Figure 4-1 and Appendix E) to prevent them from becoming impaired. Additionally, any DNR designated trout streams will also be a priority during implementation. The most current DNR list will be consulted for guiding implementation efforts.

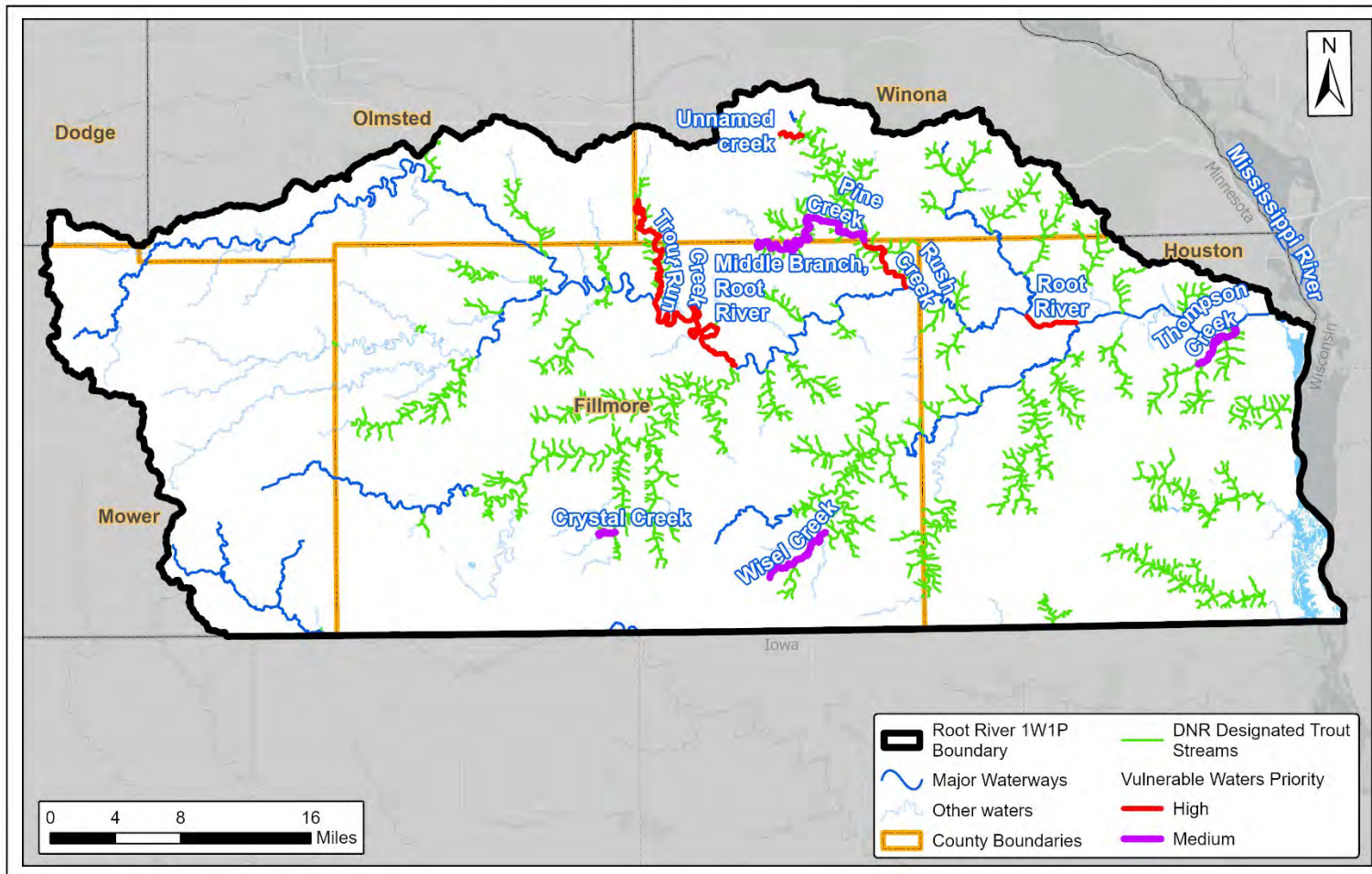


Figure 4-1. Priority Streams in the RRW





Goal: Nutrient Loading

10-Year Goals

- Reduce total nitrogen loading by 1,811,900 lbs/year (or 6%) from existing loads to make progress towards Nutrient Reduction Strategy targets
- Reduce total phosphorus loading by 79,700 lbs/year (or 6%) from existing loads to make progress towards Nutrient Reduction Strategy targets

The Nutrient Loading Goals:

Priority A:

- Groundwater Contamination
- Groundwater / Surface Water Interaction
- Nutrient Management

Priority B:

- Pesticide Management

Have numerous additional benefits:

- Work to achieve nutrient load reductions will address impairments, improve aquatic recreation, reduce stressors to aquatic life, reduce algal blooms, and protect drinking water.

Goal Rationale

Nutrients (nitrogen and phosphorus) are essential for plant growth and aquatic life, but excess concentrations may contaminate surface water and groundwater. The RRW is a particularly sensitive location for nutrient management due to its unique geologic features, such as karst. Surface application of nutrients quickly reaches groundwater in the karst landscape. Nitrate contamination can be toxic to aquatic life, and contamination of drinking water can harm human health and require costly treatment systems. The Southeast Minnesota Nitrate Strategies Collaborative Work Group created a set of recommendations for addressing nitrate contamination, as summarized below.



More living roots on the ground for longer periods



Support alternative crops and land uses



Support and increase implementation of nitrogen Best Management Practices



Education and outreach

➔ Continued on the following page





There are 16 streams with drinking water use impairments due to nitrate in the RRW (Table 4-1). A drinking water use classification does not in the case of trout streams indicate their use as direct drinking water sources. In 2007, the Basin Alliance for the Lower Mississippi in Minnesota petitioned MPCA to assess trout streams against the drinking water standard of 10 mg/L nitrate as a means of indirectly indicating impairments of groundwater aquifers associated with the trout streams. See Table 4-1 for RRW nitrate impairments, including trout streams. Additionally, nitrate is identified as a likely stressor to most RRW fish or macroinvertebrate impairments (MPCA, 2015).

In line with Work Group recommendations, the primary work to reduce nutrient loading will occur through reducing nitrate at the source through agricultural BMPs and conservation practices. The 10-year goal is based on what is feasible to attain with anticipated funding, as estimated through PTMApp (see Section 5). Other ways to reduce nutrient loading include septic system upgrades and bacteria management (see Bacteria Loading goal), prevention of streambank erosion and overland runoff, and promotion of soil health (see Stream Management and Soil Health goals).

Table 4-1. RRW Nitrate Impairments

Stream Name	AUID	MPCA 303d TMDL Year
Canfield Creek	07040008-557	2017
Crystal Creek	07040008-601	2017
Etna Creek	07040008-562	2017
Forestville Creek	07040008-563	2017
Mill Creek	07040008-536	2024
Root River, South Branch	07040008-555	2017
Spring Valley Creek	07040008-548	2024
Unnamed creek (Bloody Run Creek)	07040008-F08	2017
Unnamed creek (Mill Creek Tributary)	07040008-A47	2024
Unnamed creek (Spring Valley Creek Tributary)	07040008-D53	2024
Unnamed creek (Watson Creek Tributary)	07040008-E61	2017
Unnamed creek (Watson Creek Tributary)	07040008-E62	2017
Unnamed creek (Watson Creek Tributary)	07040008-E63	2017
Unnamed creek (Watson Creek Tributary)	07040008-E75	2017
Watson Creek	07040008-552	2017
Willow Creek	07040008-558	2017

Desired Future Condition

Meet the 2014 Nutrient Reduction Strategy goals for a 45% reduction in total phosphorus and 45% reduction in total nitrogen loading. As of 2025, phosphorus loads in the Mississippi River are down 32% since baseline; nitrate loads are down 6%.





Nutrient Loading Focus Areas

Practices to reduce nutrient loading to surface and groundwater resources will be prioritized to high and medium priority areas shown in Figure 4-2. These areas are ranked based on the Prioritize, Target, and Measure Application (PTMAApp) edge-of-field nitrogen and phosphorus loading, a high percentage of private wells in MDA Township testing that exceeded drinking water nitrate standards, the location of MDA Fall Fertilizer Restriction areas, and prominence of vulnerable DWSMAs.

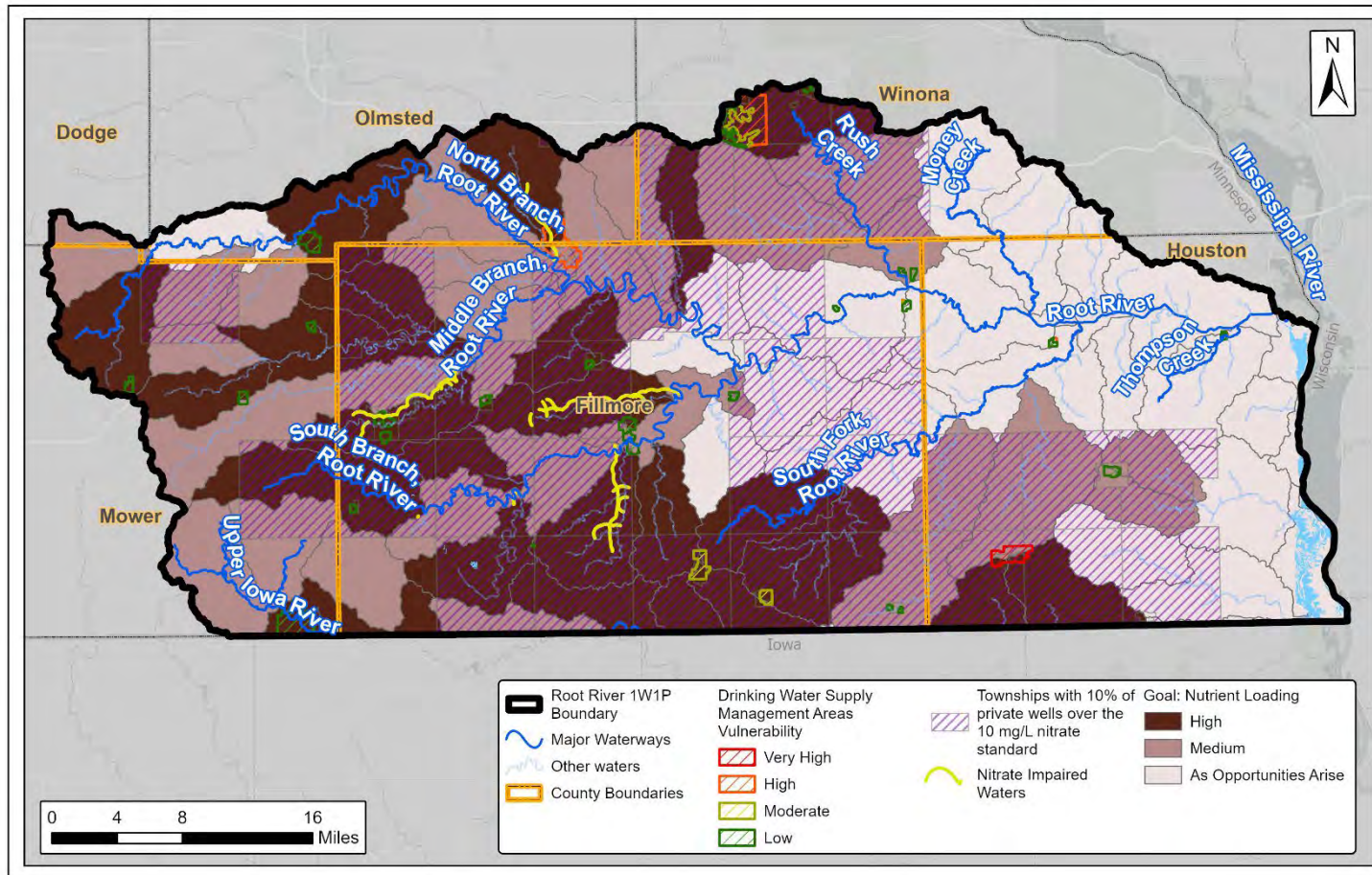


Figure 4-2. Nutrient Loading Goal focus area map





Goal: Conduits to Groundwater

10-Year Goal

- 110 potential conduits to groundwater managed
 - 100 wells sealed
 - 10 projects addressing karst features (sinkhole treatment, buffers placed around sinkholes, edge of aquifer projects)

The Conduits to Groundwater Goal:

Addresses priority opportunities:

Has numerous additional benefits:

Priority A:

- Groundwater Contamination
- Groundwater / Surface Water Interaction

- Work to address groundwater contamination will reduce risk of human health impacts from contaminants. The interactions between groundwater and surface water means groundwater quality improvements also improve stream quality and support coldwater resources.

Goal Rationale

Protection of groundwater quality is crucial as people rely on groundwater for drinking water. In the RRW, groundwater is particularly vulnerable due to the many direct connections between the surface and groundwater. Pathways to groundwater contamination include subsurface leaching to shallow groundwater, and direct connections via unsealed wells, sinkholes and other karst features, and surface water mixing with groundwater.



Sealed well, Mower SWCD

Desired Future Condition

Groundwater has a concentration of nitrate under 1 mg/L (near natural background conditions) so as to not impact human health.





Conduits to Groundwater Focus Areas

Practices to address potential conduits to groundwater will be prioritized to high and medium priority areas (Figure 4-3). These areas are ranked based on the presence of karst features and the pollution sensitivity of near-surface materials. Projects also will be prioritized along the Decorah shale edge. The Decorah shale is a thin, clay-rich rock unit that restricts the vertical movement of groundwater in the subsurface. When groundwater percolating downward reaches this layer, it moves laterally until it reaches the Decorah Edge, a woodland/wetland ecosystem critical for groundwater filtration and recharge.

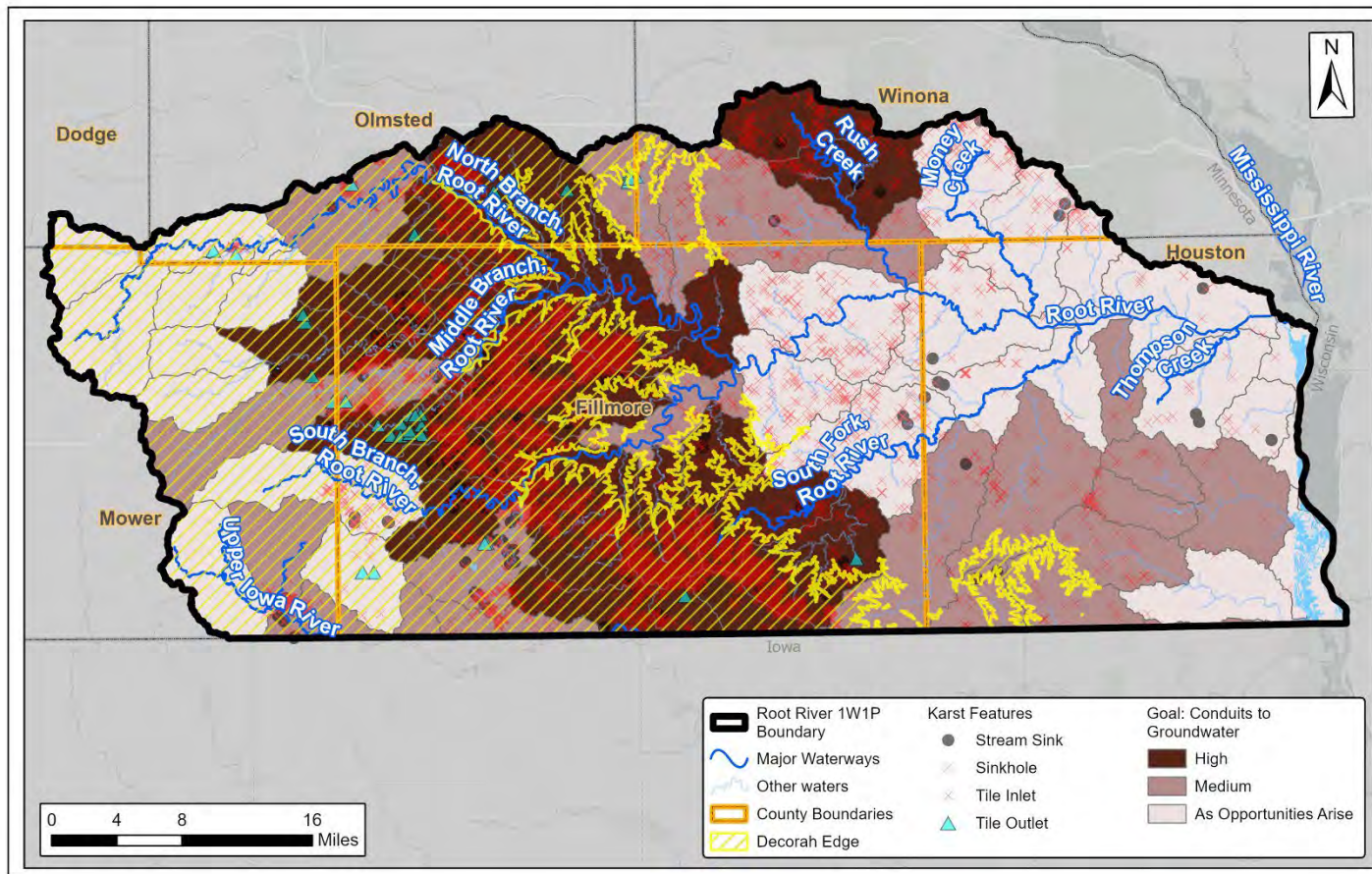


Figure 4-3. Conduits to Groundwater Goal focus area map





Goal: Bacteria Loading

10-Year Goals

- 10 bacteria management projects
- Technical support for 250 manure or nutrient management plans
- 200 SSTS upgrades

The Bacteria Loading Goals:

Address priority opportunities:

Priority A:

- Groundwater Contamination
- Nutrient Management

Priority B:

- Bacteria Management

Have numerous additional benefits:

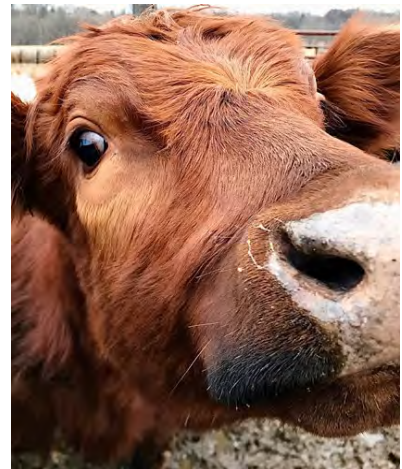
- Work to reduce bacteria loading will address impairments, improve safety of aquatic recreation, reduce nutrient loading from septic systems, and protect drinking water quality.

Goal Rationale

The interconnectedness of the surface water and groundwater in the RRW makes bacteria loading to surface waters a threat to both aquatic recreation and groundwater drinking water quality. Bacteria can come from wildlife, leaking septic systems, feedlot runoff, improper application of manure, and livestock grazing in riparian areas.

As *E. coli* is present in waste, it is monitored in water as an 'indicator bacteria' of fecal contamination even if the *E. coli* itself may be harmless. Waters are assessed for bacteria as an impairment to aquatic recreation, and there are 17 stream reaches in the RRW impaired due to bacteria (Table 4-2). See Appendix F for a full summary of impaired waters and TMDLs.

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Fillmore SWCD





This goal is focused on reducing bacteria loading via repair of septic systems, bacteria management projects, and providing technical assistance to renew or draft nutrient or manure management plans. Homes and businesses not connected to municipal sewers utilize subsurface septic treatment systems (SSTS) to dispose of waste. Many of these systems are leaking or unmaintained, acting as a potential source of bacteria and nutrients to the environment. Addressing agricultural sources of bacteria could include actions such as manure management plans, feedlot improvements, and rotational grazing.

Table 4-2. Fecal Coliform or *E. coli* impaired streams in RRW.

Stream Name	AUID	MPCA 303d TMDL Year
Bear Creek	07040008-542	2017
Deer Creek	07040008-546	2017
Forestville Creek	07040008-563	2017
Mill Creek	07040008-536	2017
Money Creek	07040008-521	2006
Robinson Creek	07040008-503	2006
Root River	07040008-501	2006
Root River, Middle Branch	07040008-506	2017
Root River, Middle Branch	07040008-534	2017
Root River, North Branch	07040008-535	2017
Root River, South Branch	07040008-550	2017
Root River, South Branch	07040008-555	2006
Root River, South Branch	07040008-H18	2006
Root River, South Branch	07040008-H19	2006
Root River, South Fork	07040008-511	N/A
Root River, South Fork	07040008-508	2017
Rush Creek	07040008-523	2017
Spring Valley Creek	07040008-548	2017
Thompson Creek	07040008-507	2017
Trout Run Creek	07040008-G88	2017
Watson Creek	07040008-552	2017
Willow Creek	07040008-558	2017

Desired Future Condition

No waterbodies are at risk of impact human health due to bacteria and drinking water supports public health.





Bacteria Loading Focus Areas

Projects to reduce bacteria loading will be prioritized to high and medium priority areas (Figure 4-4). These areas are ranked based on the presence of bacteria-impaired streams and feedlots. Also shown are areas where streams intersect pastureland. These are important areas for rotational grazing, livestock exclusion from streams, and alternate watering systems.

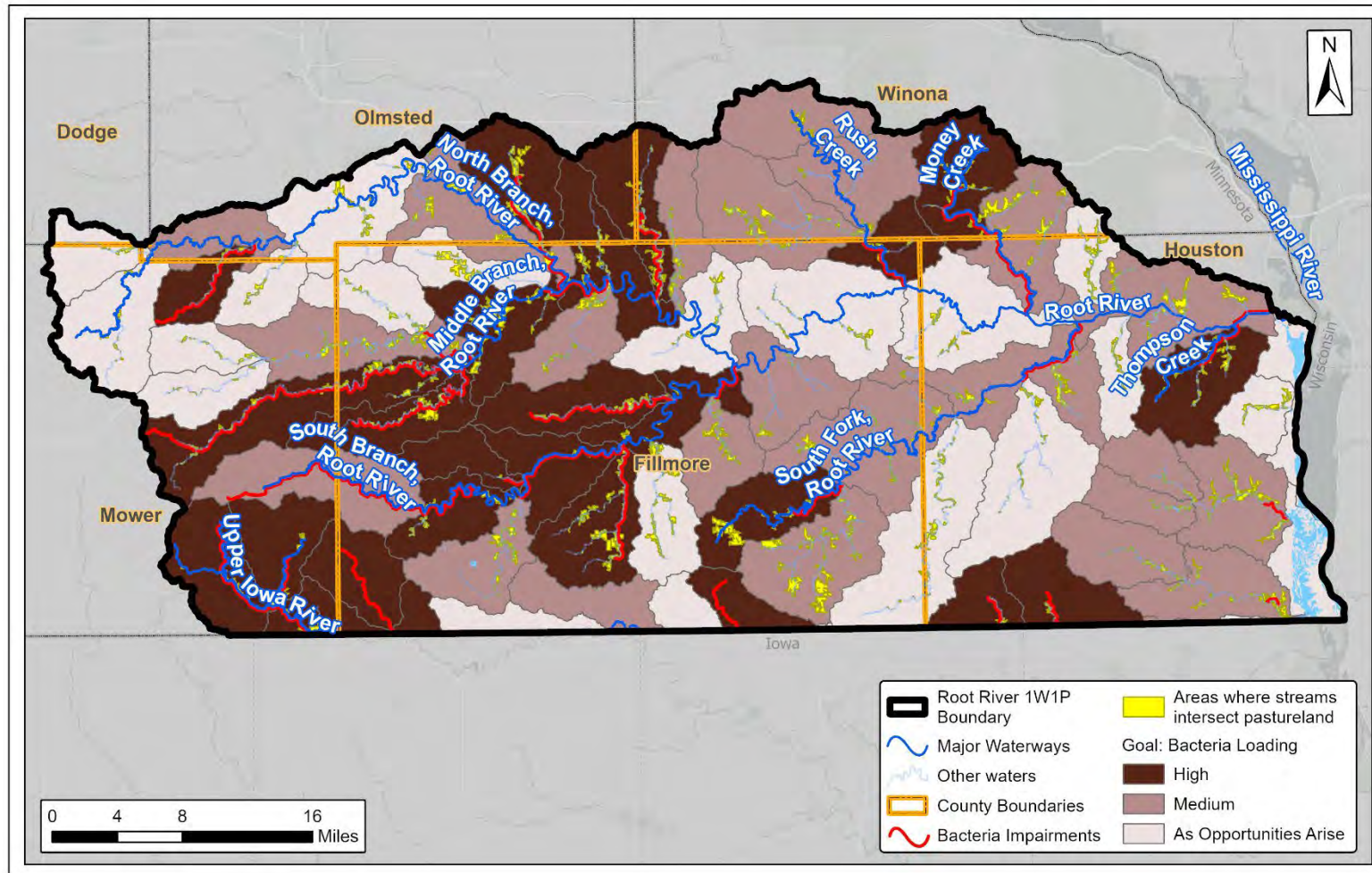


Figure 4-4. Bacteria Loading Goal focus areas





Goal: Stream Management

10-Year Goals

- 2,000 linear feet of streambank stabilization or enhancement
- 2 floodplain restoration projects

The Stream Management Goals:

Addresses priority opportunities:

Priority A:

- Nutrient Management
- Altered Hydrology and Water Storage

Priority B:

- Channel Erosion

Has numerous additional benefits:

- Work to stabilize or enhance streambanks reduces sediment and phosphorus loading, restores altered channels, and protects aquatic habitat. Floodplain restoration reduces sedimentation, addresses altered hydrology, and adds water storage.

Goal Rationale

In the RRW, the largest source of sediment loading is near channel sources (see the Soil Health goal for targeting of upland erosion) (MPCA, 2024a). Near-channel sediment loading includes floodplain soil loss and in-channel bank erosion. The Root River is prone to bank erosion, which leads to turbid water and degraded aquatic habitat.

Unstable banks can be addressed through engineered solutions such as channel restorations, or through more natural enhancement via toe wood or native vegetation plantings.

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Eroded streambank, Root River SWCD





Bank stabilizations and floodplain restorations can help address stressors to aquatic life (improve physical stream habitat and reduce excess sediment). Floodplain restorations can add water storage, reduce water flow, and improve water quality.

In the RRW, there are 19 stream reaches impaired due to total suspended solids or turbidity (Table 4-3), 41 reaches impaired due to benthic macroinvertebrate bioassessments, and 10 reaches impaired due to fish bioassessments.

Table 4-3. Total suspended sediment and turbidity impairments in the RRW.

Stream Name	AUID	MPCA 303d TMDL Year
Bear Creek (Lost Creek)	07040008-A18	N/A
Forestville Creek	07040008-563	N/A
Money Creek	07040008-521	N/A
Root River	07040008-520	2017
Root River	07040008-502	2017
Root River	07040008-527	2017
Root River	07040008-501	2017
Root River, Middle Branch	07040008-528	2017
Root River, North Branch	07040008-716	2017
Root River, North Branch	07040008-717	2017
Root River, South Branch	07040008-550	2017
Root River, South Branch	07040008-554	2017
Root River, South Branch	07040008-556	2017
Root River, South Branch	07040008-555	2017
Root River, South Fork	07040008-508	2017
Root River, South Fork	07040008-573	2017
Root River, South Fork	07040008-511	N/A
Spring Valley Creek	07040008-548	N/A
Watson Creek	07040008-552	2017

Desired Future Condition

No surface waters are impaired for sediment or turbidity; all streambanks are stable and have native vegetation as buffers.





Stream Management Focus Areas

Stream stabilization and floodplain projects will be determined as needs arise and based on data availability. Stabilization projects may receive additional consideration around priority resources and waters impaired for sediment (Figure 4-5).

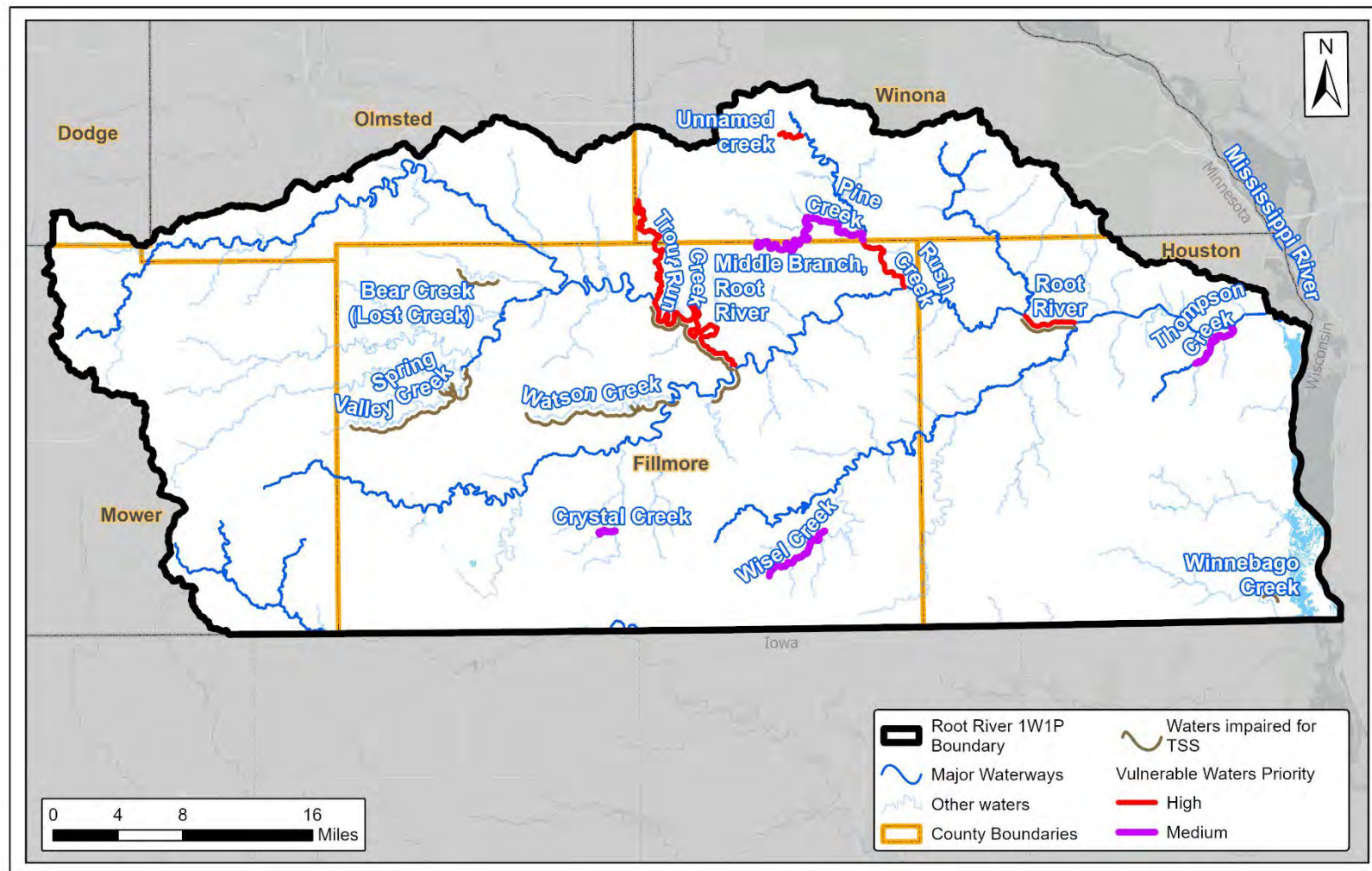


Figure 4-5. Stream Management Goal focus area map





Goal: Water Storage

10-Year Goals

- Implement 8,900 acre-feet of temporary or permanent water storage on the landscape
- 100 acres of wetland restoration

The Water Storage Goals:

Address priority opportunities:

Priority A:

- Altered Hydrology and Water Storage
- Soil Health

Priority B:

- Habitat Management, Protection, and Restoration

Have numerous additional benefits:

- Work to add water storage will reduce peak flows and bank erosion, reduce flood risk, and enhance wetland habitat.

Goal Rationale

Land conversion, drainage for crop production, and channelized streams have altered the natural hydrology of the RRW. Altered hydrology combined with an increase in precipitation in the watershed has increased annual discharge and slightly increased 10-year interval flood flows (DNR, 2022).

The RRW has experienced damaging floods in recent years. The addition of 8,900 ac-ft of water storage, 100 acres of wetland restoration, and floodplain restorations (Stream Management Goal) alleviates the impact of altered hydrology and makes the watershed more resilient to flood events.



*Flooding washed out road,
Root River SWCD*

Desired Future Condition

38,700 ac-ft of water storage is added to the landscape to achieve a 25% peak flow reduction and mitigate impacts of altered hydrology (MPCAa, 2024).





Water Storage Focus Areas

Water storage projects will be prioritized to high and medium priority areas (Figure 4-6). These areas are ranked based on local professional judgement and intent to store water in headwater reaches of the watershed. Also shown are subwatersheds that were prioritized in the WRAPS for wetland restorations.

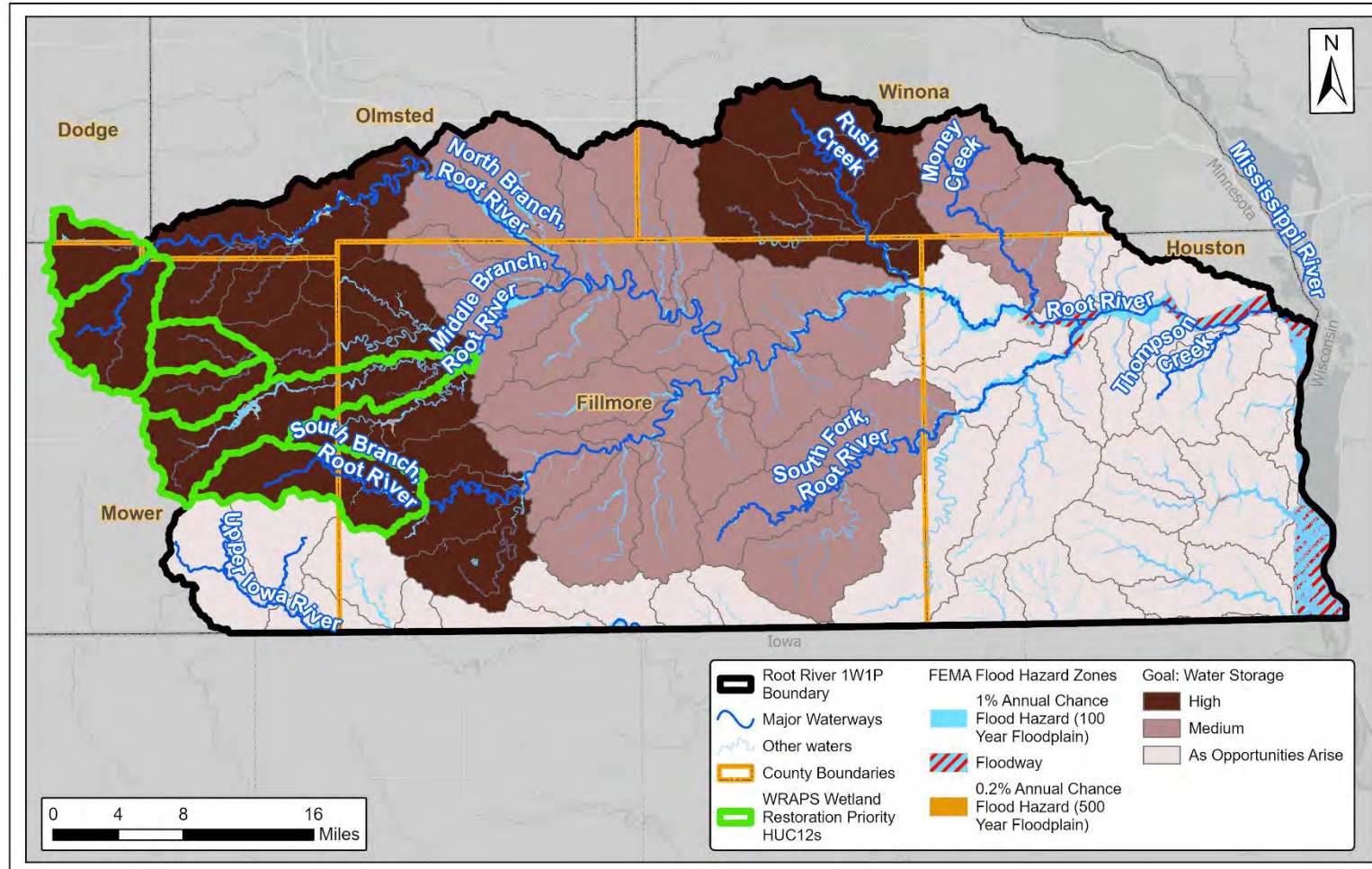


Figure 4-6. Water Storage Goal focus area map





Goal: Soil Health and Upland Erosion

10-Year Goal

- Implement an additional 22,300 acres of soil health practices
- Reduce **upland sediment** by 100,300 tons/year (or 7%) from existing loads, as estimated at the edge of the field

The Soil Health and Upland Erosion Goals:

Address priority opportunities:

Have numerous additional benefits:

Priority A:

- Soil Health
- Erosion and Sedimentation
- Groundwater Contamination
- Nutrient Management
- Altered Hydrology and Water Storage

Priority B:

- Pesticide Management

- Soil health practices support a healthy soil microbiome, store water in soils, reduce wind and water erosion from fields, sequester carbon, and protect groundwater quality. A reduction in sediment loading protects aquatic life and also reduces phosphorus bound to sediment.

Goal Rationale

As discussed in the Stream Management Goal, sediment pollution degrades water quality and has led to stream impairments. Soil loss from agricultural fields is a significant source of sediment loading in the watershed, and in certain subwatersheds may be the dominant source of sediment loading. With over 50% of land in the watershed utilized for crop production, implementation of soil health practices is an approach to reduce sediment loading while prioritizing crop productivity, land stewardship, and drinking water protection.

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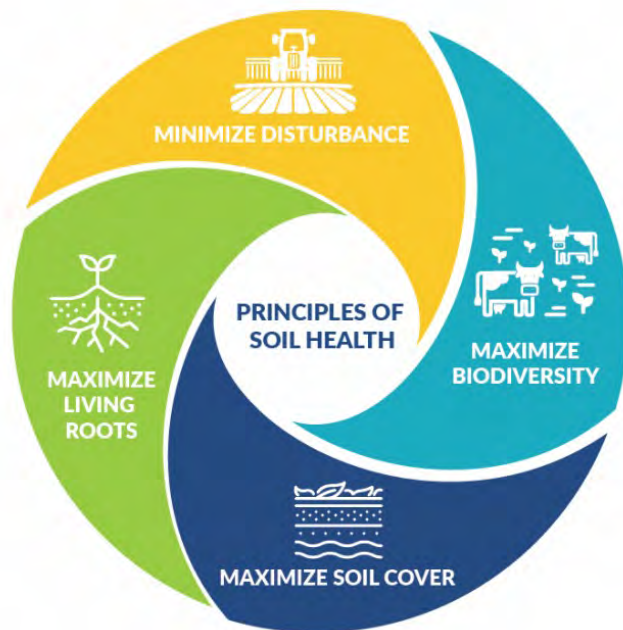
*Result of sediment loading to stream,
Fillmore SWCD*



Soils are a living ecosystem that have a diverse microbiome that cycles nutrients and filters pollutants. Soil health is the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Principles of soil health (Figure 4-7) include maximizing soil cover, living roots, and crop diversity while minimizing disturbance.

Soils intensively tilled, left bare, or used to grow monocultures may have poor health and experience wind and water erosion. Implementation of soil health practices can not only keep soil on the landscape and reduce sediment loading, but also reduce nitrate contamination (per Work Group recommendations), protecting drinking water quality.

Soil health practices can include cover crops, crop rotation, alternative cropping systems, perennial cover, and conservation tillage. Local SWCDs prioritize soil health education and adoption and are available to support producers implementing soil health practices.



Above: cover crops, Fillmore SWCD

Below: UMN



Figure 4-7. UMN Soil Health Principles.

Image credit: NRCS

Desired Future Condition

All agricultural land implements soil health principles.



Soil Health and Upland Erosion Focus Areas

Practices to improve soil health and address upland erosion will be prioritized to high and medium priority areas (Figure 4-8). These areas are ranked based on areas that contribute the most sediment to the edge of the field, as estimated by PTMApp.

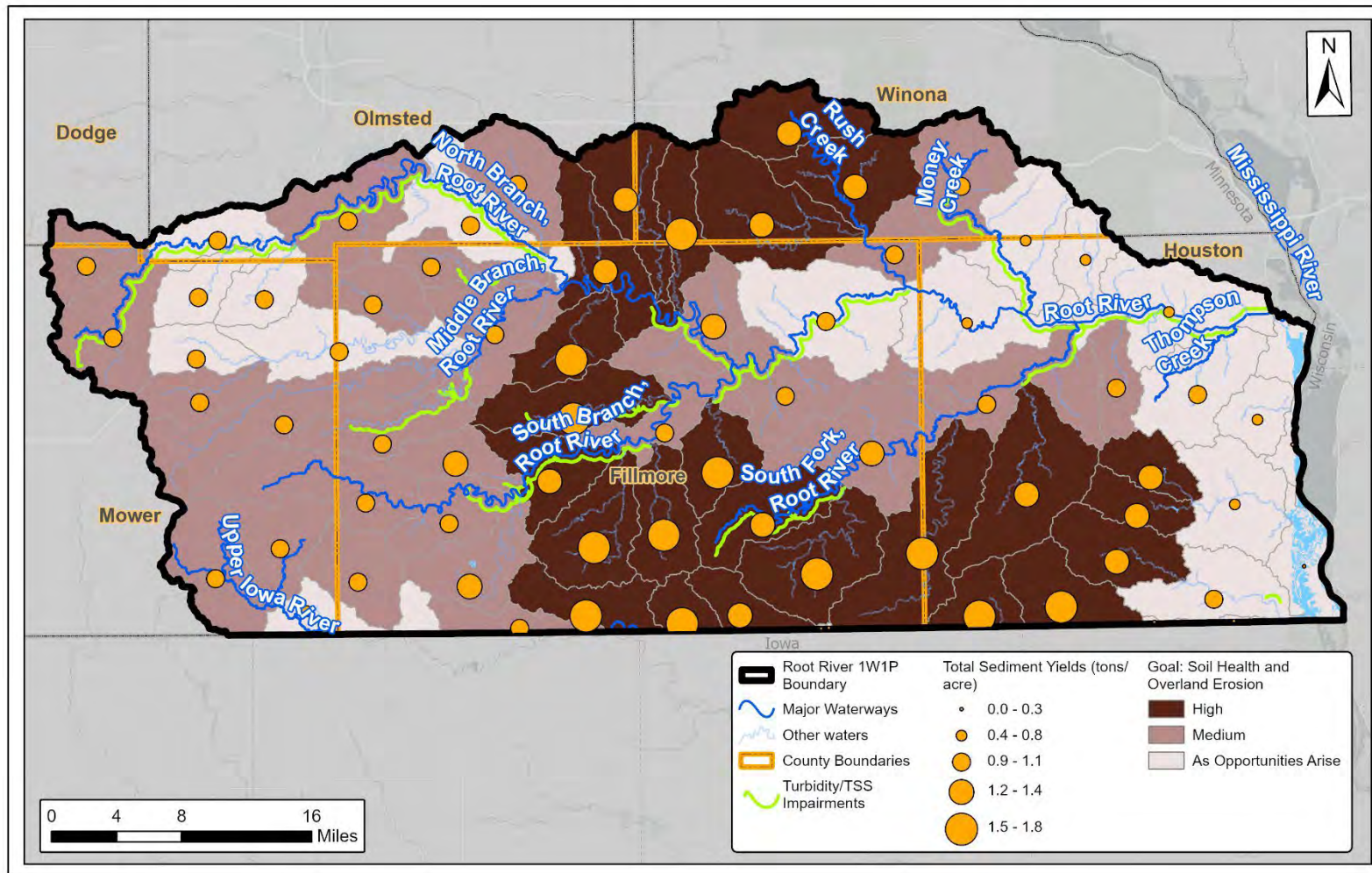


Figure 4-8. Soil Health and Upland Erosion Goal focus area map





Goal: Habitat Management, Protection, and Restoration

10-Year Goals

- 600 acres of easements or acquisitions
- 3,750 acres of habitat and forest management

The Habitat Goals:

Address the priority opportunity:

Priority B:

- Habitat Management, Protection, and Restoration

Have numerous additional benefits:

- Work to manage, protect, and restore habitat will protect wildlife, support outdoor recreation, store water, improve water quality, create habitat corridors, and sequester carbon.

Goal Rationale

The natural lands of the Driftless Region provide habitat that supports unique native and rare species. Shallow groundwater feeds coldwater streams known for excellent trout fishing. Habitat establishment and protection ensure watershed resources continue to provide and improve recreational and ecosystem benefits long into the future.

Land protection through permanent and limited easement programs pays landowners to keep land out of production, providing habitat for pollinators, native vegetation, and wildlife. 600 acres of easements and acquisitions is the amount local partners plan on implementing, but additional protection may be pursued by federal or partner entities. Habitat management could also include invasive species management, prescribed burns, or forest improvements. A focus for land management will be in the riparian corridor, especially along outstanding resources such as designated trout streams. The Local Forestry Team may be requested to assist in habitat management and restoration efforts.

Desired Future Condition

140,000 acres of land are protected in the watershed, representing 15% of all agricultural land.





Habitat Management, Protection, and Restoration Focus Areas

Easements, acquisitions, and habitat management and enhancement efforts will be prioritized to high and medium priority areas (Figure 4-9) as well as professional judgement. These areas are within a mile of The Nature Conservancy Resilient and Connected Network land and DNR priority areas for protection of biological diversity (Conservation Opportunity Areas). The [Living Landscape Priority Areas](#) may also be referenced in project implementation efforts.

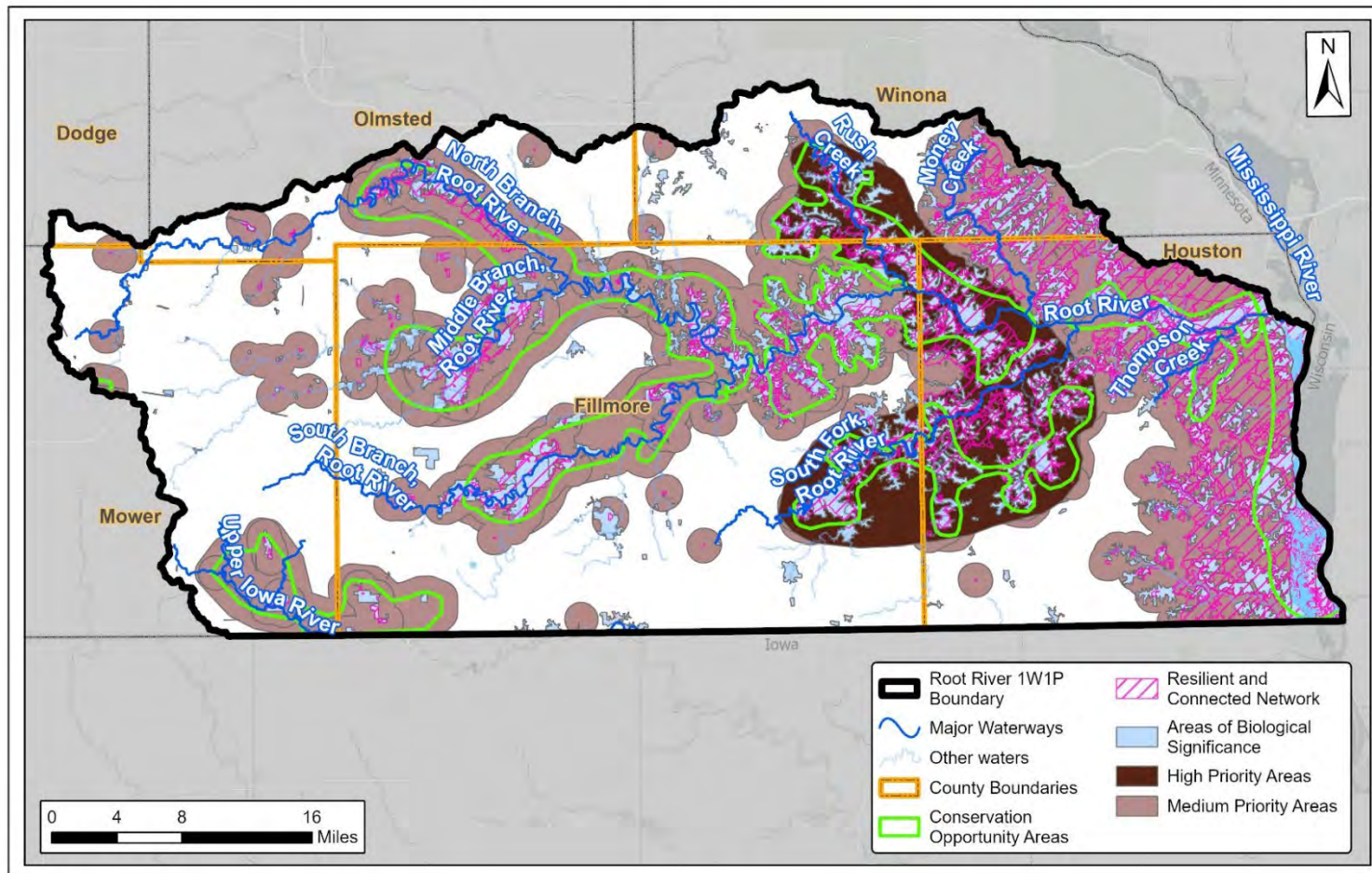


Figure 4-9. Habitat Management, Protection, and Restoration Goal focus area map





Summary of Plan Benefits

In Section 5—Targeted Implementation, actions are planned to achieve all plan 10-year goals. Many actions are specifically intended to directly meet a goal, but others will indirectly work towards improving watershed resources. Table 4-4 provides a glimpse into how plan actions will achieve (and go beyond) stated goals.

Actions listed in the table are not comprehensive. Additionally, actions that make indirect goal progress are listed on the goal that they best fit with, but it is important to note that many actions contain a wide range of benefits. For example, urban stormwater practices are listed as an action under the Nutrient Loading goal but will benefit each goal category. A full accounting of how actions benefit goals is shown in the action tables in Section 5—Targeted Implementation.

An additional benefit to implementing actions to achieve plan goals is carbon sequestration. An estimated 10,000 metric tons of CO₂-e (equivalent to emissions from 2,400 cars driven for a year!) will be sequestered from soil health and bacteria actions (see Appendix G).



Table 4-4. Summary of plan goals and corresponding actions.

Bold action = directly makes progress towards goal; Unbolded action = indirectly makes progress towards goal

Goal Name	10-Year Goal(s)	Example Implementation Actions (see Section 5)
Nutrient Loading	• Reduce total nitrogen loading by 1,811,900 lbs/year (or 6%) • Reduce total phosphorus loading by 79,700 lbs/year (or 6%)	• Structural Agricultural Practices • Soil Health and Non-Structural Practices • Urban Stormwater
Conduits to Groundwater	• 110 potential conduits to groundwater managed (100 wells sealed; 10 karst feature projects)	• Well Sealings (including high capacity) • Sinkhole Management • Pesticide Management • Well Testing Clinics • Sinkhole Inventory



Goal Name	10-Year Goal(s)	Example Implementation Actions (see Section 5)
Bacteria Loading	• 10 bacteria management projects • Technical support for 250 manure or nutrient management plans • 200 SSTS upgrades	• Livestock and Waste Management • Manure and Nutrient Management Plans • Septic Systems • Rotational Grazing and Pasture Management
Stream Management	• 2,000 linear feet of streambank stabilization or enhancement • 2 floodplain restoration projects	• Streambank Stabilization and Enhancement • Floodplain Restoration • Streambank Inventory
Water Storage	• Implement 8,900 acre-feet of temporary or permanent water storage on the landscape • 100 acres of wetland restoration	• Structural Agricultural Practices • Wetland Restoration or Creation • Feasibility Studies
Soil Health and Upland Erosion	• Implement an additional 22,300 acres of soil health practices • Reduce upland sediment by 100,300 tons/year (or 7%)	• Structural Agricultural Practices • Soil Health and Non-Structural Practices • Windbreaks • Soil Health Teams
Habitat Management, Protection, and Restoration	• 600 acres of easements or acquisitions • 3,750 acres of habitat and forest management	• Conservation Easements and Land Acquisition • Habitat Management, Enhancement, and Restoration • Woodland Stewardship Plans



Section 5.

Targeted

Implementation





5. Targeted Implementation

At the core of this CWMP are actions which address watershed opportunities and achieve plan goals. Actions are presented within a series of “action tables” that contain information about what the action is, which entities will implement it, cost, and other details.

This plan section summarizes the voluntary actions that are planned to protect, restore, and improve resources within the Root River Watershed.

Many of the actions listed here require landowner cooperation and leadership. All are voluntary. Many LGUs provide financial incentives and technical assistance to encourage BMPs and conservation action, but actions such as land protection, soil health practices, and well sealing are all done with landowner support.

Additionally, while LGUs will strive to implement the CWMP as written, undoubtedly new information and challenges will arise during the ten-year timeframe of the plan. As such, there may be deviations from the planned scope, location, or occurrence of actions summarized in this section.



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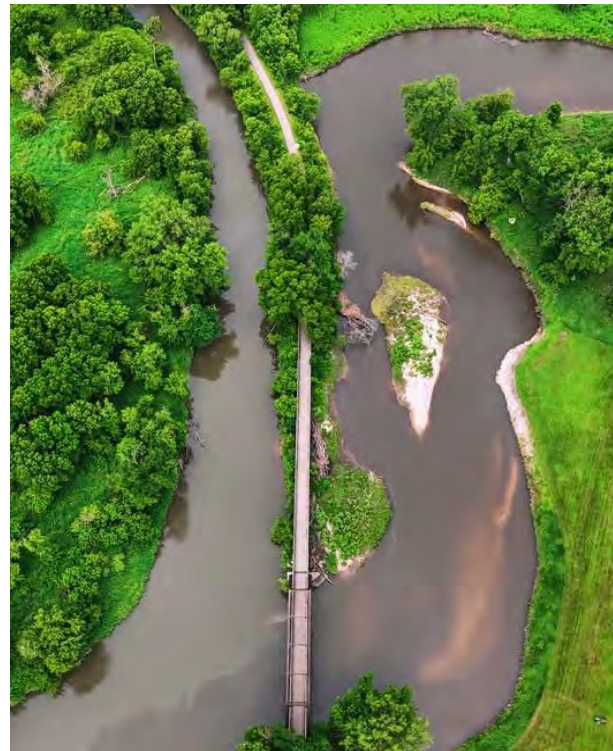


Funding

Funding is a major factor in making progress towards goals. As such, each action in the action table specifies if it's anticipated to be funded by “**Local Plan Budget**” or “**Partner/Federal**” sources of funding. It is acknowledged that inflation is likely over the course of this plan, but action costs do not increase annually to account for this. Detailed descriptions of local and partner/federal funding sources are provided in Section 7—Plan Administration and Coordination.

“**Local Plan Budget**” funds are predictable sources of local funds in the RRW, including baseline funds received by SWCDs, counties, or the Crooked Creek Watershed District on an annual basis. During implementation, the RRW will be eligible to receive additional state funding. For example, with this approved and adopted CWMP, the RRW is eligible to receive non-competitive Watershed Based Implementation Funding (WBIF) through BWSR. In recognition of this, an assumed \$1,160,000 annually has been added to baseline funding sources to develop a realistic estimate of local and state funds available to implement this plan.

Local governments in the RRW recognize that to achieve all plan goals and actions, some actions will require assistance from partnering entities. Partners may include MPCA, DNR, NRCS, United States Fish and Wildlife Service (USFWS), and other agencies or organizations with competitive and non-competitive funding programs. These partner costs are included in the action tables as “**Partner / Federal**,” highlighting that funding will come from partnering entities or federal dollars. Further detail on plan funding is included in Section 7—Plan Administration and Coordination.



*Root River Confluence, Lanesboro
Chamber of Commerce*





Plan Programs

Each action in this plan section is organized by the “implementation program” that will be the funding and administrative mechanism to implement the action. The five implementation programs for the Root River Watershed CWMP are: Projects, Practices, and Land Management; Public Participation and Engagement; Data Collection and Monitoring; Capital Improvements; and Local Controls. There is no action table for the Local Controls Program. Programs are summarized visually in Figure 5-1 and discussed in more depth in Section 6—Implementation Programs (including Local Control actions, which are ongoing and do not have an action table).

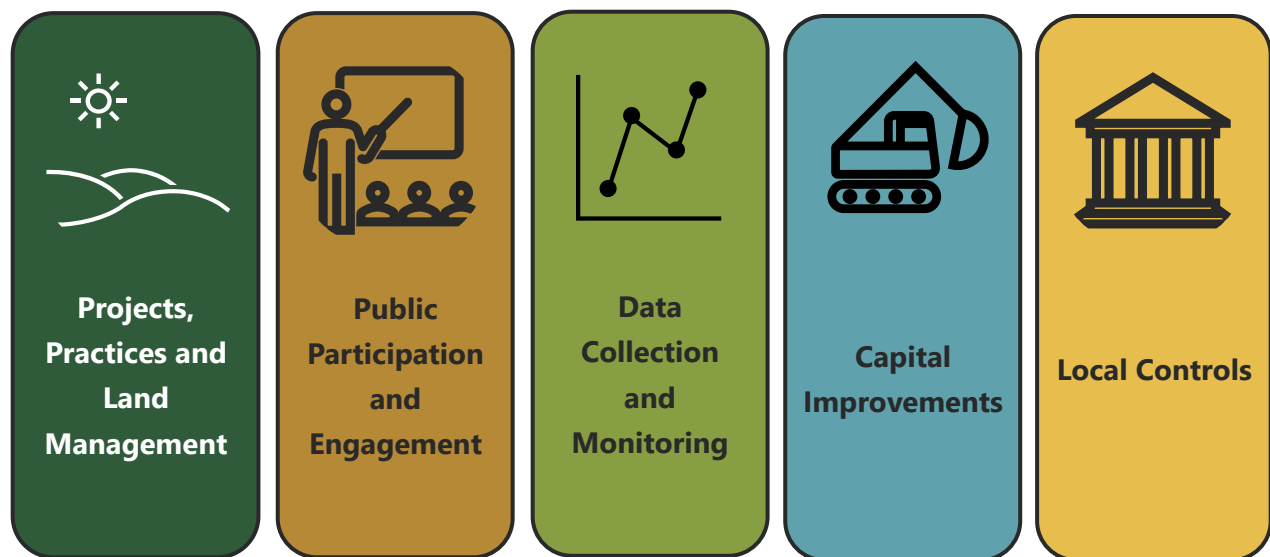


Figure 5-1. RRW Implementation Programs



Root River, Lanesboro Chamber of Commerce





Targeting Work

Modeling



The Prioritize, Target, and Measure Application (PTMApp) was used in the RRW to prioritize areas on the landscape that contribute disproportionately large amounts of sediment and nutrients (total phosphorus and total nitrogen), target where on the landscape it is feasible to implement conservation practices, and estimate the cost and benefits of practices that are part of an implementation scenario.

Like any model or tool, PTMApp has its limitations. PTMApp is well-suited for the RRW as it is primarily focused on agricultural BMPs, but it does not factor in wind, near-channel, or in-channel erosion. The way PTMApp models nitrate transport is especially important in the RRW. PTMApp estimates nitrogen reduction from overland transport, and does not model nitrogen loading or reduction to groundwater resources. The overland nitrogen loading goal is considered a surrogate for a vertical leaching reduction goal. Activities listed in the action tables will aim to address nitrogen overland loading as well as nitrogen leaching into groundwater.

Detailed information about the RRW PTMApp implementation scenario and maps of field-scale, targeted practices are provided in Appendix H. Planning partners in the RRW prioritized cost-effective practices that reduce nitrogen loading (at the edge-of-the-field) and practices that align with local implementation trends.

Actions pertaining to Structural Agricultural Practices and Soil Health and Non-Structural Practices outlined in this CWMP's implementation table are informed by PTMApp. In particular, the cost, load reductions, and acres treated in these action tables are informed by the PTMApp implementation scenario. It is important to understand that the actions planned in this section are ambitious, and while planning partners selected them believing them to be achievable, they are a best-case scenario. Implementation can be impacted by a variety of factors, including the need for voluntary landowner participation, the emergence of new data or practices, the availability of funding, field verification of practices, and the effectiveness of education and outreach efforts. New projects or practices may emerge during the planning timeframe that are not in the action tables. These can be implemented, provided benefits align with plan goals.

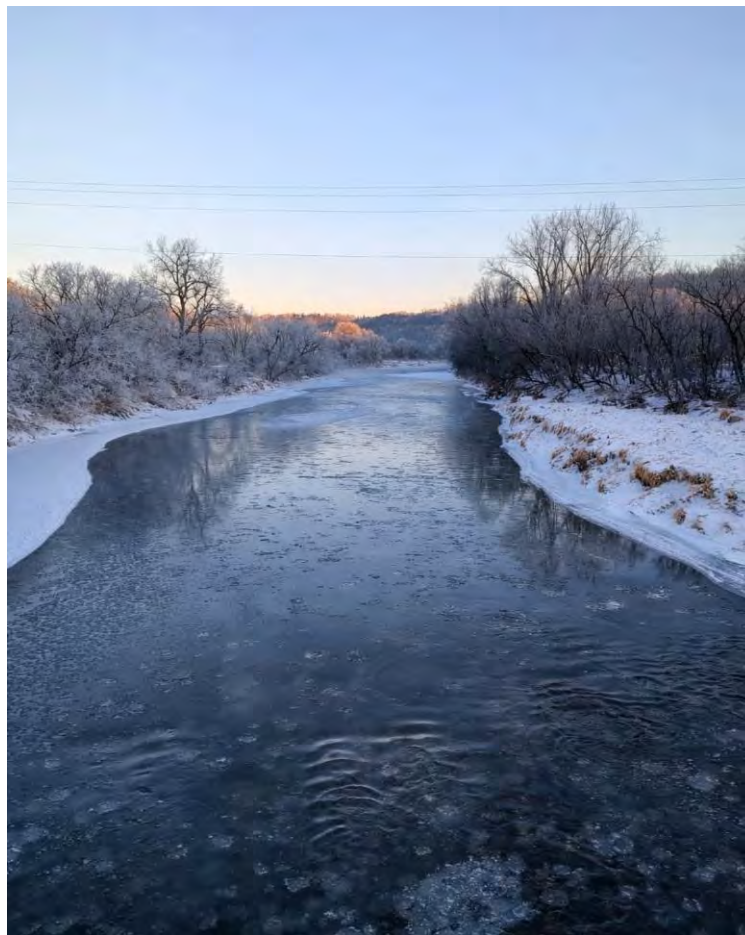




Table 5-1 shows PTMApp modeled loads at the RRW outlet along with a general comparison against results from another model [Hydrologic Simulation Program FORTRAN (HSPF)] and measured loads from the MPCA Watershed Pollutant Load Monitoring Network (WPLMN). Generally, PTMApp loads for each pollutant fell within the annual range of WPLMN measured loads, suggesting the PTMApp model accurately represents conditions within the watershed.

Table 5-1. Modeled loads comparison

	PTMApp Annual Load at Outlet	HSPF Annual Load	WPLMN Range (mean)
Sediment (tons/year)	68,982	157,062	29,495 - 767,804 (282,833)
Phosphorus (lbs/year)	304,982	846,483	213,405 - 1,942,597 (685,541)
Nitrogen (lbs/year)	7,005,988	17,778,681	6,082,358 - 35,402,482 (18,458,066)



Frozen Root River, Lanesboro Chamber of Commerce





Planning Regions

As the RRW spans over 1.3 million acres, targeting work is essential for effective implementation. Targeting is done in three ways—through organizing implementation actions around “planning regions,” modeling to target the most effective BMPs at a field-scale, and through development of a comprehensive priority map by subwatershed.

The RRW planning regions (Figure 5-2) organize the watershed into thirds, defined and described by their geology: Glacial Till, Karst, and Bluffland Karst regions. Organizing implementation efforts by planning regions allows actions and funding to be directed to the specific areas most relevant to address local opportunities and resources. **The Projects, Practices, and Land Management implementation program utilizes planning regions to target implementation actions. Actions in other programs are planned at the watershed scale.**

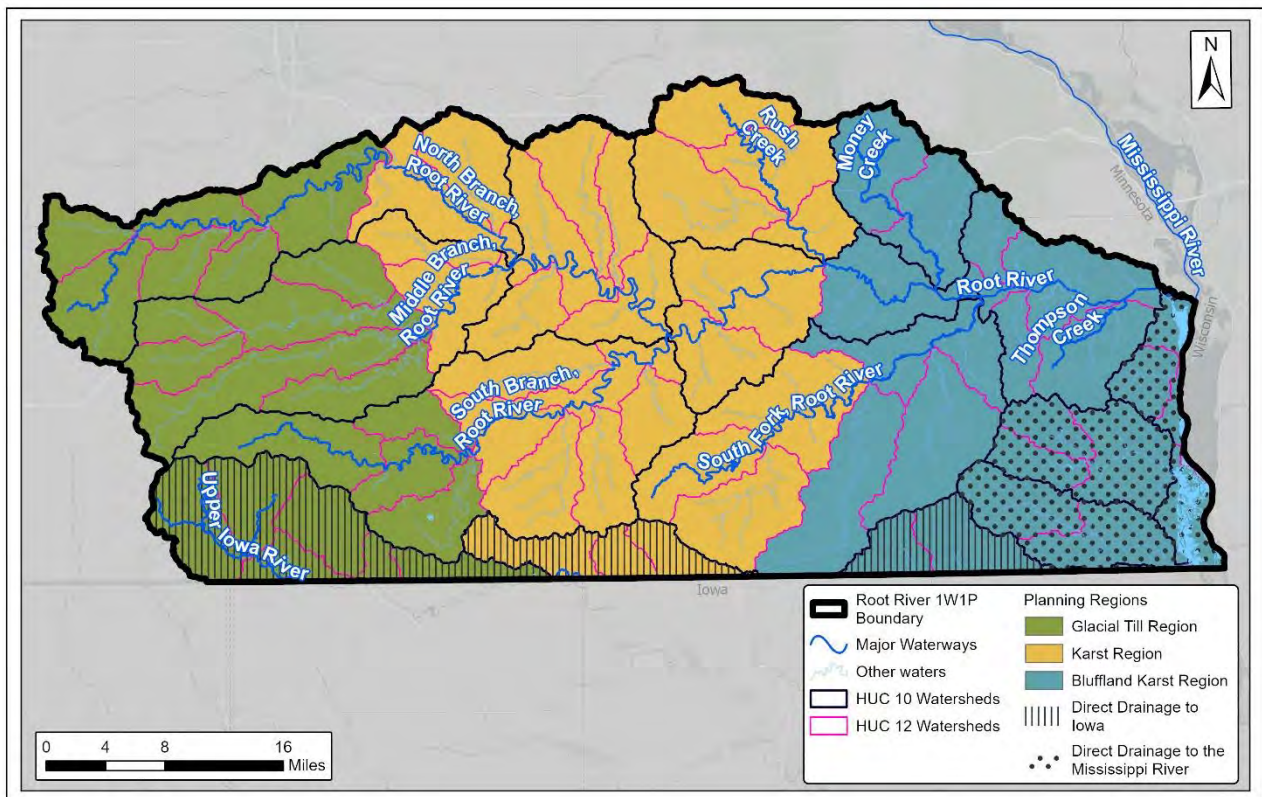


Figure 5-2. RRW Planning Regions

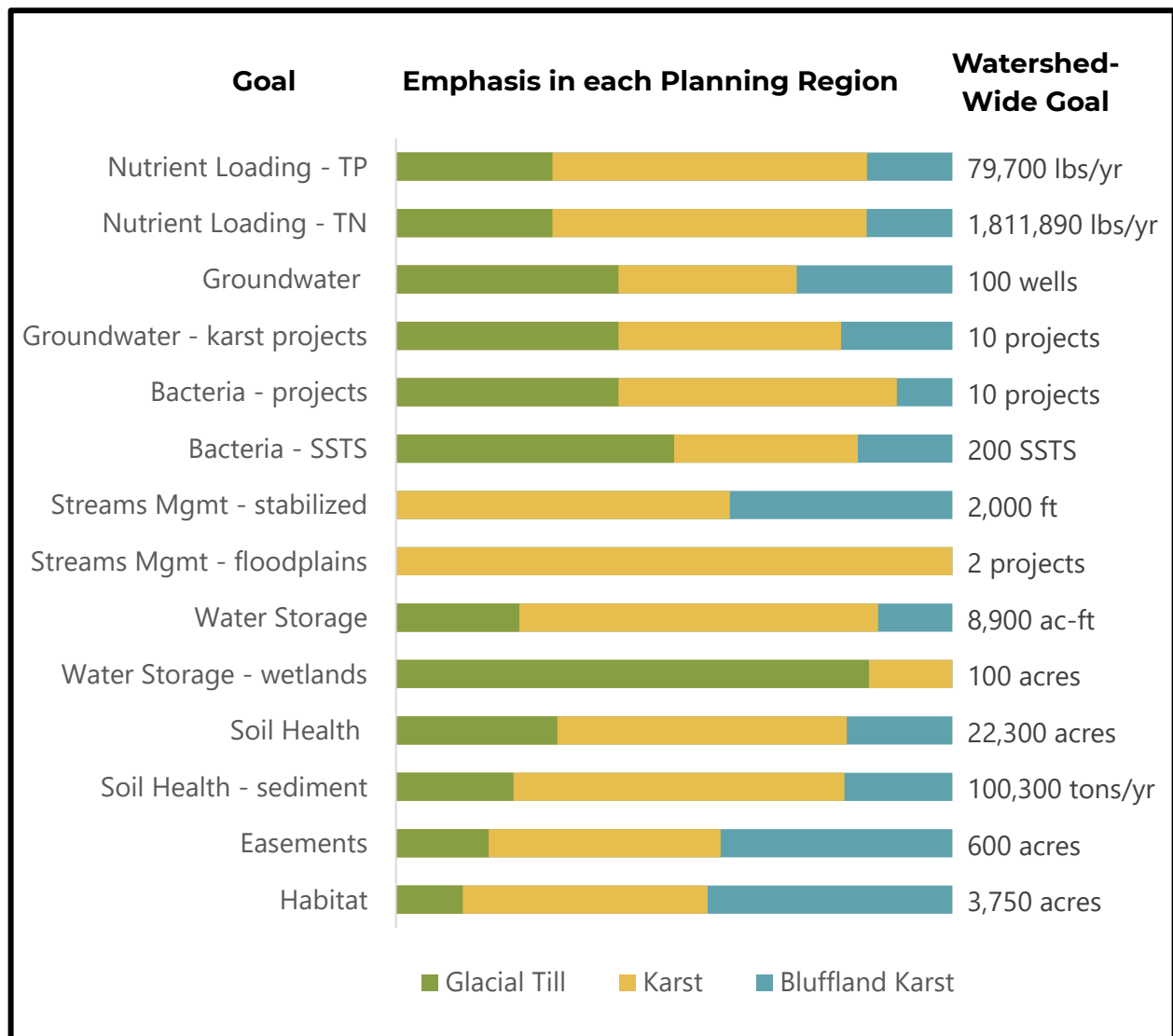




Progress Toward Goals

Goals in Section 4—Measurable Goals are summarized at a watershed-wide scale, however, progress towards these goals will be accrued within each planning region. Figure 5-3 visually summarizes how work towards each watershed-wide goal is anticipated among the three RRW planning regions. This milestone chart shows the watershed-wide goal on the right. Each bar on the chart represents the level of progress expected to be made in each planning region based on the focus area maps in Section 4—Measurable Goals and overall comprehensive priority areas. Planning regions that have a larger milestone contribution for a goal indicate that the opportunity is more prominent in that particular region.

Figure 5-3. Goal progress within planning regions





Comprehensive Focus Map

Each goal in Section 4—Measurable Goals has a focus area map with high priority subwatersheds identified through ranking of relevant geospatial data layers. Rather than relying on individual goal focus maps to inform implementation efforts, particularly pertaining to structural and non-structural practices, planning partners elected to create one comprehensive priority map to prioritize areas on the landscape that are highest priority for addressing multiple goals. The RRW Comprehensive Implementation Map (Figure 5-4) was developed by overlaying all goal maps except for Stream Management and Habitat. The resulting map summarizes the overall priority areas for implementation, again primarily for structural and non-structural practices. Work will be prioritized through ranking in high priority areas, as these areas are most likely to have multiple benefits to watershed opportunities and goals. Work pertaining to Stream Management and Habitat will be focused based on each goal focus map (Figure 4-5 and 4-9 respectively).

The Karst planning region has the highest number of high priority subwatersheds, which is reflected in action distribution (especially pertaining to Water Storage and Nutrient Loading actions) shown in Figure 5-3.

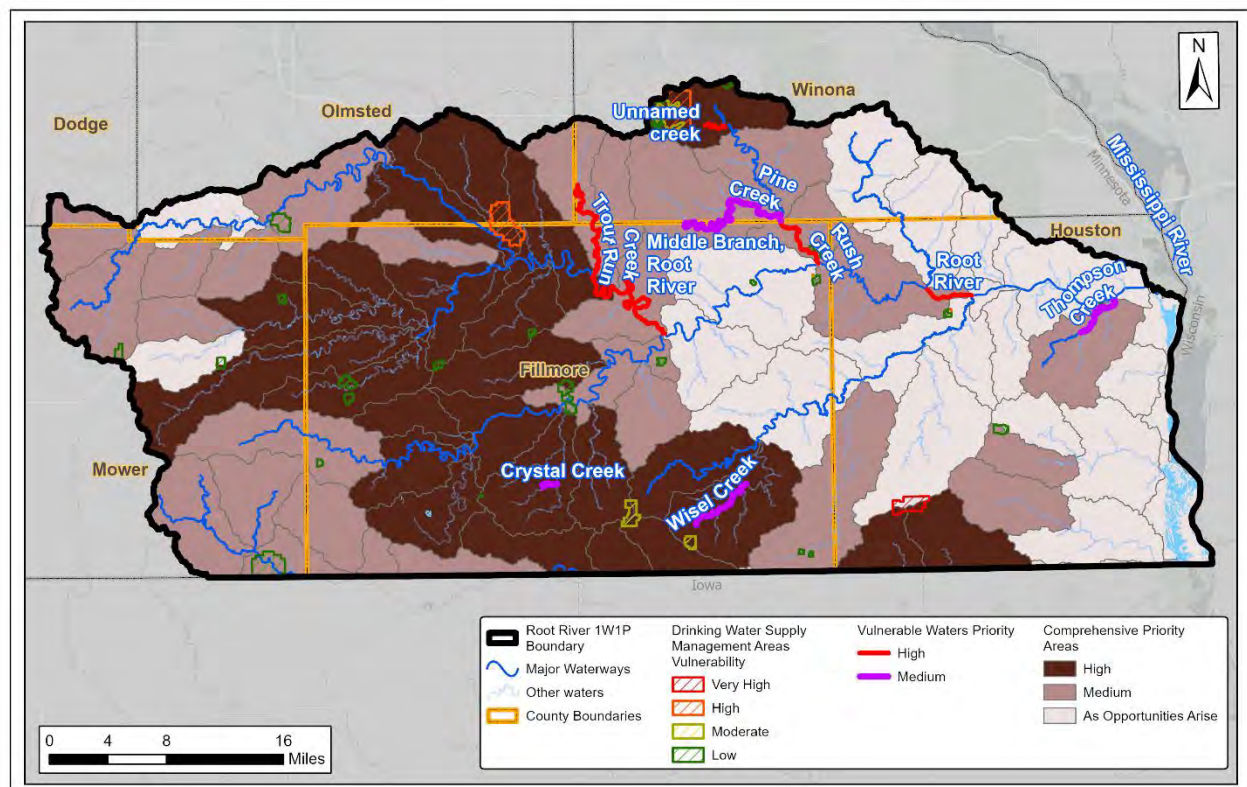


Figure 5-4. RRW Comprehensive Implementation Map





Action Tables

Actions are planned to comprehensively achieve all measurable goals, which are designed to address priority opportunities. The action list spans subjects such as sealing wells, protecting land, and designing and implementing agricultural BMPs. The full inventory of actions was collaboratively brainstormed by the Planning Work Group (PWG) and Advisory Committee. Some actions directly achieve goals (e.g. Bacteria Loading goal is 200 SSTs upgrades, an action listed in the table is upgrading 200 SSTs accordingly) while others indirectly address goals or opportunities.

Plan actions are summarized in the following action tables. They contain the following information:

- Action ID and description
- Focus area
 - Comprehensive priority areas (Figure 5-4)
 - Geographic targeting, with suggestions for Section 4 goal focus areas
- An output (i.e., a well sealing action has an output of 50 wells sealed)
- Goals progress addressed by each action
- Responsible partner / entity
- Implementation timeline
- Local 10-year cost
- Partner 10-year cost

The following pages contain watershed-wide action tables separated by program: Projects, Practices, and Land Management; Public Participation and Engagement; Data Collection and Monitoring; and Capital Improvement Projects.

Each planning region is highlighted with its own Projects, Practices, and Land Management action table—note that these actions are not in addition to watershed-wide actions, they are simply a breakdown of the watershed-wide actions within each planning region.





Table 5-2. Projects, Practices, and Land Management: Watershed-Wide

ID	Description	Focus Area	Output / Load Reduction	Measurable Goals							Responsibility (lead is bolded)	Timeline					10-Year Cost	
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	Local Plan Budget	Partner / Federal
WW-1	Structural Agricultural Practices Grassed waterways, grade stabilizations, groundwater recharge conservation practices, farm ponds, side water inlets, WASCOBs, etc.	Comprehensive Priority Areas	8,900 ac-ft storage 54,700 tons sediment 52,800 lbs TP 1,165,900 lbs TN	●	○	○		●	●		SWCDs , NRCS, BWSR, MDA, DNR	✓	✓	✓	✓	✓	\$5,016,900	N/A
WW-2	Soil Health and Non-Structural Practices Cover crops, conservation tillage, perennial cover, nutrient management, alternative cropping systems, etc.	Comprehensive Priority Areas	22,300 acres 45,600 tons sediment 26,900 lbs TP 646,000 lbs TN	●	○	○		○	●	○	SWCDs , Counties, Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$3,339,800	N/A
WW-3	Well Sealings Seal unused or abandoned wells	Watershed-wide	100 wells	○	●	○					Counties , SWCDs , Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$100,000	\$500,000
WW-4	Well Sealings – High Capacity Seal unused high capacity-wells	Watershed-wide	4 wells	○	○	○					Counties , Cities , SWCDs , MDH, BWSR		✓		✓		\$4,000	\$16,000
WW-5	Sinkhole Management Treat sinkholes or reduce groundwater contamination via filling, vegetative buffers, fencing, or other nutrient management surrounding the sinkhole	Conduits to Groundwater Focus Areas	10 projects	○	●	○					Counties , SWCDs , Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$22,500	\$7,500
WW-6	Livestock and Waste Management Projects to reduce bacteria including feedlot improvements, livestock exclusion, manure storage	Bacteria Loading Focus Areas	10 projects	○	○	●	○		○		SWCDs , MPCA, Counties, NRCS, BWSR, MDA	✓	✓	✓	✓	✓	\$75,000	\$25,000
WW-7	Rotational Grazing and Pasture Management Rotational grazing, pasture management, fencing, watering facilities, livestock pipeline, heavy use area protection, etc.	Bacteria Loading Focus Areas	400 acres	○	○	○			○	○	SWCDs , MPCA, Counties, NRCS, BWSR, MDA, NGOs	✓	✓	✓	✓	✓	\$90,000	\$30,000
WW-8	Septic Systems Upgrade of non-compliant SSTS	Watershed-wide	200 upgrades	○	○	●			○		Counties , MPCA	✓	✓	✓	✓	✓	\$1,500,000	\$1,500,000
WW-9	Urban Stormwater Management of urban runoff via stormwater detention ponds, raingardens, etc.	Watershed-wide	12 projects	○	○	○	○	○	○	○	Cities , SWCDs , MPCA, Counties	✓	✓	✓	✓	✓	\$270,000	\$90,000
WW-10	Streambank Stabilization and Enhancement	Priority Streams	2,000 feet	○		○	●		○	○	SWCDs , DNR, NRCS,	✓	✓	✓	✓	✓	\$250,000	\$250,000

● = action directly makes progress towards the goal

○ = action indirectly makes progress towards the goal





ID	Description	Focus Area	Output / Load Reduction	Measurable Goals							Responsibility (lead is bolded)	Timeline					10-Year Cost	
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	Local Plan Budget	Partner / Federal
	Stabilize streambank via restorations, grade stabilization, or buffer enhancement										BWSR							
WW-11	Floodplain Restoration Projects to reconnect streams to the floodplain	Priority Streams	2 projects	o	o	o	●	o	o	o	DNR, Counties, SWCDs				✓	✓	\$250,000	\$285,000
WW-12	Wetland Restoration or Creation Restoration or creation of wetlands	Water Storage Focus Areas	100 acres	o		o		o	o	o	BWSR, DNR, Counties, SWCDs	✓	✓	✓	✓	✓	\$100,000	\$1,900,000
WW-13	Conservation Easements and Land Acquisition Enrollment in permanent conservation easements, or land acquisitions	Habitat Focus Areas	600 acres	o	o	o	o	o	o	●	LFT, BWSR, DNR, MLT, FSA	✓	✓	✓	✓	✓	\$200,000	\$1,000,000
WW-14	Habitat Management, Enhancement, and Restoration Habitat and forest management and restoration such as conservation cover, prescribed burns, native / prairie / pollinator plantings, perennial cover, bluffland management, prairie and oak savanna restoration, riparian wetlands, temporary easements, and invasive species management	Karst Features, Decorah Edge, Habitat Focus Areas	3,750 acres	o	o	o		o	o	●	SWCDs, DNR, LFT, Counties, MDA	✓	✓	✓	✓	✓	\$337,500	\$600,000
WW-15	Woodland Stewardship Plans Plans with a roadmap for landowner forest management	Habitat Focus Areas	400 plans		o				o	o	DNR, LFT, SWCDs	✓	✓	✓	✓	✓	\$35,000	\$105,000
WW-16	Pesticide Management Pest or pesticide management plans	Nutrient Loading Focus Areas	15 projects	o	o				o	o	MDA, SWCDs	✓	✓	✓	✓	✓	\$30,000	N/A
WW-17	Windbreaks Windbreaks to reduce wind erosion	Soil Health and Upland Erosion Focus Areas	80,000 linear ft						o	o	SWCDs, DNR	✓	✓	✓	✓	✓	\$200,000	N/A
WW-18	Technical and Project Assistance- General*	Watershed-wide	Funds spent	o	o	o	o	o	o	o	SWCDs, DNR, MPCA, Counties, NRCS, BWSR, MDA, MDH	✓	✓	✓	✓	✓	\$8,032,000	N/A
WW-19	Technical and Project Assistance- Nutrient Management*	Watershed-wide	250 nutrient or manure management plans	o		●			o		SWCDs, MPCA, Counties, NRCS, BWSR, MDA	✓	✓	✓	✓	✓	\$900,000	N/A
WW-20	Technical and Project Assistance- Workload Analysis*	Watershed-wide	Funds spent	o	o	o	o	o	o	o	SWCDs		✓				\$75,000	N/A
10-Year Watershed-Wide Total																	\$20,827,700	\$6,308,500

● = action directly makes progress towards the goal o = action indirectly makes progress towards the goal

*Only included in this watershed-wide table, not the planning region tables





Table 5-3. Public Participation and Engagement

ID	Description	Focus Area	Output	Measurable Goals							Responsibility (lead is bolded)	Timeline					Estimated Cost (Local Plan Budget)
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	
PPE-1	General Education and Outreach Campaign Promote CWMP goals and educate residents on watershed resources and opportunities through social media posts and general outreach activities	Watershed-wide	Ongoing programming	o	o	o	o	o	o	o	SWCDs , Counties	✓	✓	✓	✓	✓	\$830,000
PPE-2	Well Testing Clinics Promote understanding of drinking water quality (such as the TAP-IN program) and hold clinics for private well testing	Watershed-wide	20 clinics		o						SWCDs , Counties, MDH, MPCA	✓	✓	✓	✓	✓	\$50,000
PPE-3	Pesticide Outreach Educate pesticide applicators on best practices, technology for minimizing application, and impacts of pesticides on groundwater and aquatic life	Nutrient Loading Focus Areas	10 workshops		o				o	o	MDA , SWCDs, NRCS, BWSR, MDA, MDH, UMN Extension	✓	✓	✓	✓	✓	\$20,000
PPE-4	Soil Health Teams Create soil health teams to further expand marketing and implementation of soil health practices	Soil Health and Upland Erosion Focus Areas	Teams created	o	o	o		o	o	o	SWCDs , NRCS, BWSR, MDA	✓	✓	✓	✓	✓	\$20,000
PPE-5	Youth Outreach Partner on youth education on environmental issues	Watershed-wide	30 school visits	o	o	o	o	o	o	o	SWCDs , Counties, UMN Extension	✓	✓	✓	✓	✓	\$60,000
PPE-6	Drainage Management LGU collaboration and early coordination for multipurpose drainage management	Watershed-wide	Annual meetings	o	o	o	o	o	o	o	Counties , SWCDs, DNR	✓	✓	✓	✓	✓	N/A
PPE-7	Fish Kill Education Education on fish kill causes and prevention	Watershed-wide	5 workshops							o	MPCA , SWCDs, Counties,	✓	✓	✓	✓	✓	\$10,000
PPE-8	Septic Education Educate homeowners on septic system maintenance	Watershed-wide	10 workshops	o	o	o					Counties , SWCDs, MPCA	✓	✓	✓	✓	✓	\$20,000
PPE-9	AIS Workshops Hold AIS workshops to reduce the spread of aquatic invasive species	Watershed-wide	5 workshops							o	SWCDs , Counties, DNR, UMN Extension	✓	✓	✓	✓	✓	\$20,000
PPE-10	Surface Water / Groundwater Interaction Education Educate watershed residents on the unique geology of the region, the implications to groundwater quality, and ways to protect groundwater	Conduits to Groundwater Focus Areas	10 workshops		o					o	SWCDs , DNR, Counties, Cities, MDH, MPCA	✓	✓	✓	✓	✓	\$10,000
PPE-11	Field Days Hold field days for education with residents and agricultural BMP contractors on forest, habitat, or agricultural land management	Watershed-wide	20 events	o	o	o	o	o	o	o	SWCDs , LFT , Counties, DNR, NRCS	✓	✓	✓	✓	✓	\$100,000
PPE-12	Root River State Water Trail Enhance accessibility of the trail, educate visitors via tours	Watershed-wide	Ongoing				o			o	DNR , SWCDs	✓	✓	✓	✓	✓	N/A
10-Year Total																	\$1,140,000

● = action directly makes progress towards the goal o = action indirectly makes progress towards the goal





Table 5-4. Data Collection and Monitoring

ID	Description	Focus Area	Output	Measurable Goals							Responsibility (lead is bolded)	Timeline					Estimated Cost (Local Plan Budget)
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	
DCM-1	Continue and Expand Surface Water Monitoring Continue current monitoring (and expand if possible) with the goal of understanding water quality, trends, emerging contaminants (e.g., PFAS, neonicotinoids), and impacts of conservation action	Watershed-wide	Coordination meeting if needed	o	o	o	o	o	o	o	MPCA, MDA, DNR, SWCDs, MDH	✓	✓	✓	✓	✓	\$2,501,000
DCM-2	Monitor for Pesticides Explore additional pesticide monitoring of groundwater resources beyond MDH and MDA testing	Nutrient Loading Focus Areas	Pesticide report		o					o	MPCA, MDA, SWCDs, MDH		✓	✓	✓	✓	\$0 (Partner funded)
DCM-3	Septic Inventory Identify noncompliant SSTs	Watershed-wide	Inventory completed	o	o	o					Counties, MPCA	✓					\$10,000
DCM-4	Sinkhole Inventory Identify sinkholes that could be a pathway to groundwater contamination	Watershed-wide	Inventory completed		o						Counties, SWCDs, Cities, MDH, BWSR	✓					\$10,000
DCM-5	Well Inventory Identify wells to be sealed	Watershed-wide	Inventory completed	o	o	o					Counties, SWCDs, Cities, MDH	✓	✓				\$20,000
DCM-6	Streambank Inventory Identify areas for stabilization or enhancement	Stream Management Focus Areas	Inventory completed	o			o			o	DNR, MPCA, SWCDs, Counties	✓	✓				\$20,000
DCM-7	Feasibility Studies Complete feasibility studies or analyses on potential water storage or streambank stabilization projects	Water Storage Focus Areas, Priority Streams	3 Studies				o	o	o	o	Counties, SWCDs, MPCA, DNR, BWSR	✓	✓				\$150,000
DCM-8	Funding Opportunities Identify potential avenues of partner funding for wetland restorations, land protection actions, etc.	Watershed-wide	Funding source(s) identified	o	o	o	o	o	o	o	SWCDs, Counties, LFT	✓	✓	✓			\$10,000
DCM-9	Microbial Source Tracking Conduct a microbial source tracking study to identify sources of bacteria	Bacteria Loading Focus Areas	MST completed			o					MPCA, SWCDs, Counties, LFT				✓		\$0 (Partner funded)
10-Year Total																	\$2,721,000

● = action directly makes progress towards the goal o = action indirectly makes progress towards the goal





The Capital Improvement Projects (CIP) Action Table summarizes the actions pertaining to the construction, repair, retrofit, or increased utility or function of physical facilities, infrastructure, or environmental features. CIPs require external funding. They will be implemented through the CIP Implementation Program, described further in Section 6—Implementation Programs. Where eligible, the planning partners intend to use approximately \$115,000 /year to support implementation of these projects, likely sourcing from WBIF.

Table 5-5. Capital Improvements

Project Title	Description	Lead Entity	Information Source	Timeline	Status	Cost
Pine Creek Storage Structures	Implement storage structures in the Pine Creek subwatersheds to reduce erosion and flood risk	Winona SWCD	Committee Feedback	2027-2037	Not started	TBD
Waste Water Treatment Plan Upgrades	Several WWTPs discharge into the Root River and are undersized, impacting water quality and trout stream health	Cities	Committee Feedback	2027-2037	Not started	TBD
Nitrate Sensor Network Project	Develop a sensor network to better understand nitrate loading and trends in the watershed	State Agencies	Committee Feedback	2027-2037	Not started	TBD
Urban Stormwater and Erosion Control Ponds	There will be a focus on maintaining stormwater ponds in the upstream region of the watershed.	Cities	Committee Feedback	2027-2037	Not started	TBD





Planning Region: Glacial Till



Planning Region Quick Stats

- Within Mower, Olmsted, and Fillmore Counties (and a small amount of land in Dodge County)
- Home to the cities of Spring Valley and Stewartville
- Contains no priority streams
- Headwaters of North, Middle, and South Branches of the Root River, and the Upper Iowa River
- Largely agricultural land use

Priority levels will be used to rank and prioritize potential projects (Figure 5-5). Work in low priority subwatersheds will occur as opportunities arise / on a case-by-case basis. Use of WBIF must be predominantly for implementation in medium or high priority subwatersheds.

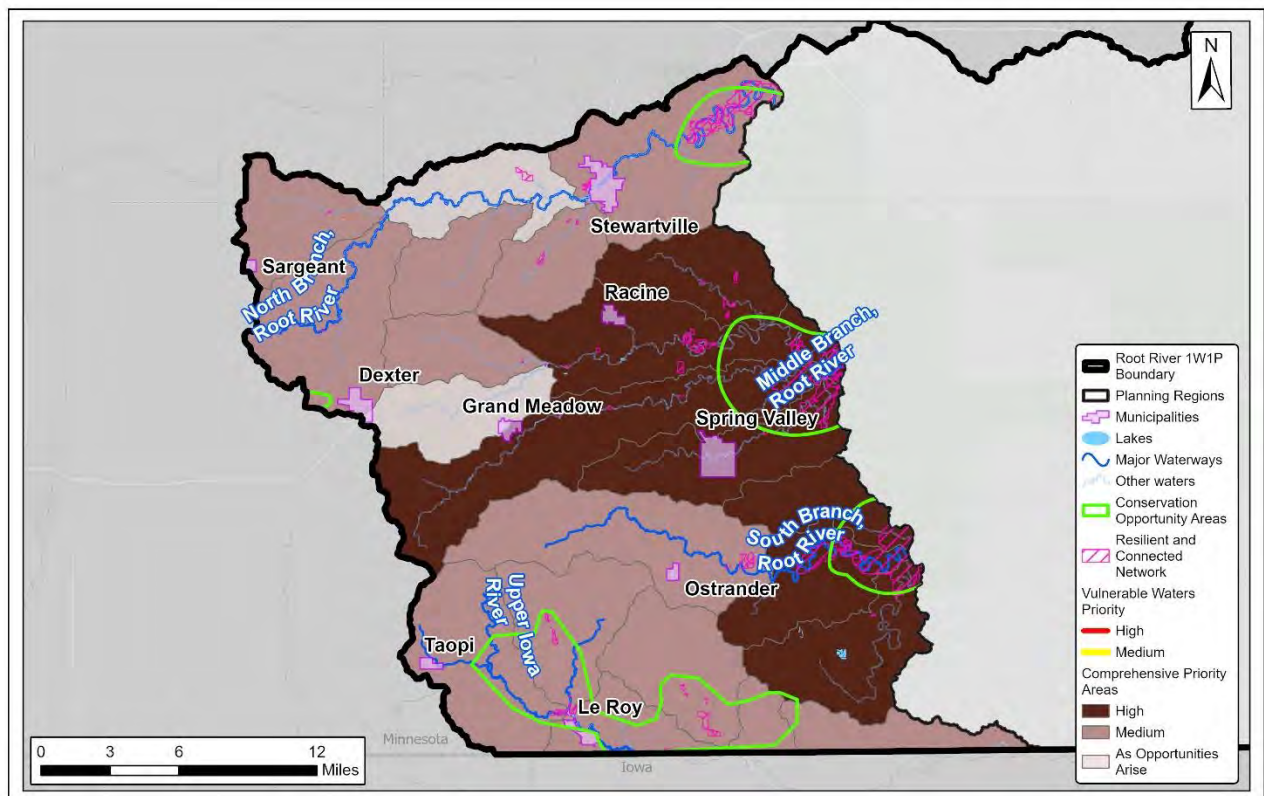


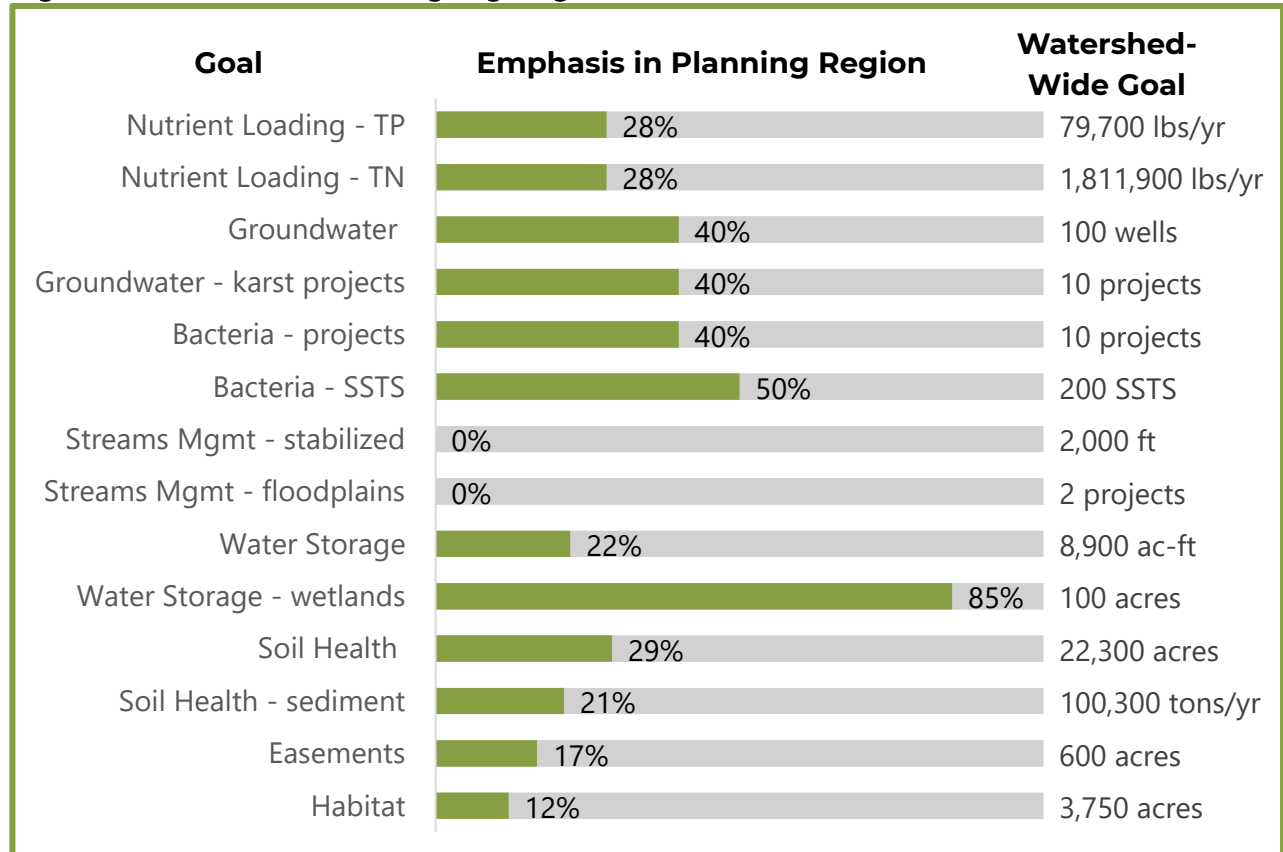
Figure 5-5. Glacial Till Planning Region priority areas





The Glacial Till milestone chart shows the watershed-wide goal on the right. Each bar on the chart represents the level of progress for a goal expected to be made in the planning region. The greatest emphasis on wetland restoration and SSTS management will occur in the Glacial Till Planning Region.

Figure 5-6. Glacial Till Planning Region goal milestones



Wykoff Balsam Fir Scientific and Natural Area





Table 5-6. Glacial Till Planning Region: Projects, Practices and Land Management

ID	Description	Focus Area	Output / Load Reduction	Measurable Goals							Responsibility (lead is bolded)	Timeline					10-Year Cost	
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	Local Plan Budget	Partner / Federal
GT-1	Structural Agricultural Practices Grassed waterways, grade stabilizations, groundwater recharge conservation practices, farm ponds, side water inlets, WASCOBs, etc.	Comprehensive Priority Areas	2,000 ac-ft storage 12,600 tons sediment 14,600 lbs TP 321,900 lbs TN	●	○	○		●	●		SWCDs , NRCS, BWSR, MDA, DNR	✓	✓	✓	✓	✓	\$1,453,900	N/A
GT -2	Soil Health and Non-Structural Practices Cover crops, conservation tillage, alternative cropping systems, perennial cover, nutrient management, etc.	Comprehensive Priority Areas	6,500 acres 8,500 tons sed 7,800 lbs TP 187,400 lbs TN	●	○	○		○	●	○	SWCDs , Counties, Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$968,700	N/A
GT -3	Well Sealings Seal unused or abandoned wells	Watershed-wide	40 wells	○	●	○					Counties , SWCDs , Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$40,000	\$200,000
GT -4	Well Sealings – High Capacity Seal unused high capacity-wells	Watershed-wide	2 wells	○	●	○					Counties , Cities , SWCDs, MDH, BWSR		✓				\$2,000	\$8,000
GT -5	Sinkhole Management Treat sinkholes or reduce groundwater contamination via filling, vegetative buffers, fencing, or other nutrient management surrounding the sinkhole	Conduits to Groundwater Focus Areas	4 projects	○	●	○					Counties , SWCDs, Cities, MDH, BWSR	✓	✓				\$9,000	\$3,000
GT -6	Livestock and Waste Management Projects to reduce bacteria including feedlot improvements, livestock exclusion, manure storage	Bacteria Loading Focus Areas	4 projects	○	○	●	○		○		SWCDs , MPCA, Counties, NRCS, BWSR, MDA	✓	✓				\$30,000	\$10,000
GT -7	Rotational Grazing and Pasture Management Rotational grazing, pasture management, fencing, watering facilities, livestock pipeline, heavy use area protection, etc.	Bacteria Loading Focus Areas	250 acres	○	○	○			○	○	SWCDs , MPCA, Counties, NRCS, BWSR, MDA, NGOs	✓	✓	✓	✓	✓	\$56,250	\$18,750
GT -8	Septic Systems Upgrade of non-compliant SSTS	Watershed-wide	100 upgrades	○	○	●			○		Counties , MPCA	✓	✓	✓	✓	✓	\$750,000	\$750,000

● = action directly makes progress towards the goal

○ = action indirectly makes progress towards the goal





ID	Description	Focus Area	Output / Load Reduction	Measurable Goals							Responsibility (lead is bolded)	Timeline					10-Year Cost	
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	Local Plan Budget	Partner / Federal
GT -9	Urban Stormwater Management of urban runoff via stormwater detention ponds, raingardens, etc.	Watershed-wide	5 projects	o	o	o	o	o	o	o	Cities , SWCDs, MPCA, Counties	✓	✓	✓	✓	✓	\$112,500	\$37,500
GT -10	Streambank Stabilization and Enhancement Stabilize streambank via restorations, grade stabilization, or buffer enhancement	N/A	0 feet	o		o	●		o	o	SWCDs , DNR, NRCS, BWSR						N/A	N/A
GT -11	Floodplain Restoration Projects to reconnect streams to the floodplain	N/A	0 projects	o	o	o	●	o	o	o	DNR , Counties, SWCDs						N/A	N/A
GT -12	Wetland Restoration or Creation Restoration or creation of wetlands	Water Storage Focus Areas	85 acres	o		o		o	o	o	BWSR , DNR, Counties, SWCDs	✓	✓	✓	✓	✓	\$85,000	\$1,615,000
GT -13	Conservation Easements and Land Acquisition Enrollment in permanent conservation easements, or land acquisitions	Habitat Focus Areas	100 acres	o	o	o	o	o	o	●	LFT , BWSR, DNR, MLT, FSA	✓	✓	✓	✓	✓	\$33,300	\$166,700
GT -14	Habitat Management, Enhancement, and Restoration Habitat and forest management and restoration such as conservation cover, prescribed burns, native / prairie / pollinator plantings, perennial cover, bluffland management, prairie and oak savanna restoration, riparian wetlands, temporary easements, and invasive species management	Karst Features, Decorah Edge, Habitat Focus Areas	450 acres	o	o	o		o	o	●	SWCDs , DNR, LFT , Counties, MDA	✓	✓	✓	✓	✓	\$40,500	\$72,000
GT -15	Woodland Stewardship Plans Plans with a roadmap for landowner forest management	Habitat Focus Areas	40 plans		o				o	o	DNR , LFT , SWCDs	✓					\$3,500	\$10,500
GT -16	Pesticide Management Pest or pesticide management plans	Nutrient Loading Focus Areas	10 projects	o	o				o	o	MDA , SWCDs	✓	✓	✓	✓	✓	\$20,000	N/A
GT -17	Windbreaks Windbreaks to reduce wind erosion	N/A	0 linear ft						o	o	SWCDs , DNR						N/A	N/A
10-Year Planning Region Total																	\$3,604,650	\$2,891,450

● = action directly makes progress towards the goal

o = action indirectly makes progress towards the goal





Planning Region: Karst



Planning Region Quick Stats

- Within Olmsted, Winona, and Fillmore Counties (and a small amount of land in Houston County)
- Home to the cities of Harmony, Preston, Rushford, and Chatfield
- Seven of nine priority streams are in the Karst Planning Region: Wisel, Rush, Pine, Crystal, Trout Run, and Unnamed Creeks, and Middle Branch of the Root River
- Contains two highly vulnerable DWSMAs

The majority of Projects, Practices and Land Management funding will be focused in the Karst Planning Region to align with comprehensive priority areas. Priority levels will be used to rank and prioritize potential projects (Figure 5-7). Work in low priority subwatersheds will occur as opportunities arise / on a case-by-case basis. Use of WBIF must be predominantly for implementation in medium or high priority subwatersheds.

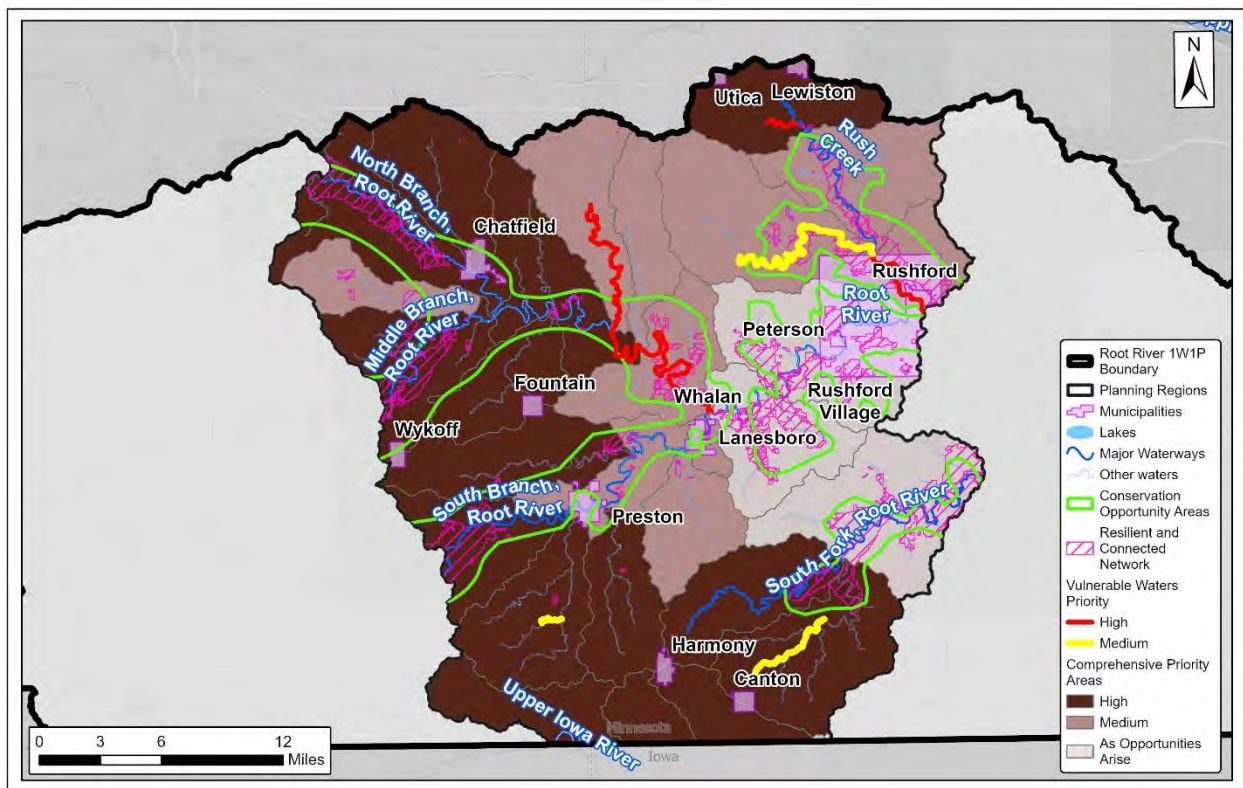


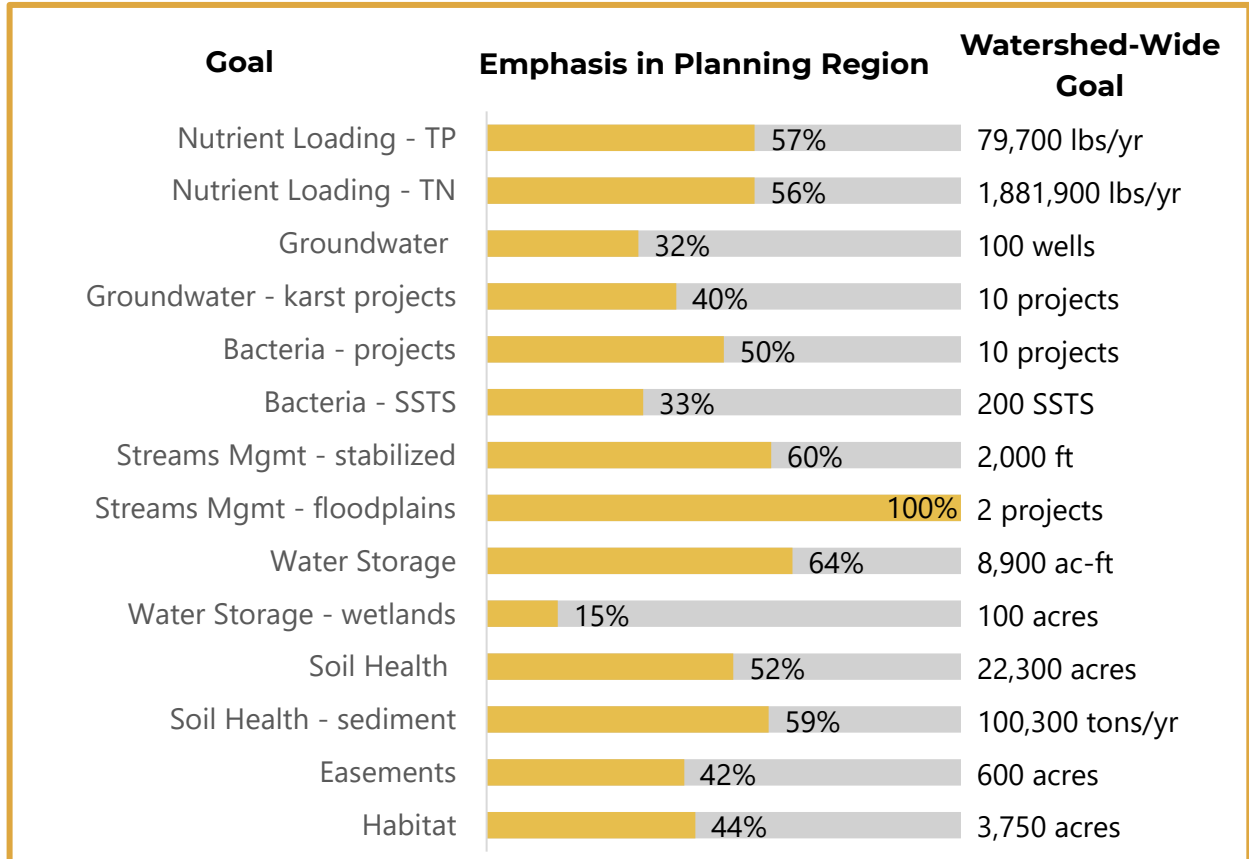
Figure 5-7. Karst Planning Region priority areas





The Karst milestone chart shows the watershed-wide goal on the right. Each bar on the chart represents the level of progress for a goal expected to be made in the planning region. The Karst planning region has the largest focus of implementation efforts, particularly in streambank stabilization, soil health, and nutrient loading actions. Floodplain restoration is also focused here, based on the prominence of priority streams.

Figure 5-8. Karst Planning Region goal milestones



Middle Branch Root River





Table 5-7. Karst Planning Region: Projects, Practices and Land Management

ID	Description	Focus Area	Output / Load Reduction	Measurable Goals							Responsibility (lead is bolded)	Timeline					10-Year Cost	
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	Local Plan Budget	Partner / Federal
K-1	Structural Agricultural Practices Grassed waterways, grade stabilizations, groundwater recharge conservation practices, farm ponds, side water inlets, WASCOBs, etc.	Comprehensive Priority Areas	5,700 ac-ft storage 33,700 tons sediment 31,000 lbs TP 687,300 lbs TN	●	○	○		●	●		SWCDs , NRCS, BWSR, MDA, DNR	✓	✓	✓	✓	✓	\$2,609,600	N/A
K -2	Soil Health and Non-Structural Practices Cover crops, conservation tillage, alternative cropping systems, perennial cover, nutrient management, etc.	Comprehensive Priority Areas	11,600 acres 26,000 tons sediment 14,000 lbs TP 336,000 lbs TN	●	○	○		○	●	○	SWCDs , Counties, Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$1,737,100	N/A
K -3	Well Sealings Seal unused or abandoned wells	Watershed-wide	32 wells	○	●	○					Counties , SWCDs , Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$32,000	\$160,000
K -4	Well Sealings – High Capacity Seal unused high capacity-wells	Watershed-wide	1 well	○	○	○					Counties , Cities , SWCDs , MDH, BWSR				✓		\$1,000	\$4,000
K -5	Sinkhole Management Treat sinkholes or reduce groundwater contamination via filling, vegetative buffers, fencing, or other nutrient management surrounding the sinkhole	Conduits to Groundwater Focus Areas	4 projects	○	●	○					Counties , SWCDs , Cities, MDH, BWSR			✓	✓		\$9,000	\$3,000
K -6	Livestock and Waste Management Projects to reduce bacteria including feedlot improvements, livestock exclusion, manure storage	Bacteria Loading Focus Areas	5 projects	○	○	●	○		○		SWCDs , MPCA, Counties, NRCS, BWSR, MDA	✓	✓	✓	✓	✓	\$37,500	\$12,500
K -7	Rotational Grazing and Pasture Management Rotational grazing, pasture management, fencing, watering facilities, livestock pipeline, heavy use area protection, etc.	Bacteria Loading Focus Areas	150 acres	○	○	○			○	○	SWCDs , MPCA, Counties, NRCS, BWSR, MDA, NGOs	✓	✓	✓	✓	✓	\$33,750	\$11,250
K -8	Septic Systems Upgrade of non-compliant SSTs	Watershed-wide	66 upgrades	○	○	●			○		Counties , MPCA	✓	✓	✓	✓	✓	\$495,000	\$495,000

● = action directly makes progress towards the goal

○ = action indirectly makes progress towards the goal





ID	Description	Focus Area	Output / Load Reduction	Measurable Goals							Responsibility (lead is bolded)	Timeline					10-Year Cost	
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	Local Plan Budget	Partner / Federal
K -9	Urban Stormwater Management of urban runoff via stormwater detention ponds, raingardens, etc.	Watershed-wide	5 projects	o	o	o	o	o	o	o	Cities, SWCDs, MPCA, Counties	✓	✓	✓	✓	✓	\$112,500	\$37,500
K -10	Streambank Stabilization and Enhancement Stabilize streambank via restorations, grade stabilization, or buffer enhancement	Priority Streams	1,200 feet	o		o	●		o	o	SWCDs, DNR, NRCS, BWSR	✓	✓	✓	✓	✓	\$150,000	\$150,000
K -11	Floodplain Restoration Projects to reconnect streams to the floodplain	Priority Streams	2 projects	o	o	o	●	o	o	o	DNR, Counties, SWCDs				✓	✓	\$250,000	\$285,000
K -12	Wetland Restoration or Creation Restoration or creation of wetlands	Water Storage Focus Areas	15 acres	o		o		o	o	o	BWSR, DNR, Counties, SWCDs	✓	✓	✓	✓	✓	\$15,000	\$285,000
K -13	Conservation Easements and Land Acquisition Enrollment in permanent conservation easements, or land acquisitions	Habitat Focus Areas	250 acres	o	o	o	o	o	o	●	LFT, BWSR, DNR, MLT, FSA	✓	✓	✓	✓	✓	\$83,300	\$416,650
K -14	Habitat Management, Enhancement, and Restoration Habitat and forest management and restoration such as conservation cover, prescribed burns, native / prairie / pollinator plantings, perennial cover, bluffland management, prairie and oak savanna restoration, riparian wetlands, temporary easements, and invasive species management	Karst Features, Decorah Edge, Habitat Focus Areas	1,650 acres	o	o	o		o	o	●	SWCDs, DNR, LFT, Counties, MDA	✓	✓	✓	✓	✓	\$148,500	\$264,000
K -15	Woodland Stewardship Plans Plans with a roadmap for landowner forest management	Habitat Focus Areas	160 plans		o				o	o	DNR, LFT, SWCDs		✓	✓	✓	✓	\$14,000	\$42,000
K -16	Pesticide Management Pest or pesticide management plans	Nutrient Loading Focus Areas	5 projects	o	o				o	o	MDA, SWCDs	✓	✓	✓	✓	✓	\$10,000	N/A
K -17	Windbreaks Windbreaks to reduce wind erosion	Soil Health and Upland Erosion	70,000 linear ft						o	o	SWCDs, DNR	✓	✓	✓	✓	✓	\$175,000	N/A
10-Year Planning Region Total																	\$5,913,250	\$2,165,900

● = action directly makes progress towards the goal

o = action indirectly makes progress towards the goal





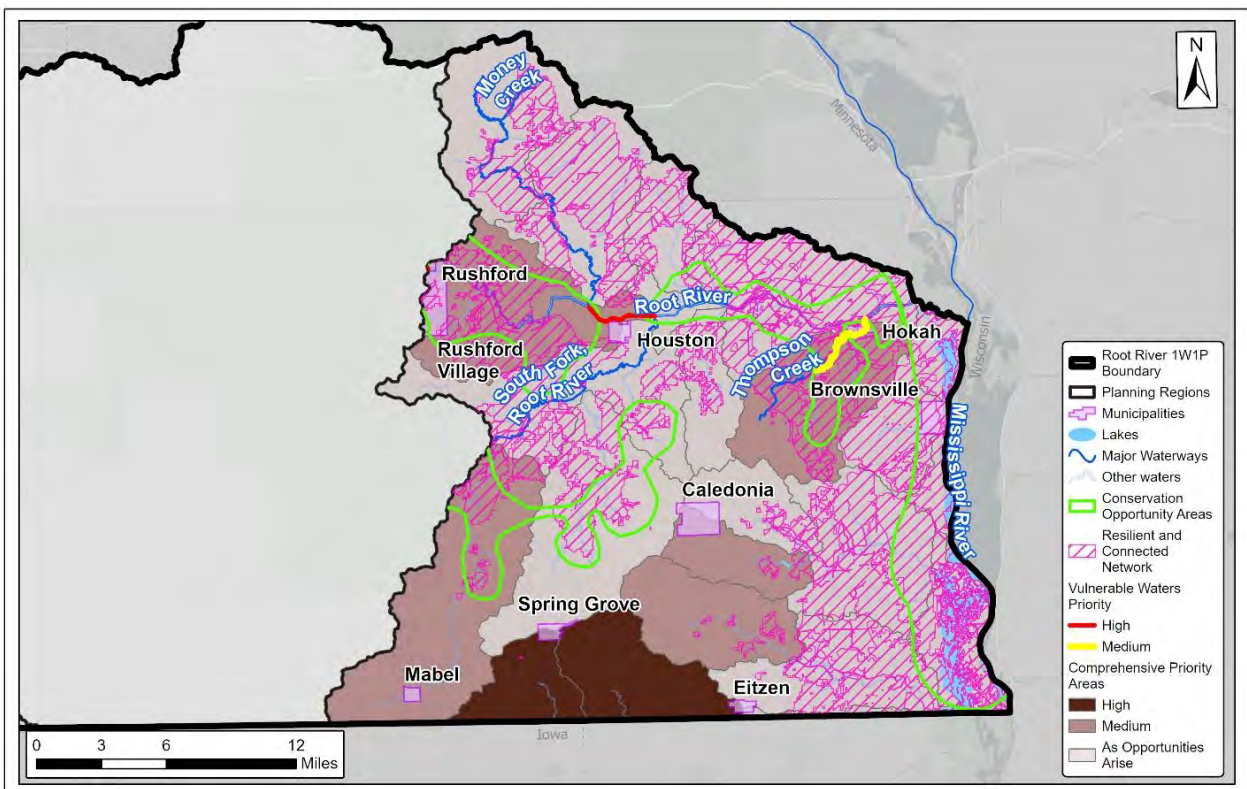
Planning Region: Bluffland Karst



Planning Region Quick Stats

- Largely within Houston County, some land in Fillmore and Winona Counties
- Home to the cities of Caledonia, Spring Grove, and Houston
- Two priority streams: Thompson Creek and Root River
- Borders the Mississippi River
- One very highly vulnerable DWSMA, two highly vulnerable DWSMAs

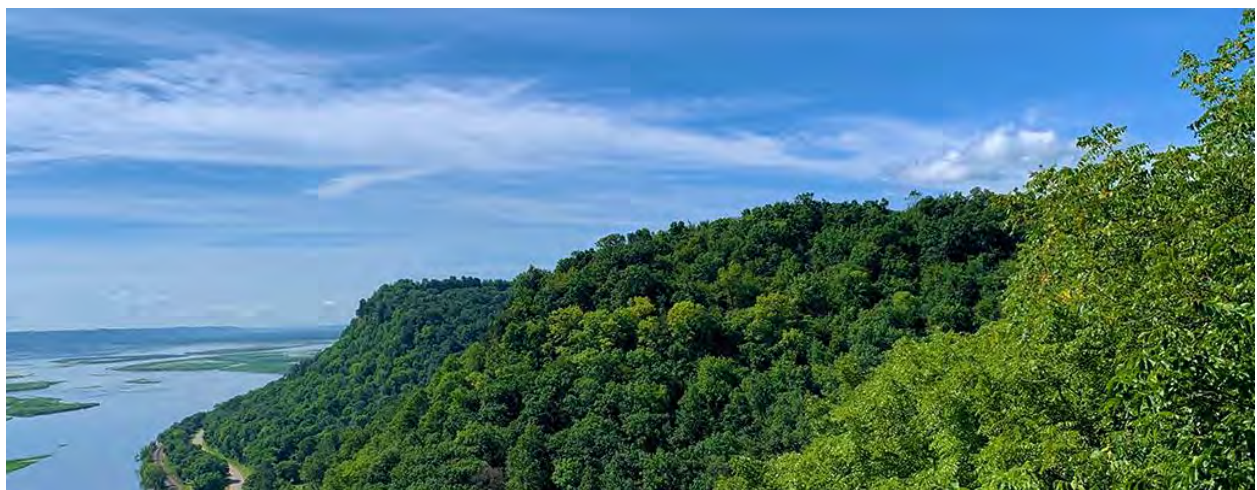
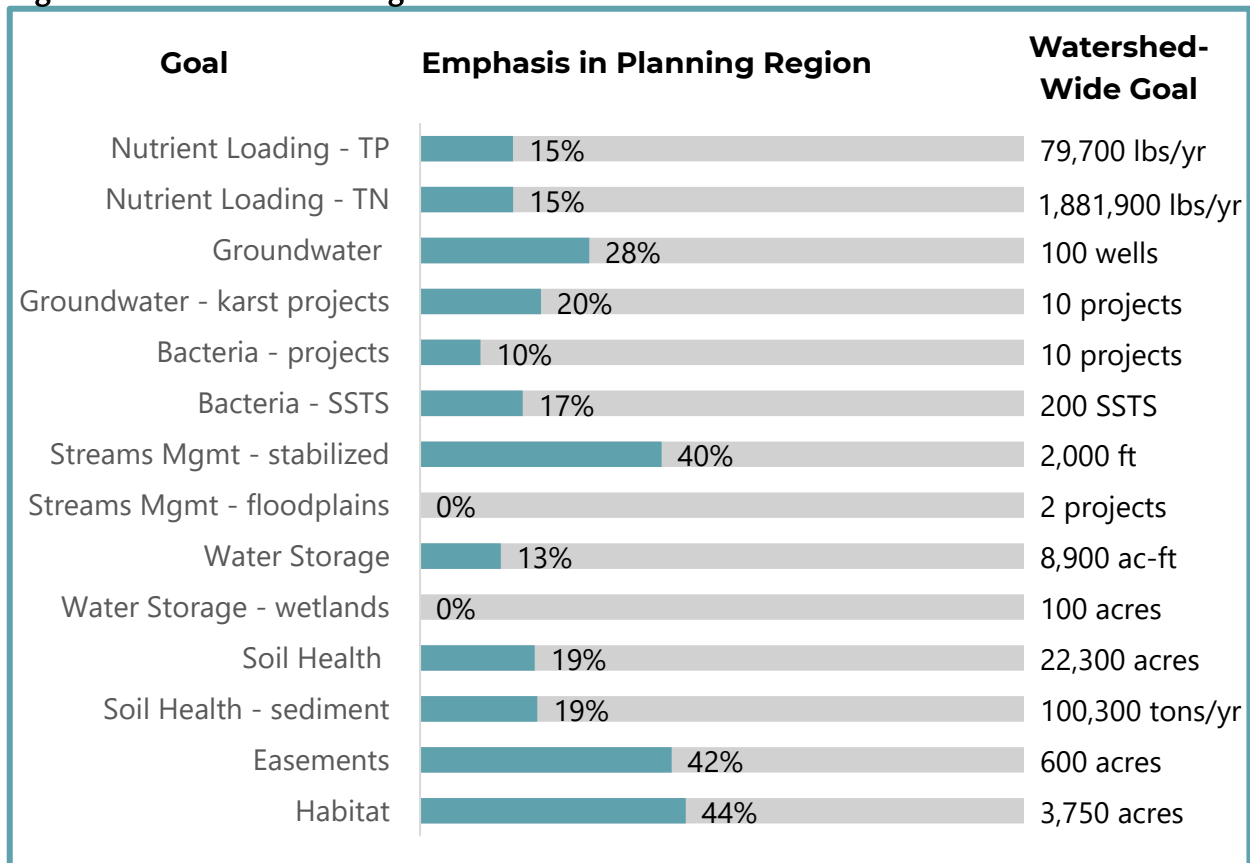
Priority levels will be used to rank and prioritize potential projects (Figure 5-9). Work in the low-priority subwatersheds will occur as opportunities arise / on a case-by-case basis. Use of WBIF must be predominantly for implementation in medium or high priority subwatersheds.





The Bluffland Karst milestone chart shows the watershed-wide goal on the right. Each bar on the chart represents the level of progress for a goal expected to be made in the planning region. Habitat management, conservation easements, and streambank stabilization are actions in which a significant amount of work is intended to occur in the Bluffland Karst Region.

Figure 5-10. Bluffland Karst goal milestones



Brownsville Bluff Scientific and Natural Area



Table 5-8. Bluffland Karst Planning Region: Projects, Practices and Land Management

ID	Description	Focus Area	Output / Load Reduction	Measurable Goals							Responsibility (lead is bolded)	Timeline					10-Year Cost	
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	Local Plan Budget	Partner / Federal
BK-1	Structural Agricultural Practices Grassed waterways, grade stabilizations, groundwater recharge conservation practices, farm ponds, side water inlets, WASCOb, etc.	Comprehensive Priority Areas	1,200 ac-ft storage 8,400 tons sediment 7,200 lbs TP 156,700 lbs TN	●	○	○		●	●		SWCDs, NRCS, BWSR, MDA, DNR	✓	✓	✓	✓	✓	\$953,400	N/A
BK-2	Soil Health and Non-Structural Practices Cover crops, conservation tillage, alternative cropping systems, perennial cover, nutrient management, etc.	Comprehensive Priority Areas	4,200 acres 11,100 tons sediment 5,100 lbs TP 122,600 lbs TN	●	○	○		○	●	○	SWCDs, Counties, Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$634,000	N/A
BK-3	Well Sealings Seal unused or abandoned wells	Watershed-wide	28 wells	○	●	○					Counties, SWCDs, Cities, MDH, BWSR	✓	✓	✓	✓	✓	\$28,000	\$140,000
BK-4	Well Sealings – High Capacity Seal unused high capacity-wells	Watershed-wide	1 well	○	○	○					Counties, Cities, SWCDs, MDH, BWSR				✓		\$1,000	\$4,000
BK-5	Sinkhole Management Treat sinkholes or reduce groundwater contamination via filling, vegetative buffers, fencing, or other nutrient management surrounding the sinkhole	Conduits to Groundwater Focus Areas	2 projects	○	●	○					Counties, SWCDs, Cities, MDH, BWSR					✓	\$4,500	\$1,500
BK-6	Livestock and Waste Management Projects to reduce bacteria including feedlot improvements, livestock exclusion, manure storage	Bacteria Loading Focus Areas	1 project	○	○	●	○		○		SWCDs, MPCA, Counties, NRCS, BWSR, MDA					✓	\$7,500	\$2,500
BK-7	Rotational Grazing and Pasture Management Rotational grazing, pasture management, fencing, watering facilities, livestock pipeline, heavy use area protection, etc.	Bacteria Loading Focus Areas	0 acres	○	○	○			○	○	SWCDs, MPCA, Counties, NRCS, BWSR, MDA, NGOs						N/A	N/A
BK-8	Septic Systems Upgrade of non-compliant SSTS	Watershed-wide	34 upgrades	○	○	●			○		Counties, MPCA	✓	✓	✓	✓	✓	\$255,000	\$255,000

● = action directly makes progress towards the goal

○ = action indirectly makes progress towards the goal



ID	Description	Focus Area	Output / Load Reduction	Measurable Goals							Responsibility (lead is bolded)	Timeline					10-Year Cost	
				Nutrient Loading	Conduits to Groundwater	Bacteria Loading	Stream Management	Water Storage	Soil Health & Upland Erosion	Habitat Management, Protection, & Restoration		2027-2028	2029-2030	2031-2032	2033-2034	2035-2036	Local Plan Budget	Partner / Federal
BK-9	Urban Stormwater Management of urban runoff via stormwater detention ponds, raingardens, etc.	Watershed-wide	2 projects	o	o	o	o	o	o	o	Cities , SWCDs, MPCA, Counties				✓	✓	\$45,000	\$15,000
BK-10	Streambank Stabilization and Enhancement Stabilize streambank via restorations, grade stabilization, or buffer enhancement	Priority Streams	800 feet	o		o	●		o	o	SWCDs , DNR, NRCS, BWSR	✓	✓	✓	✓	✓	\$100,000	\$100,000
BK-11	Floodplain Restoration Projects to reconnect streams to the floodplain	N/A	0 projects	o	o	o	●	o	o	o	DNR , Counties, SWCDs						N/A	N/A
BK-12	Wetland Restoration or Creation Restoration or creation of wetlands	N/A	0 acres	o		o		o	o	o	BWSR , DNR, Counties, SWCDs						N/A	N/A
BK-13	Conservation Easements and Land Acquisition Enrollment in permanent conservation easements, or land acquisitions	Habitat Focus Areas	250 acres	o	o	o	o	o	o	●	LFT , BWSR, DNR, MLT, FSA	✓	✓	✓	✓	✓	\$83,300	\$416,650
BK-14	Habitat Management, Enhancement, and Restoration Habitat and forest management and restoration such as conservation cover, prescribed burns, native / prairie / pollinator plantings, perennial cover, bluffland management, prairie and oak savanna restoration, riparian wetlands, temporary easements, and invasive species management	Karst Features, Habitat Focus Areas	1,650 acres	o	o	o		o	o	●	SWCDs , DNR, LFT , Counties, MDA	✓	✓	✓	✓	✓	\$148,500	\$264,000
BK-15	Woodland Stewardship Plans Plans with a roadmap for landowner forest management	Habitat Focus Areas	200 plans		o				o	o	DNR , LFT , SWCDs	✓	✓	✓	✓	✓	\$17,500	\$52,500
BK-16	Pesticide Management Pest or pesticide management plans	Nutrient Loading Focus Areas	0 projects	o	o				o	o	MDA , SWCDs						N/A	N/A
BK-17	Windbreaks Windbreaks to reduce wind erosion	Soil Health and Upland Erosion	10,000 linear ft						o	o	SWCDs , DNR	✓	✓	✓	✓	✓	\$25,000	\$0
10-Year Planning Region Total																	\$2,302,700	\$1,251,150

● = action directly makes progress towards the goal o = action indirectly makes progress towards the goal





Implementation Summary

The ten-year local cost for implementing all actions is estimated at \$38,204,900. Table 5-9 summarizes implementation costs by program. An additional \$6,308,500 in partner or federal funding is needed to fully implement all the actions in the plan and meet plan goals (see Section 7 for potential funding sources).

Table 5-9. 10-Year Implementation Cost

	Local Plan Budget	Partner / Federal	Total Plan Cost
Projects, Practices, and Land Management - Total	\$20,827,700	\$6,308,500	\$27,136,200
Actions WW-1 through WW-17	\$11,820,600	\$6,308,500	\$18,129,100
Technical Assistance	\$9,007,100	N/A	\$9,007,100
Public Participation and Engagement	\$1,140,000	N/A	\$1,140,000
Data Collection and Monitoring	\$2,721,000	N/A	\$2,771,000
CIPs	\$1,158,000	N/A	\$1,158,000
Local Controls	\$4,302,000	N/A	\$4,302,000
Operations and Maintenance	\$589,700	N/A	\$589,700
Plan Administration	\$1,158,000	N/A	\$1,158,000
Total:	\$31,896,400	\$6,308,500	\$38,204,900





Section 6.

Implementation

Programs





6. Implementation Programs

Within Section 5—Targeted Implementation, actions are organized within programs they fall under: Projects, Practices, and Land Management; Public Participation and Engagement; Data Collection and Monitoring; Capital Improvements; and Local Controls. These “implementation programs” are summarized visually in Figure 6-1 and discussed in detail in the following pages.

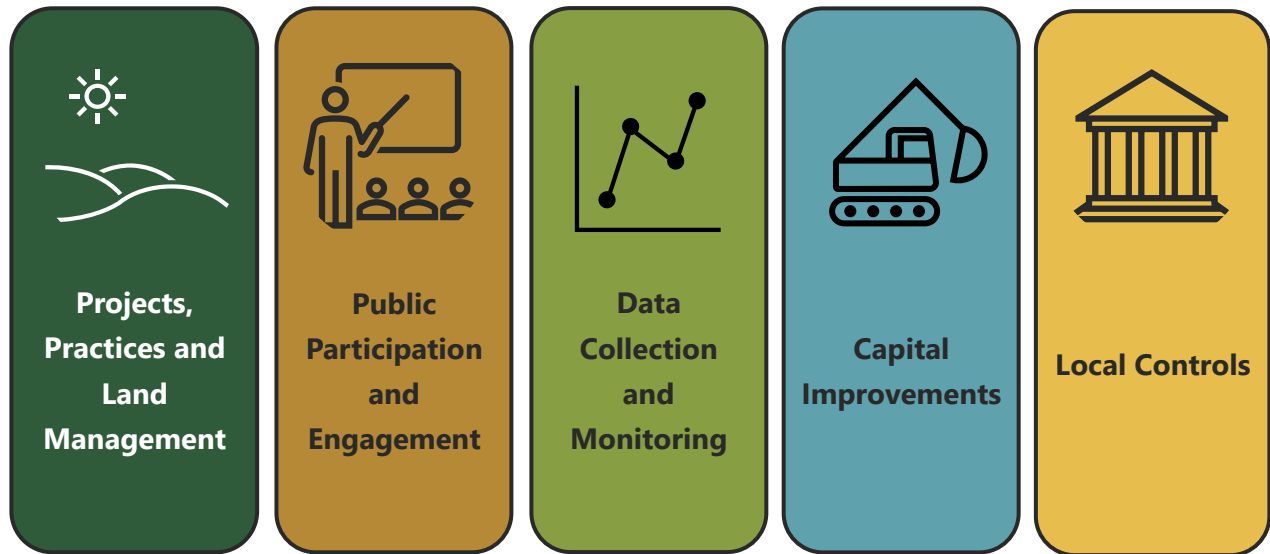


Figure 6-1. Root River Watershed CWMP Implementation Programs



Root River, Lanesboro Chamber of Commerce





Projects, Practices, and Land Management



The Projects, Practices, and Land Management Implementation Program deals with actions related to the planning, design, and implementation of conservation practices. It also provides financial assistance or incentives for land protection and management. The program assists landowners in implementing voluntary actions through financial assistance, technical assistance, tax exemption, conservation easement, or land acquisition and is funded by local, state, and federal dollars.

During implementation, local planning partners may create decision-making processes, such as a ranking and scoring sheet that ranks best projects based on priority location and benefits to resources. This method can then be used to select projects and practices for funding. For each grant received, such as WBIF, a policy document will also be developed to specify funding categories and how much funding practices may receive. This will be completed in conjunction with the local Policy Committee. Funding will preferentially be given to projects and practices identified within the action tables and in priority areas.

Financial Assistance

Financial assistance is available at the local, state, and federal level to financially assist landowners with the cost of installing a project or practice that accrues natural resource benefits. Projects and practices can be structural (i.e., grassed waterways, controlled drainage) or nonstructural (i.e., nutrient management, cover crops, conservation tillage). The purpose of financial assistance is to expand the adoption of plan practices with financial support. The program follows the scope identified by Section 5—Targeted Implementation action tables, and practices will be selected for the program according to the degree to which they best align with implementation focus areas and actions.

Operation and maintenance of financial assistance projects will be required, as regular on-site inspections and maintenance will ensure the project's continued function and success.

Operation and maintenance will be the responsibility of the project owner.

Inspection plans will be developed for each project or practice following applicable grant or BWSR guidelines. Project inspections shall confirm that the operation and maintenance plan is being followed and that the project has not been altered or removed. The expected lifespan, specific site conditions, and findings of previous inspections determine frequency of inspections.





Land Protection

Land protection programs maintain existing acres that are currently protected, or expand acres into land protection. Land protection can be temporary or permanent. Permanent protection programs (e.g., RIM) protect the land over longer periods of time, and in some cases indefinitely, whereas temporary protections have a limited term for protection. There are many state, federal, partner-funded, and other easements of value in the plan area. One example of a temporary protection program is the Conservation Reserve Program (CRP).

CRP is a land conservation program administered by the Farm Service Agency (FSA). In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality. Contracts for land enrolled in CRP are 10-15 years in length. Land enrolled in CRP and similar protection programs produce numerous environmental benefits including a reduction in runoff, erosion, and nutrients.



North Branch of the Root River





Public Participation and Engagement



Implementation of actions in this plan is voluntary and requires willing landowner participation. As such, public participation and engagement are essential for successful implementation. The Public Participation and Engagement Implementation Program funds actions to increase engagement, understanding, and address conservation barriers. The program builds on a foundation of engagement activities already occurring in the watershed, both through individual partners and as part of the Root River CWMP. This work is expected to continue during plan implementation and support goals watershed-wide. Promotion of plan actions will be targeted to high and medium priority areas.

Additional details on practices being implemented can be found in the Public Participation and Engagement action table in Section 5—Targeted Implementation. Examples of public participation and engagement activities may include:

- Youth and landowner engagement
- SWCD and LGU social media outreach
- SWCD workshops and clinics
- Field days (LSP and LFT hold field days)
- Communicating the agency Southeast Minnesota Groundwater Protection core messages on nitrate and groundwater
- Education on soil health, fish kill prevention, AIS, pesticide application



Outreach Events, Winona SWCD





Data Collection and Monitoring



The Data Collection and Monitoring Program funds actions that close data gaps to allow for effective and more informed implementation. The program also funds ongoing monitoring efforts aimed at tracking resource conditions and impacts of conservation action.

Currently, a variety of monitoring programs are carried out by multiple government and local organization levels (Table 6-1). Data from monitoring efforts were essential in understanding the current conditions of surface water, groundwater, and habitat.

Table 6-1. Summary of ongoing water quality and quantity monitoring programs. Source: BWSR.

Parameters	MPCA	DNR	MDH	MDA	County, SWCD
Nutrients	RS, W	RS		RS, GW	RS, GW
Suspended Solids	RS, W	RS		RS	RS
Productivity	RS	RS			
Pesticides				RS, W, GW	
Bacteria	RS		GW		RS
Biology	RS*, W	RS			
Water level/Flow	RS	RS, GW			RS
Invasive Species		RS			
Fish Contaminants	RS				
Chlorides	RS, W	RS	RS, GW		
Sulfates	RS, W	RS	RS, GW		

Key: **RS** = rivers and streams, **W** = wetlands, and **GW** = groundwater

*MPCA's long-term biological monitoring is valued for assessment and trend evaluation



Willow Creek, Fillmore SWCD





There are two long-term surface water monitoring efforts within the RRW. The Root River Watershed Pollutant Load Monitoring Network (WPLMN) provides monitoring data from five monitoring sites located on the main stem and main tributaries of the Root River. Monitoring data collected for the Root River WPLMN consists of stream flow data collected by USGS and the MnDNR, and water quality data collected by the MPCA and local partners. Additional long-term monitoring data is available from the Upper Iowa River Watershed monitoring, where two sites in Mower County and one in Fillmore County have been monitored since 2000.

Root River Watershed Pollutant Load Monitoring Network Site Locations:

- Middle Branch subwatershed at County 5 bridge
- North Branch subwatershed at County 21 bridge
- South Branch subwatershed in Lanesboro
- Main Branch subwatershed at Hwy 76 bridge in Houston
- South Fork subwatershed at Hwy 16 bridge east of Houston

Intensive surface water monitoring stations were established in the plan area as part of MPCA's 2008 Root River Watershed Intensive Monitoring Program. These stations consist of stream, biological, and monitoring components. The Citizen Stream Monitoring Program is also a component of MPCA's watershed monitoring approach, which gains valuable long-term data that can be used to evaluate trends.



Root River Field to Stream

Other existing surface water monitoring sites in the plan area are operated by the DNR, the USGS, and the MDA Root River Field to Stream Partnership. The DNR operates three monitoring locations on the main stem of the Root River, purposed for stream and biological assessments. There are also flow monitoring stations operated by the USGS, some of which are continuous. Three additional edge-of-field and three in-stream monitoring stations are located at the outlets of three small subwatersheds in the plan area. These stations are part of the MDA Root River Field to Stream Partnership, a partnership formed in 2009 by agricultural businesses, state agencies, LGUs,





producers and landowners to determine sediment and nutrient exports and sources. Activities at the monitoring stations include continuous monitoring, autosamplers, bi-weekly grab samples, and stormwater flow sampling year-round (plus events).

Monitoring efforts also support tracking groundwater trends in the Root River plan area. As part of the Southeast Minnesota WRAPS Nitrogen planning efforts, the MPCA previously operated three continuous nitrate monitoring stations at the Lanesboro Fish Hatchery. Additionally, a Volunteer Nitrate Monitoring Network was established in 2008, providing a network of private wells which are monitored once a year for nitrate concentrations, and will continue indefinitely. Winona State University has also been subcontracted to maintain and sample soil porewater lysimeters.

Capital Improvements



A capital improvement is defined as a major non-recurring expenditure for the construction, repair, retrofit, or increased utility or function of physical facilities, infrastructure, permanent protection, or environmental features.

The life expectancy of these projects is generally at least 25 years. Some capital improvements are beyond the normal financial means of the Partnership, often exceeding \$250,000, and are unlikely to get constructed without external funding.

Proposed capital improvements are shown in Section 5—Targeted Implementation. Members of the Policy Committee or the Partnership's individual and representative Boards may discuss the means and methods for funding new capital improvements with potential funding partners. CIPs completed through this plan will be operated and maintained by the owner of the project for its lifespan. Signage for completed projects is encouraged to acknowledge larger projects and funding sources to the public.

Drainage improvements can occur through the CIP program. Drainage authorities may help coordinate implementing the action tables to make progress towards plan goals. Based on this arrangement, drainage authorities could access implementation funds to adopt drainage actions in the action tables during 103D and 103E processes and procedures when the opportunity arises within the planning area. 103B.335 (special taxing district) also allows for these types of projects.





Operations and Maintenance

Entities within the plan area are engaged in the inspection, operation, and maintenance of CIPs, stormwater infrastructure, public works, facilities, natural and artificial watercourses, and legal drainage systems. The operation and maintenance of natural watercourses, legal drainage systems, impoundments, and small dams will continue under the regular operations and maintenance plans of the entities that have jurisdiction over these systems.

Local Controls



Some watershed opportunities can be addressed in part through enforcement of local ordinances and administration of statutory responsibilities. In many cases, local ordinances have been adopted to conform to (or exceed) the standards and requirements of the state statutes. The responsibility for implementing these programs will remain with the respective counties or appointed LGUs.

Participating counties are encouraged to meet and discuss ordinances and notify each other of proposed ordinance amendments. These entities may also review local ordinances that are most relevant to the plan's opportunities, goals, and actions. They will look for similarities and differences in local regulatory administration to identify local successes and identify future changes needed to make progress towards goals. A comparison of how local ordinances and controls relevant to the CWMP is provided in Appendix I.



Example Prairie Strip, MDA Root River Field to Stream Partnership





Aquatic Invasive Species

The spread of Aquatic Invasive Species (AIS) can be reduced by management and education. The DNR oversees AIS enforcement. Counties receive grants for AIS programs, and SWCDs partner with counties for AIS outreach and education programs.

Buffers

Minnesota has a long history of enacting legislation requiring buffers. The 1977 buffer legislation refers to changes made to Minnesota's Drainage Law to require ditch buffer strips for public drainage systems. In 2015, Minnesota enacted legislation requiring perennial vegetation of an average of 50 feet with a minimum of 30 feet on public waters and 16.5 feet for public drainage systems. The 2015 "Buffer Law" is regulated by BWSR and implemented at the county level. Each county has an ordinance for buffer management, and SWCDs conduct buffer compliance checks.

Construction Erosion Control

Temporary construction erosion control is the practice of preventing and/or reducing the movement of sediment from a site during construction. All construction projects should follow construction BMPs, but projects disturbing one acre or more of land will require a National Pollutant Discharge Elimination System (NPDES) Permit and Stormwater Pollution Prevention Plan from the MPCA.

Comprehensive Land Use Plans

Counties are responsible for land use planning, administered through local zoning ordinances. Each county has adopted a comprehensive land use plan. Many LGUs in the watershed overlap in land and resource management, resulting in the need for shared goals. A sample of comprehensive land use plans in the watershed is listed in Table 6-2.

Table 6-2. Example Comprehensive Land Use Plans in the Root River Watershed.

LGU	
Fillmore County	Fillmore County Comprehensive Plan (2006)
Mower County	Mower County Comprehensive Plan (2024)
Olmsted County	Olmsted County General Land Use Plan (2022)
Winona County	Winona County Comprehensive Plan Update (2014, update expected in 2026)
Houston County	Houston County Comprehensive Plan (2008, update expected in 2026)
Dodge County	Comprehensive Plan Dodge County (2019)





Decorah Shale Protection

Olmsted County protects the Decorah Shale within the Wetland Conservation Ordinance. The County identifies Edge Support Areas and states the Decorah Edge is a high priority area and development must protect groundwater and wetlands.

Feedlots

MPCA rules govern the collection, transportation, storage, processing, and land application of animal manure and other livestock operation wastes. MPCA has delegated authority to Winona, Fillmore, Mower, and Houston Counties for local administration, but Olmsted and Dodge Counties do not administer the program.

Floodplain Management

Floodplain zoning regulations manage development in the floodplain to minimize loss of life and property, disruption to government services and the local economy, and interruption of transportation. The DNR has current flood maps on their website. All RRW counties have floodplain ordinances.

Hazard Management

Hazard management involves planning for natural or manmade incidents in a way that reduces the impact if or when an event occurs. In watershed management, hazards include dam failure, flooding, drought, etc. Each county in the RRW has a Hazard Mitigation Plan, making them eligible for FEMA funding applications.

Shoreland Management

Minnesota has shoreland management rules that are administered by the DNR. LGUs are required to have land use controls that protect shorelands along lakes and rivers, and they can adopt stricter ordinances than the State's, if desired. RRW counties have adopted ordinances regarding lot setback, lot width, and lot area.

Sinkhole Management

Sinkholes are a characteristic of the karst geology in the RRW. Sinkholes can act as a conduit from the landscape to groundwater, providing a chance for groundwater contamination. Fillmore County has adopted a sinkhole dumping restriction in the county zoning ordinance to protect groundwater.





Solid Waste Management

Solid waste management in Minnesota is managed at the county level and includes programs related to mixed municipal solid waste, industrial waste, and non-landfill programs such as recycling to include paper, plastics, metal, tires, electronics, appliances, and other recyclable items. All counties in the RRW have approved Solid Waste Management Ordinances.

Subsurface Sewage Treatment Systems (SSTS)

Each county has SSTS ordinances. Maintenance and replacements of SSTS will be important for reducing bacteria and nutrient loads to surface and groundwater resources. Low-interest loans and low-income grants are available from the county for replacements as well as through MDA agricultural BMP Loan Program.

Wellhead Protection

The purpose of the Wellhead Protection Program is to prevent contamination of public drinking water supplies by identifying water supply recharge areas and implementing management practices for potential pollution sources found within those areas. MDH is responsible for statewide administration. The program has since expanded to conduct Source Water Assessments and Surface Water Intake Protection Plans for public water supply systems that rely on surface water as a drinking water source.

Wetland Conservation Act (WCA)

The Minnesota Legislature passed the WCA in 1991, which requires no net loss of wetlands. It aims to increase the quantity and quality of wetlands that provide numerous ecological and economic benefits to Minnesotans. LGUs are responsible for administering the WCA, which includes regulating and educating landowners. BWSR oversees WCA but LGUs locally administer wetland controls. RRW LGUs are Fillmore, Winona, and Houston Counties, Olmsted, Dodge, and Mower SWCDs, as well as the City of Winona. LGUs have a Technical Evaluation Panel that makes wetland recommendations.





Section 7.

Plan Administration and Coordination





Section 7. Plan Administration and Coordination

There are 13 local government unit planning partners involved in implementing the Root River CWMP (collectively referred to as the “Partnership”):

- Dodge County
- Dodge SWCD
- Fillmore County
- Fillmore SWCD
- Houston County
- Root River SWCD
- Crooked Creek Watershed District
- Mower County
- Mower SWCD
- Olmsted County
- Olmsted SWCD
- Winona County
- Winona County SWCD

In 2017, the Policy Committee and the members’ respective boards approved a Joint Powers Agreement to continue to operate cooperatively and collaboratively, but not as a separate entity, for the purpose of continued planning of, review of, advising on, and coordinating the implementation of the Root River CWMP. This formal agreement will continue to serve this plan update for the next 10 years.

While the roles of each implementation partner are outlined initially in this section, it is the ultimate responsibility of member LGUs to fill their roles in plan implementation based on established bylaws. The roles of the Partnership, how the plan will be funded, and the assessment process are explained in this section.

Decision Making and Staffing

Three committees carry out the coordinated planning, development, and implementation of the Root River CWMP. Each committee is described below:

- Policy Committee (PC): Comprised of an elected official from each member LGU, this committee has the primary role of making final decisions regarding the watershed plan, work plans, and budgets and their submittal to and approval by BWSR.
- Planning Work Group (PWG): Comprised of local staff from each member LGU, this committee develops grant workplans for Policy Committee approval, biennial budget requests to BWSR, and updates the Policy Committee of implementation progress.





- Advisory Committee (AC): Comprised of state agency staff and local professionals, landowners, or stakeholders, this committee makes recommendations to the Policy Committee regarding identification of priority resources and targeted implementation for protecting and restoring water resources.

Table 7-1 further outlines the roles and functions of these primary committees during implementation. Expectations are that the roles of each committee will shift and change focus during implementation. Fiscal and administrative duties may be assigned to a member LGU through PWG decision as outlined in the formal agreement.

Table 7-1: Roles for RRW CWMP Implementation.

Committee	Primary Roles
Policy Committee (PC)	• Approve work plan and biennial budget • Review and confirmation of priority opportunities • Approve minor plan amendments as a committee, and regular amendments through respective Board resolutions • Implement ordinances and statutes separately • Approve assessments as needed • Oversee grant agreement and contracts
Planning Work Group (PWG)	• Review status of available implementation funds • Review opportunities for collaborative grants • Review work plan and adjust as needed • Review reports submitted to BWSR as required • Biennial review and confirmation of priority opportunities • Prepare plan amendments • Assist with grant and eLINK reporting • Implement action tables
Advisory Committee (AC)	• Advise the PWG and PC • Identify opportunities to coordinate with partners • Provide input and updates on priority resources, opportunities and targeted implementation throughout the watershed
Local Fiscal Agent and/or Plan Coordinator	• Convene meetings • Prepare and submit grant applications and funding requests • Prepare work plan • Responsible for grant and eLINK reporting • Compile results for annual assessment • Enter into sub-agreements with LGU partners to disperse grant funds





Collaboration

Between Planning Partners

Although collaboration informally and formally is encouraged, mandatory participation is not required by this plan. LGUs who adopt this CWMP can choose whether to approve or participate in formal implementation agreements. The benefits of successful collaboration between planning partners will ultimately result in additional water quality benefits,



City of Preston

including consistent implementation of actions watershed-wide, increased likelihood of funding, and resource efficiencies gained.

The Partnership will pursue opportunities for collaboration with fellow planning partners to gain administrative and program efficiencies, pursue collaborative grants, and provide technical assistance. Collaboration with drainage authorities will also be

pursued. The Partnership will also review similarities and differences in local controls and regulations to identify successes as well as future changes needed to make progress towards the goals outlined in this plan.

There are costs associated with collaboration—for example, increased meeting and travel time; increased tracking, assessment, evaluation, and reporting requirements; a decrease of efficiency when actions must be coordinated in concert with separately governed organizations; and possible increases to project completion timelines.

With Other Units of Government

The Partnership will continue coordination and cooperation with other governmental units at both the local level and at the state/federal level. At the state/federal level, coordination between the Partnership and agencies such as BWSR, US Army Corps of Engineers, DNR, MDH, MDA, and the MPCA are mandated through legislative and permit requirements. Local coordination between the Partnership and comparable units of government, such as





municipalities, city councils, township boards, and county boards are a practical necessity to facilitate watershed-wide activities. Intergovernmental coordination and communication are essential for the Partnership to perform its required functions. The Partnership will continue to foster an environment that enhances coordination and cooperation to the maximum extent possible throughout plan implementation.

A close partnership is expected between the CWMP implementation partners and the local forestry team (LFT). LFTs formed to implement Landscape Stewardship Plans, and the RRW LFT has been working with landowners to protect and restore habitat and forests. The RRW LFT anticipates implementing the Bluffland RIM Program in partnership with local stakeholders and local, state, and federal agency partners.

With Others

Plan partners expect to continue and build on existing collaboration with others, including non-governmental organizations, while implementing this plan. Many of these existing collaborations are aimed to increase habitat and recreational opportunities within the plan area, while providing education and outreach opportunities.

Funding

Local Funding

Local revenue is defined as money derived from either the local property tax base or in-kind services of any personnel funded from the local tax base. Examples include local levy, county allocations, and local match dollars (see Local Funding Authorities in Appendix J). 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.



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State Funding

State funding includes all funds derived from the State tax base. Examples of state funding include conservation delivery, soil health cost-share, state cost-share program, and Clean Water Funds. WBIF (and/or Clean Water Funds) are anticipated to be a large source of funding during implementation.

Partners may apply for competitive state grants on behalf of the Partnership. The assumption is that future base support for implementation will be provided to the RRW as formula-based WBIF grants. Where the purpose of an implementation program 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.

Federal Funding

Federal funding includes all funds derived from the Federal tax base. Partnerships with federal agencies are an important resource for ensuring implementation success. 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 actions described by this plan. For example, the NRCS will likely provide support for agricultural conservation practices, while the FSA may provide land-retirement program funds such as CRP.

Plan Funding Overview

This plan recognizes and includes three funding levels (Table 7-2).

- **Baseline Funding** is the estimated existing annual revenue and natural resource management expenditures for plan partners combined and then allocated to the plan area based on the percentage of each county's land area in the watershed.
- **Local Plan Budget** is the focus of this Plan's action tables. It refers to the Baseline budget plus reliable funding anticipated during implementation such as WBIF. Dollars are not adjusted for inflation.
- **Partner / Federal Funding** refers to the dollars needed from state, federal, or other non-governmental organizations to fund and implement the actions in the plan.





Table 7-2: Funding sources overview

Funding Level	Estimated Annual Average	Estimated 10-Year Total
Baseline	\$1,896,000	\$18,960,000
Local Plan Budget	\$3,080,765	\$30,807,650
Partner/Federal Funding	\$630,850	\$6,308,500

Table 7-3 summarizes the amount of funding that is assumed to continue during plan implementation as part of baseline funds from local and state sources. Federal sources of funding from NRCS like EQIP and CRP are not included in baseline funding estimates, and is instead included in “Partner/Federal” funding.

Table 7-3: Estimated sources of baseline funding in the RRW CWMP. Dollars are for 10 years and are estimated from the historical baseline.

Implementation Program	Local	State	Total
Projects, Practices, and Land Management	\$3,960,000	\$7,400,000	\$11,360,000
Data Collection and Monitoring	\$150,000	\$1,990,000	\$2,140,000
Public Participation and Engagement	\$200,000	\$360,000	\$560,000
Local Controls	\$1,270,000	\$3,040,000	\$4,310,000
Capital Improvements	\$0	\$0	\$0
Operations and Maintenance	\$0	\$590,000	\$590,000
Total	\$5,580,000	\$13,380,000	\$18,960,000

Additional Funding

The Local Plan Budget is not enough to fully implement the action tables. As such, the success of implementing the plan will depend on collaboratively sought competitive state, federal, and private grant dollars, and increased capacity. Staff capacity can also be a barrier to plan implementation. As such, there is an action in the plan to conduct a staffing analysis to analyze, and potentially address that perceived barrier.





Plan participants may pursue funding opportunities collaboratively or individually to fund implementation, but collaboration is encouraged. Table 7-4 shows potential sources of partner funding for implementation.

Several non-governmental funding sources may also provide technical assistance and fiscal resources to implement the plan. Private sector companies, including those specifically engaged in agribusiness, are often overlooked as a potential source of funding for implementation. Some agribusiness companies are providing technical or financial implementation support because they are interested in agricultural sustainability and carbon market benefits. This plan could be used to explore whether the resource benefits arising from implementation provide access to funding from the private sector.

Table 7-4: Example funding sources for the RRW. Note: List is not all-inclusive.

Program/Grant		Primary Assistance	Projects, Practices, LM	CIPs	Data Collection & Monitor	Ed. and Outreach
Federal Programs / Grants						
NRCS	Conservation Innovation Grant (CIG)	F	X			
	Conservation Stewardship Program (CSP)	F	X			
	Regional Conservation Partnership Program (RCPP)	F	X	X		
	Environmental Quality Incentives Program (EQIP)	F	X			
	Agricultural Conservation Easement Program (ACEP)	E	X			
FSA	Conservation Reserve Program (CRP)	E	X	X		
	Farmable Wetlands Program (FWP)	E	X			
	Grasslands Reserve Program (GRP)	E	X			
	Wetland Reserve Program (WRP)	E	X	X		
FSA/ USDA	Source Water Protection Program (SWPP)	T				X
USFWS	Partners for Fish and Wildlife Program	F/T	X			
	Grassland Easements (Working Lands)	F/T	X			
	Wetland Easements (Working Lands)	F/T	X			
FEMA	Hazard Mitigation Grant Program (HMGP)	F	X	X		
	Pre-Disaster Mitigation (PDM)	F	X	X		
	Flood Mitigation Assistance (FMA)	F	X	X		
	Risk Mapping, Assessment, and Planning	T	X	X		
EPA	Water Pollution Control Program Grants (Section 106)	F				X
	State Revolving Fund (SRF)	L	X			
	Drinking Water State Revolving Fund (DWSRF)	L	X			
	Section 319 Grant Program	F	X		X	X
NACD	Technical Assistance Grants	F/T	X	X	X	X





Program/Grant		Primary Assistance	Projects, Practices, LM	CIPs	Data Collection & Monitor	Ed. and Outreach
State Programs / Grants						
LSOHF	Lessard-Sams Outdoor Heritage Fund (OHF)	F	X	X	X	X
DNR	Aquatic Invasive Species Control Grant Program	F/T	X			X
	Conservation Partners Legacy Grant Program	F/T	X	X		
	Pheasant Habitat Improvement Program (PHIP)	F/T	X			
	Flood Hazard Mitigation Grant Assistance	F/T	X	X	X	X
	Forests Legacy Program	F	X			
	Forest Stewardship Program	F/T	X			
	Local Forestry Teams (implement programs)	F/T	X		X	X
	Wetland Tax Exemption Program	F/T	X			
BWSR	Clean Water Fund (WBIF, competitive)	F	X	X		X
	Conservation Contracts Program	F	X			
	Natural Resources Block Grant (NRBG)	F	X			X
	Living Landscape Initiative	F/T	X		X	X
	Reinvest in Minnesota (RIM)	F	X	X		X
MPCA	Surface Water Assessment Grants (SWAG)	F			X	X
	Clean Water Partnership	L	X	X		
	WRAPS Clean Water Fund	T			X	X
MDH	Source Water Protection Grant Program	F	X	X	X	X
	Public and Private Well Sealing Grant Program	F	X		X	
MDA	Agriculture BMP Loan Program	F	X			
	Minnesota Agricultural Water Quality Certification Program	F/T	X			X
	Nutrient Management Initiative (NMI)	F	X			
	Soil Health Financial Assistance Program Grant	F	X			
	Noxious Weed Grant Program	F	X			
MFRC	General support of forest grants	T	X		X	
	Landscape Stewardship Plan (SE Regional Landscape Committee)	T				X
LCMMR	Environment and Natural Resources Trust Fund	F	X			
Other Partner Organizations						
Pheasants Forever		F/T	X	X	X	X
Trout Unlimited		F/T	X	X	X	X
The Nature Conservancy		F	X	X	X	X
Minnesota Land Trust		F	X	X	X	X
Trust for Public Land		F	X			

F = Financial; T = Technical; L = Loan, X = indicates a grant could apply to a CWMP program





Work Planning

Local Work Plan

Grant work plans are envisioned to align priority opportunities, funds, and roles and responsibilities for implementation. The intent of these work plans will be to maintain collaborative progress toward accomplishing plan goals.

For each grant cycle a work plan will be developed by the fiscal agent and/or plan coordinator with input from and review by the PWG. Review and edits to the work plan will be ongoing based on collaborative tracking systems and to align with grant requests or changes identified through self-assessments. Over the plan lifespan of 10 years, new opportunities may emerge and/or new monitoring data, models, or research may become available which would warrant work plan updates. The work plan will be presented to the Policy Committee for approval as needed.

State Funding Request

The PWG will collaboratively develop, review, and submit a WBIF funding request to BWSR. This request will be submitted to and ultimately approved by the Policy Committee before submitting it to BWSR. The request will be developed based on information in the action tables and any adjustments made through self-assessments.



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Assessments

Accomplishment Assessment

Implementation partners will develop / agree on a system to track plan progress throughout implementation. During the annual review process, feedback will be solicited from local boards and the Policy Committee. The PWG will provide the Policy Committee with a quarterly update on the progress of the plan's implementation. This feedback will be presented by the fiscal agent and/or coordinator to the Policy Committee to set the coming year's priorities for achieving the plan's goals and to decide on the direction for collaborative grant submittals. In addition, this feedback will be documented and incorporated into annual and mid-point evaluations.





Partnership Assessment

In addition to assessing plan progress toward goals, the annual review process will consider implementation partner roles. The ability and extent to which implementation partners are fulfilling assigned roles and responsibilities, the efficiency and effectiveness of delivering services, collaboration with partners, and success at securing funding will all be examined. Steps will be taken to support partners to achieve roles and responsibilities.

Mid-Point Evaluation

This plan has a 10-year timeframe beginning in 2027. To meet statutory requirements, this plan will be updated and/or renewed every 10 years. Over the course of the 10 years, progress towards reaching goals and completing the action tables may vary. In addition, new opportunities may emerge and/or new monitoring data, models, or research may become available. As such, at the mid-point of a plan life-cycle, a mid-point evaluation will be conducted to determine if the current course of action is sufficient to reach the goals of the plan or if a change is necessary based on the latest monitoring data and research findings.

Reporting

Reporting plan implementation progress to LGUs will be done during the annual accomplishment assessment. A report summarizing implementation tracking will be shared with plan partners and stakeholders.

LGUs currently have a variety of statutory reporting requirements related to their activities, programs, and grants. A number of these reporting requirements will remain the LGUs responsibility. However, reporting related to grants and programs developed collaboratively and administered under this plan (including WBIF) may be reported by the fiscal agent and/or coordinator. The fiscal agent and/or coordinator is responsible for reporting. The PWG may support the agent or coordinator in reporting.

Plan Amendments

The CWMP is effective 10 years following BWSR approval. Actions 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 One Watershed One Plan Operating Procedures. This provision for flexibility includes changes to the actions.





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. Amendments may be proposed by plan partners. Plan amendment initiation processes will be started by the Policy Committee according to their bylaws and will follow established BWSR procedures, including determination if the proposed changes to the plan constitute a minor plan amendment or a regular Plan amendment.





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