Sauk River

COMPREHENSIVE WATERSHED MANAGEMENT PLAN

PREPARED FOR:

The Landowners, Citizens, and Local Governments of the Sauk River Watershed

Funding for this project was provided by the Clean Water, Land and Legacy Amendment

March 2021, Amended May 22nd, 2026

RSI-3151

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COMPREHENSIVE WATERSHED MANAGEMENT PLAN

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RSI-3151

Acknowledgements

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Pope County
Pope County Soil and Water Conservation District
Sauk River Watershed District
Stearns County
Stearns County Soil and Water Conservation District
Todd County
Todd County Soil and Water Conservation District

STATE AGENCIES

Minnesota Board of Water and Soil Resources
Minnesota Department of Agriculture
Minnesota Department of Health
Minnesota Department of Natural Resources
Minnesota Pollution Control Agency

FEDERAL AGENCIES

Natural Resources Conservation Service

COMMUNITY AND CITIZEN REPRESENTATIVES

City of St. Cloud
University of Minnesota Extension Service
Stearns County Coalition of Lake Associations
The Nature Conservancy
Pheasants Forever

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List of Acronyms

1W1P	One Watershed, One Plan
AC	Advisory Committee
ACPF	Agricultural Conservation Planning Framework
ACT	Avoiding, controlling, or trapping
AFREC	Agricultural Fertilizer Research and Education Council
AIS	Aquatic invasive species
AMC	Association of Minnesota Counties
AU	Animal unit
AUID	Assessment Unit Identification
AURI	Agricultural Utilization Research Institute
BMP	Best management practices
BPA	Bisphenol A
BWSR	Board of Water and Soil Resources
CAFO	Concentrated Animal Feeding Operation
CD	County Ditch
CEC	Contaminant of emerging concern
CIP	Capital improvement plan
CMWEA	Central Minnesota Water Education Alliance
CP	Conservation practices
CPF	Compensation Planning Framework
CRP	Conservation Reserve Program
CWMP	Comprehensive Watershed Management Plan
DEET	Diethyltoluamide
DEM	Digital elevation models
DFRIM	Digital Flood Insurance Rate Maps
DNR	Department of Natural Resources
DWSMA	Drinking water supply management area
EDA	Environmental Data Access
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
GLID	Grand Lake Improvement District
HAB	Harmful algal bloom
HSPF	Hydrologic Simulation Program-Fortran
HUC	Hydrologic Unit Code
IBA	Important Bird Area
ILF	In-lieu-fee
ITPHS	Imminent threat to public health and safety
JD	Judicial Ditch
JPC	Joint powers collaborative
LCCMR	Legislative-Citizen Commission on Minnesota Resources
LGU	Local government unit
LID	Lake improvement districts

List of Acronyms (cont.)

LSOHC	Lessard-Sams Outdoor Heritage Council
MAISRC	Minnesota Aquatic Invasive Species Research Center
MASWCD	Minnesota Association of Soil and Water Conservation Districts
MAWD	Minnesota Association of Watershed Districts
MAWQCP	Minnesota Agricultural Water Quality Certification Program
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MIDS	Minimal Impact Design Standard
MOA	Memorandum of Agreement
MPCA	Minnesota Pollution Control Agency
MRBI	Mississippi River Basin Initiative
MS4	Municipal Separate Storm Sewer System
NASS	National Agricultural Statistics Service
NLEB	Northern long-eared bat
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O&M	Operation and maintenance
OHWL	Ordinary High-Water Level
PFBA	Perfluorobutanoic acid
PTMApp	Prioritize, Target, and Measure Application
PWS	Public water supply
RAA	Risk assessment advice
SAM	Scenario Application Manager
SDWA	Safe Drinking Water Act
SEH	Short Elliott Hendrickson Inc.
SHPO	State Historic Preservation Office
SNA	Scientific and natural area
SRCOL	Sauk River Chain of Lakes
SRW	Sauk River Watershed
SRWD	Sauk River Watershed District
SSTS	Subsurface sewage treatment systems
SWCD	Soil and Water Conservation District
SWPP	Source water protection plan
SWPPP	Stormwater pollution prevention plan
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TP	Total phosphorus
TSS	Total suspended solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UV	Ultraviolet

List of Acronyms (cont.)

WASCOB	Water and Sediment Control Basin
WCA	Wetland Conservation Act
WEPS	Wind Erosion Prediction System
WLA	Wasteload allocation
WMA	Wildlife Management Area
WMD	Wetland Management District
WPA	Waterfowl Production Areas
WRAPS	Watershed Restoration and Protection Strategy

List of Units

ac	acres
°F	degrees Fahrenheit
lbs/year	pounds per year
mg/L	milligrams per liter
mi	miles
mi^2	square miles
org/100 mL	organisms per 100 milliliters
ppm	parts per million
µg/L	micrograms per liter

1 EXECUTIVE SUMMARY

The Sauk River Comprehensive Watershed Management Plan (CWMP) is an evolutionary step in local water planning to streamline the programs and authorities of nine government units by facilitating both the progressive restoration of impaired and degraded resources and the protection of high-quality resources from adverse future impacts. The partnership responsible for developing this plan was formalized through a memorandum of agreement and consists of the Sauk River Watershed District (SRWD), Stearns County and the Stearns County Soil and Water Conservation District (SWCD), Todd County and the Todd SWCD, Douglas County and the Douglas SWCD, and Pope County and the Pope SWCD. Working together, these entities developed this CWMP as part of the Minnesota Board of Water and Soil Resources (BWSR) One Watershed, One Plan (1W1P) program, which is detailed in Minnesota Statute 103B.101.

Vision Statement:

A resilient landscape that balances a healthy ecosystem with a vibrant economy for generations to come.

The BWSR 1W1P program vision is to evolve from managing resources on political boundaries to focusing on the watershed as a unique resource to be managed comprehensively. As a result, cohesive planning and implementation will provide greater assurances that water quality and natural-resource management goals will be attainable.

The Sauk River CWMP addresses a wide range of land and water resources with particular attention paid to priority resources and subwatersheds that were identified through a multilevel prioritization process. This plan is intended to direct the investments made into projects and programs that will restore degraded resources and protect high-quality resources from degradation in the Sauk River Watershed (SRW). The plan also provides information regarding potential funding opportunities to implement these objectives and obtain measurable goals.

Because of the complex nature of the Sauk River Watershed, a multileveled prioritization framework was developed to guide the project partners' actions to achieve the plan's goals. This framework is represented by the connection of watershed-wide issues highlighted in Chapter 4, *Priority Resource Concerns*, with targeted resources identified within each management district in Chapter 5,*Geographic Management Areas*.

"This plan is intended to direct the investments made into projects and programs that will restore degraded resources and protect high-quality resources from degradation in the Sauk River Watershed."

GENERAL DESCRIPTION OF THE AREA COVERED BY THE PLAN AND MANAGEMENT UNITS

The SRW (Hydrologic Unit Code 8 [HUC-8] - 07010202) lies in central Minnesota and covers more than 1,042 square miles (667,315 acres) within Douglas, Meeker, Pope, Stearns, and Todd Counties (Figure 1-1). The watershed is approximately 75 miles in length and some areas are up to 30 miles in width (Minnesota Pollution Control Agency [MPCA], 2015). The Sauk River originates in Todd County at the outlet of Lake Osakis and flows through several lakes (notably Sauk Lake and the Sauk Chain of Lakes) over its 134.9-river-mile course (MPCA, 2015) to its mouth at the Mississippi River in the St. Cloud area, Stearns County. The elevation drop from the headwaters of the Sauk River at Lake Osakis to the Mississippi River is 340 feet (MPCA, 2015). The watershed transitions from mixed agriculture and forests in the northern and western portions, to a heavily agricultural landscape in the central portion, to the heavily urbanized St. Cloud area in the lower portion of the watershed. The Sauk River CWMP is geographically organized into ten management districts (Figure 1-2).

watershed stats

1,042
Square Miles

75
Miles in Length

30
Miles Wide

134.9
River Miles

340 FEET
Elevation Drop

PRIORITY RESOURCES, ISSUES, AND ISSUE STATEMENTS

A list of resource concerns was developed using the aggregated data and information from existing plans and studies as well as input obtained from the public, organizations, and agencies at the beginning of the CWMP development process. The summary of input considered includes:

- Approximately fifty existing plans, studies, and reports
- Eight comment letters that were submitted during the public notice of the planning process
- Forty-five people who participated in the two public kick-off meetings
- Thirty-four people who completed the online survey.

Each comment and concern noted was listed in a spreadsheet. The comments were coded as to the resource category or concern, such as groundwater, surface water, and other natural resources being addressed by the comment. The comments for each resource category were then synthesized into 39 draft issue statements that addressed a wide variety of resource issues and concerns. The Advisory Committee, which was responsible for overall guidance for developing the plan content, aggregated and prioritized the 39 resource concerns and issues to 10, with the natural resource issues being combined into one issue (Table 1-1). The Advisory Committee members worked in small groups to develop the issue statement and develop a framework for how the issue would be addressed in the plan. The work completed by the small groups were presented and approved by the full Advisory Committee prior to the Policy Committee's review and approval. Prioritizing the resource concerns and issues was accomplished using a screening process that evaluated considerations such as the planning partnership's ability to address the resource issues, if there were enough data to address the cause of the issue, and whether the actions that may be taken by the planning partnership would result in meaningful change in the resource condition.

Table 1-1. Sauk River CWMP Resource Concerns and Issue Statements According to Resource Category.

Resource Category	Resource Concern	Issue Statement
Altered Hydrology	Altered hydrology	Accelerated runoff, reduced watershed storage, and reduced connection between surface water and groundwater are causing adverse impacts to downstream waters, wetlands, groundwater, and habitat.
Surface Water	*E. coli* impairments	Surface waters face *E. coli* contamination caused by agricultural, urban, and residential uses.
	Sediment and nutrient impairments	Excessive nutrients and sediment are causing aquatic life and recreational-use impairments.
	Protecting high water quality resources	A lack of protection priorities could cause degradation of high-quality lakes.
Groundwater and Drinking Water	Quantity and availability	Groundwater availability is at risk because of reduced recharge and increased withdrawals.
	Drinking water quality	Drinking water supplies obtained from groundwater may be contaminated or are at risk of contamination.
	Drinking water	The drinking water for the city of St. Cloud is impacted by the Sauk River's water quality.
Land Use	Sustainability of land use decisions	Land use management decisions can impact long-term sustainability of resource goals.
	Riparian area management	Land use activities in riparian and adjacent areas have impacts on surface waters.
Habitat	Aquatic Wetland Upland	Habitat areas have been negatively impacted due to fragmentation, pollution, invasive species, and intensifying land use.

IMPLEMENTATION ACTIONS AND PROGRAMS

The Sauk River CWMP targeted implementation schedule is organized according to each of the four program areas listed below:

- On-the-ground implementation activities
- Land use and regulatory
- Monitoring, studies, and planning
- Outreach and education.

On-the-ground implementation activities that provide multiple benefits were selected to the extent possible. These activities include large projects that would be categorized as capital improvements as well as individual landowner best management practices (BMPs). Operation and maintenance are then key to maintaining the functionality of the capital improvements and landowner BMPs. The activities are structured according to the Natural Resources Conservation Service (NRCS) systems approach for avoiding, controlling, or trapping pollutants (ACT). Examples of on-the-ground implementation activities most frequently used in the plan's implementation tables that are a part of the ACT approach are provided in Table 1-2.

Table 1-2. Example BMPs According to the NRCS ACT Systems Approach to Nutrients.

Approach	Example Bmp
Avoid Surface Runoff and Leaching to Groundwater	» Cover Crops » Livestock Access Control/Fencing » Manure/Fertilizer Incorporation
Control Surface Runoff and Leaching to Groundwater	» Stream Bank/In-Channel Restoration » Feedlot Manure/Runoff Storage » Alternative Tile Intakes
Trap Stop Contaminants From Entering Surface or Groundwater	» WASCOBs » Restore Wetlands » Infiltration Basins

The monitoring, data, and planning activities are intended to enhance targeting for implementation actions as well as evaluate progress towards goals. The activities under consideration in the land use and regulatory program area will be undertaken to determine critical gaps in land use management that may prevent goals from being achieved. Only in the event that such gaps exist and regulatory programs are deemed necessary will those programs be developed further. The Advisory Committee envisioned the creation of an education and outreach program that is structured around the prioritize, target, and measure approach. The result of the newly envisioned program will provide greater assurances that the Sauk River CWMP goals will be achieved because the landowners that can implement projects that result in the most-improved watershed conditions will be targeted and barriers to adoption will be addressed. Until the new program is developed, the current education and outreach actions, which are identified in the priority concerns section (Chapter 4, *Priority Resource Issues*) of the plan, will continue to be implemented.

The partnership is committed to implementing the plan using an adaptive management approach. Therefore, the on-

the-ground implementation activities and supporting programs are structured so that the planning partners can implement the priority actions to targeted audiences, evaluate results, and adjust the level of effort and program options as needed to meet Sauk River CWMP goals. As a result, implementation actions are not intended to be done in an ordinal manner to address all of the top-priority concerns before moving to the next priority; rather, the prioritization framework laid out in this plan is intended to be used by the project partners to guide their implementation decisions.

MEASURABLE GOALS

The Advisory Committee established preliminary goals for each priority issue. Existing goals were adopted when appropriate, such as those established through Total Maximum Daily Load (TMDL) studies. Preliminary goals were a starting point to determine the strategies and actions that would best assure that the goals would be achieved. The preliminary goals were refined to be challenging yet achievable based on implementation actions that were identified for priority resources.

The resulting goals are simply stated, indicating the desired change for a priority resource concern. These goals have been lettered to help identify throughout the plan but do not imply a priority hierarchy. There are specific measures and accomplishments established for each 10-year plan goal. Metrics that indicate pace of progress have also been established for each goal. The Advisory Committee members provided the details regarding what should be accomplished, who will be involved, how long it will take, the location of any strategy, and the purpose. This information was used to develop the targeted implementation schedule and programs.

10-Year Plan Goals and Measurable Outcomes

ALTERED HYDROLOGY 10-Year Plan Goal

A) Maintain current average annual discharge relative to precipitation.

- **Measurable Outcome**: Discharge does not increase relative to precipitation at the U.S. Geological Survey (USGS) gage station in St. Cloud.

E. COLI IMPAIRMENTS 10-Year Plan Goal

B) Reduce *E. coli* in surface waters.

- **Measurable Outcome**: Reduce the occurrence of acute *E. coli* exceedances by 70 percent on prioritized streams.
- **Measurable Outcome**: Reduce the occurrence of chronic *E. coli* exceedances by 15 percent on prioritized streams.

EXCESSIVE NUTRIENTS AND SEDIMENT 10-Year Plan Goal

C) Reduce phosphorus and sediment loading and concentration in surface waters.

- **Measurable Outcome for Lakes:** Achieve the 10-year phosphorus reduction goals established by the MPCA for each prioritized lake.
- **Measurable Outcome for Streams:** Achieve a 10 percent reduction in total phosphorus (TP) and total suspended solids (TSS) at targeted endpoints on the Sauk River.

HIGH WATER QUALITY LAKES 10-Year Plan Goal

D) Maintain or enhance the water quality in high water quality lakes.

- **Measurable Outcome:** Achieve the 10-year phosphorus reduction goals established by the MPCA for each prioritized lake.

LAND USE 10-Year Plan Goal

E) Increase the understanding of land use management opportunities to reduce harmful impacts to natural resources.

- **Measurable Outcome:** Land use management decisions incorporate sustainable practices.
- **Measurable Outcome:** No net decrease in the 120,671 acres of natural areas, including CRP, RIM, protected wetlands, and state and county lands.
- **Measurable Outcome:** Identify priority farmland protection areas to encourage working land easements and other farmland protection tools.
- **Measurable Outcome:** Obtain no less than tolerable soil loss (T) on priority highly erodible lands within prioritized subwatersheds.

F) Improve stewardship of riparian areas.

- **Measurable Outcome:** Achieve 100 percent buffer compliance.

GROUNDWATER AVAILABILITY 10-Year Plan Goal

G) Increase groundwater conservation and recharge.

- **Measurable Outcome:** Well interference, as reported to the Minnesota Department of Natural Resources (DNR), is reduced.
- **Measurable Outcome:** Groundwater levels, as indicated by the DNR Observation Well network, are maintained or increased.

GROUNDWATER QUALITY 10-Year Plan Goal

H) Reduce the risk of groundwater contamination.

- **Measurable Outcome:** Increased groundwater protection in areas that are highly vulnerable to contamination or are designated as a nitrogen mitigation area.
- **Measurable Outcome:** Increased understanding of the impact that surface water has on groundwater drinking water sources.

ST. CLOUD DRINKING WATER 10-Year Plan Goal

I) Reduce the severity and duration of pollutant loads in the Lower Sauk River.

- **Measurable Outcome:** Reestablish water quality monitoring program in the Lower Sauk River.
- **Measurable Outcome:** Prioritize and implement projects that will reduce nutrient, sediment, and *E. coli* loading to the Sauk River.

HABITAT 10-Year Plan Goal

J) Protect, enhance, and restore habitat.

- **Measurable Outcome:** Enhance or restore 10 percent of permanently protected habitat.
- **Measurable Outcome:** Increase the amount of permanently protected habitat by 2,700 acres.

ROLES AND RESPONSIBILITIES OF PARTICIPATING LOCAL GOVERNMENTS

The Sauk River CWMP will be administered through a joint powers collaborative (JPC) agreement between Douglas County, the Douglas SWCD, Pope County, the Pope SWCD, Stearns County, the Stearns County SWCD, Todd County, the Todd SWCD, and the SRWD. Because the successful implementation of the Sauk River CWMP will require increased coordination, capacity, and funding within the partnership, the probable committees, roles, and responsibilities, as outlined in Table 1-3, will be established to ensure accountability to the partnership, SRW citizens and stakeholders, and funders.

Table 1-3. Roles and Responsibilities for Implementing the Sauk River CWMP.

POLICY COMMITTEE One board member from each JPC entity	» Meet quarterly. » Review and approve the biennial work plan and associated budget for partner activities. » Conduct an annual meeting to review progress and determine if changes are needed in priorities, actions, and responsibilities.
FISCAL AGENT Stearns County	» Prepare and submit grant applications and funding requests on behalf of the partnership. » Submit required financial reports to funders and provide regular updates to the Policy Committee.
PLAN COORDINATOR Sauk River Watershed District	» Coordinate and convene meetings. » Collaborate with and provide support to JPC entities to implement plan activities. » Collaborate with the fiscal agent to develop biennial workplans and status reports.
IMPLEMENTATION TEAM One staff member from each JPC entity.	» Meet quarterly, or more frequently if necessary. » Implement the targeted implementation schedule. » Identify opportunities to coordinate shared services, streamline processes, and eliminate program overlap or duplication of effort. » Review progress on the implementation plan; identify and work to address issues. » Conduct an evaluation of progress toward goals at least biennially; make recommendations to the Policy Committee on needed changes.
TECHNICAL COMMITTEE* State agency representatives as well as technical experts on an as-needed basis *Serves as the required advisory committee	» Meet at the call of the Implementation Team, but at least annually. » Made up of the Implementation Team, state agency representatives, and technical experts on an as needed basis. » Provide technical support on CWMP implementation to the Implementation Team. » Advise the Implementation Team on new programs, funding opportunities, and emerging issues. » Provide feedback and input to the Implementation Team on projects and issues.

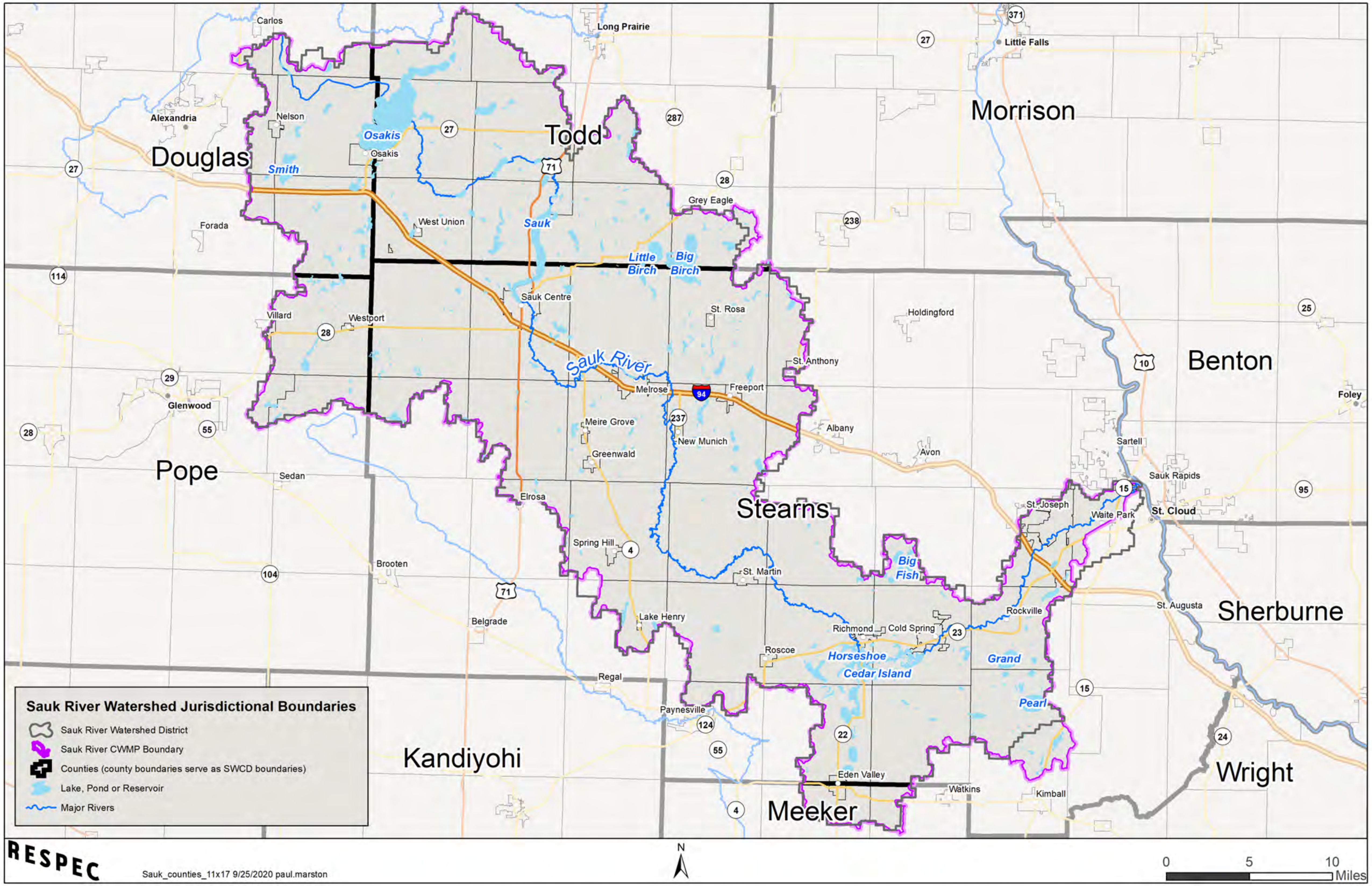


Figure 1-1. Jurisdictional Boundaries and Management Districts Within the Sauk River CWMP Planning Area.

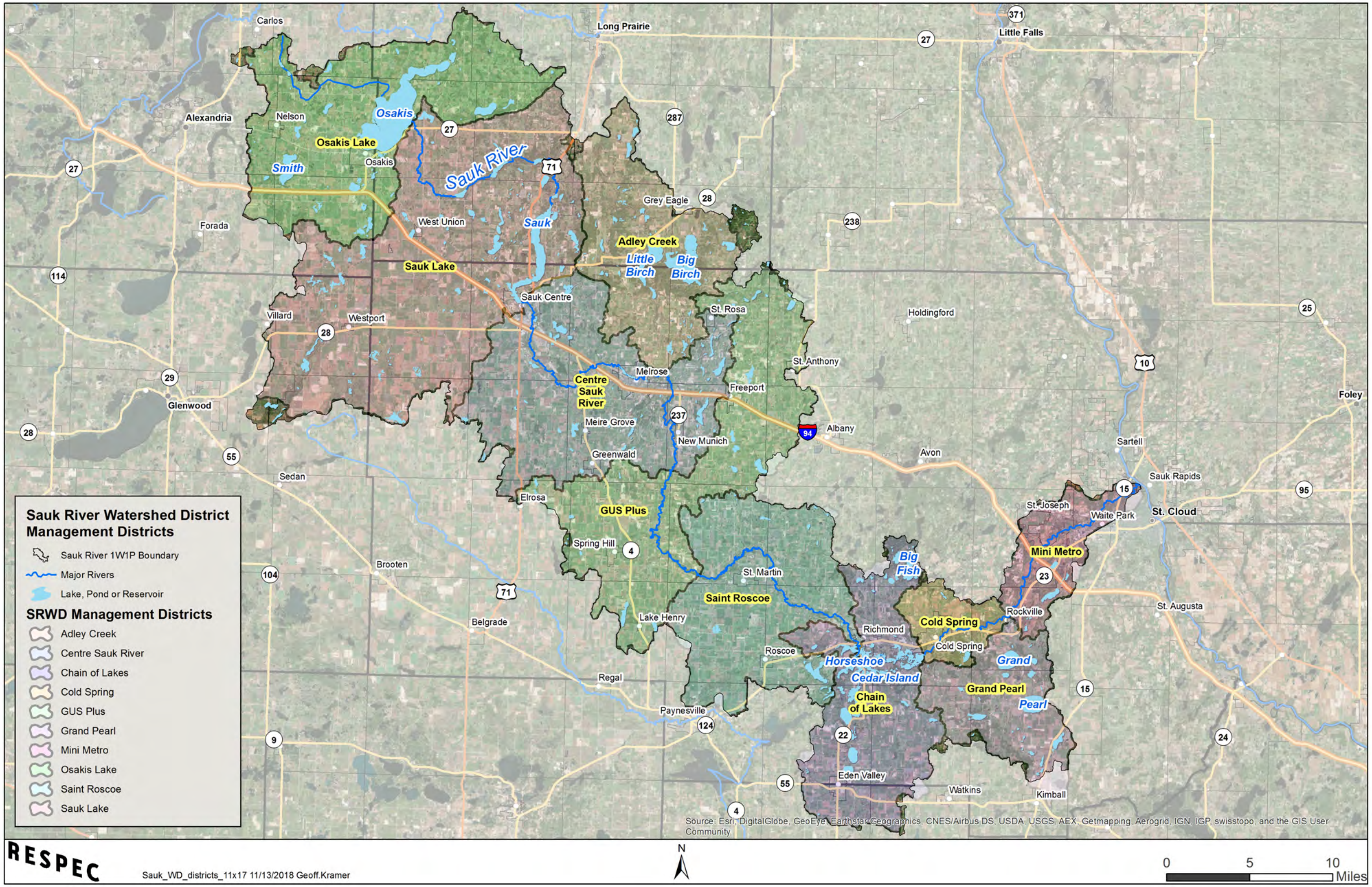


Figure 1-2. SRW Management Districts.

2 PLAN INTRODUCTION

This chapter provides the reader with an orientation to how the plan is organized. This plan is organized according to the following:

1 Executive Summary
Provides an overview of the key information provided in each section of the Sauk River CWMP.

2 Plan Introduction
Orients the reader to the organization of the plan content and describes the planning partnership, management districts, and watershed.

3 Priorities, Goals, and Emerging Issues
Describes the process by which priorities were identified, how measurable goals were determined, and the emerging concerns that were identified during the prioritization process.

4 Priority Issues
Provides an in-depth discussion of each priority issue, resource targeting, goals, and strategies that will implemented to address each priority issue.

5 Geographic Priorities
Describes each management district, targeted resources, and specific goals for each targeted resource.

6 Implementation Schedule
Presents the specific on-the-ground implementation actions; regulatory programs; outreach and education initiatives; and monitoring, data, and studies that will be undertaken to meet plan goals, as well as the decision-making process used to prioritize actions.

7 Implementation Programs
Describes incentive programs; regulatory programs; outreach and education initiatives; and monitoring, data, and studies that will be used to support plan goals.

8 Administration and Coordination
Describes the organizational arrangements, funding, and performance review process that will be undertaken throughout the 10-year plan.

PLANNING PARTNERSHIP AND PLAN DEVELOPMENT

The local governments involved in managing the SRW resources recognized that the BWSR 1W1P program provided a unique opportunity to develop a management plan that unifies and accelerates the restoration of degraded resources and protection of high-quality resources. The SWCDs and counties within the SRW and SRWD recognized the need to increase coordination, reduce potential duplication of activities, and provide greater assurances for meeting goals and measurable outcomes.

A Sauk River CWMP planning team was accordingly established and worked collaboratively to develop and submit a response to a BWSR-generated Request for Interest to develop a CWMP as part of the BWSR 1W1P program. Upon BWSR nomination and funding approval in September 2018, the collaborative arrangement was formalized through a Memorandum of Agreement (MOA) executed in April 2018 (Appendix C) and subsequent bylaws that were approved in April 2018 (Appendix D). The MOA was entered into by the SRWD, Stearns County and the Stearns County SWCD, Todd County and the Todd SWCD, Douglas County and the Douglas SWCD, and Pope County and the Pope SWCD. A small portion (1 percent) of the watershed is in Meeker County, which elected not to participate because of the small geographic area the county has in the Sauk River CWMP boundary.

Watershed Stats

Percentage of each county's area that is within the Sauk River CWMP boundary:

64%
Stearns County

21%
Todd County

9%
Douglas County

1%
Meeker County

5%
Pope County

Participation in the CWMP is not required if less than 5 percent of the jurisdictional land area of the local government is within the planning area. Figure 1-1 shows the jurisdictional boundaries in the SRW planning area.

Three committees were established to develop, advise, and approve the plan. The governance structure established in the formal agreement is outlined below. The committee membership at the time of publishing this plan is provided in Appendix E.

Governance Structure

POLICY COMMITTEE

The responsibilities of the Policy Committee included making final decisions about the plan contents and submittal.

STEERING COMMITTEE

The Steering Committee consisted of staff representatives from each local government that signed the MOA. The Steering Committee was responsible for coordinating the initial planning of the effort.

ADVISORY COMMITTEE

The Advisory Committee consisted of the Steering Committee members and representatives from state agencies, nonprofit and civic organization, lake associations, agricultural organizations, the University of Minnesota Extension Service, and the City of St. Cloud. This workgroup provided logistical and day-to-day decision-making in the planning process. The Advisory Committee was responsible for overall guidance for developing the plan content, including the priorities, implementation plan, implementation programs, and funding. The Advisory Committee provided oversight to all of the content development and plan review.

MANAGEMENT DISTRICTS

The Sauk River CWMP is geographically organized into ten management districts (Table 2-1 and Figure 2-1), which have been widely accepted and used by various units of government for nearly 20 years.

Table 2-1. SRW Management District Area and County Jurisdictions

Management District	Total Area (ac)	Total Area (mi^2)	Counties
Osakis Lake	87,267	136.35	Douglas, Todd
Sauk Lake	147,377	230.28	Douglas, Stearns, Todd, Pope
Adley Creek	57,135	89.27	Stearns, Todd
Centre Sauk River	87,699	137.03	Stearns
GUS Plus	84,629	132.02	Stearns
Saint Roscoe	69,134	108.02	Stearns
Chain of Lakes	61,092	95.46	Stearns, Meeker
Grand Pearl	35,147	54.92	Stearns
Cold Spring	14,015	21.90	Stearns
Mini Metro	23,719	37.06	Stearns

ac = acres
mi^2 = square miles

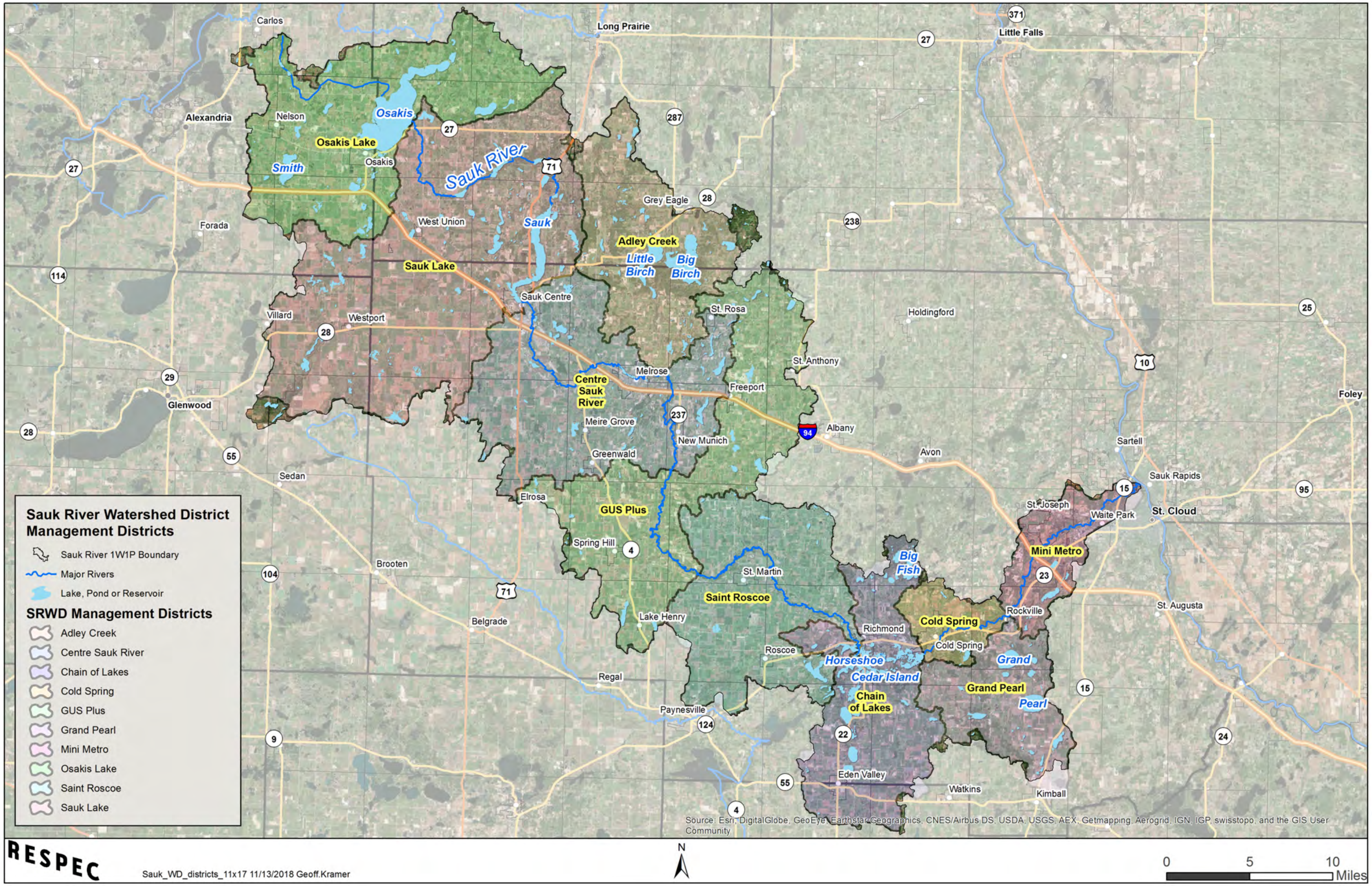


Figure 2-1. SRW Management Districts.

WATERSHED AT A GLANCE

The SRW is located in the central portion of Minnesota with Interstate 94 running through most of the watershed from the headwaters in the west to the St. Cloud Mini-Metro region in the east. A summary of land cover in the SRW is shown in Figure 2-2; agricultural land covers dominate with cultivated crops (49 percent) and pasture/hay (24 percent) constituting nearly three-fourths of the watershed. Figure 2-3 shows the distribution of land cover across the SRW; agricultural land covers extend across the entire watershed from the headwaters in the northwest to the outskirts of St. Cloud in the southeast. Forested areas are located in the north-central portion of the watershed, mostly in Todd County, as well as an area that extends from the northwest to the southeast of the city of Cold Spring. Developed areas are mostly located in the cities of St. Joseph, Rockville, lakeshore development on the Sauk River Chain of Lake, Waite Park, and St. Cloud with growing development in the cities of Cold Spring, Richmond, Melrose, and Sauk Centre. Soil-drainage classifications vary widely in the watershed (Table 2-2) with poorly drained soils located mostly in areas with the greatest percentage of land in agricultural use (Figure 2-4). The SRW has diverse natural resources that require management and protection, including trout streams, fen wetlands, native prairies, and hardwood forests.

The surficial geology of the SRW was formed during the last ice age as the Des Moines lobe moved its way across Minnesota. As the glacier retreated north it deposited sediment and formed many of the features that define the landscape, including its rolling terrain and well-known lakes. Following the glaciation period roughly 11,000 years ago rivers such as the Mississippi and Sauk have continued to shape the every-changing landscape into what it is today (Lusardi, B. A. and E. L. Dengler, 2017). Shaded relief, known as hillshade, data are used to highlight the topography of the SRW (Figure 2-5). The aquifers that provide drinking water to the area are also a result of the glaciation with surficial sand and gravel aquifers and buried and confined glacial till aquifers (Minnesota Department of Health, 2018).

The SRW contains 586 intermittent and perennial streams with an estimated total of 1,682 miles of streams (MPCA, 2015). Of the 1,682 miles of stream in the SRW, roughly 50 percent, or 833 miles, are altered. Major tributaries in the SRW include Ashley, Hoboken, Adley, Getchell, Stony, and Mill Creeks (Table 2-3). Many additional miles of ephemeral streams also exist and are channelized areas in the landscape that collect and transport runoff during snow melt and storm events.

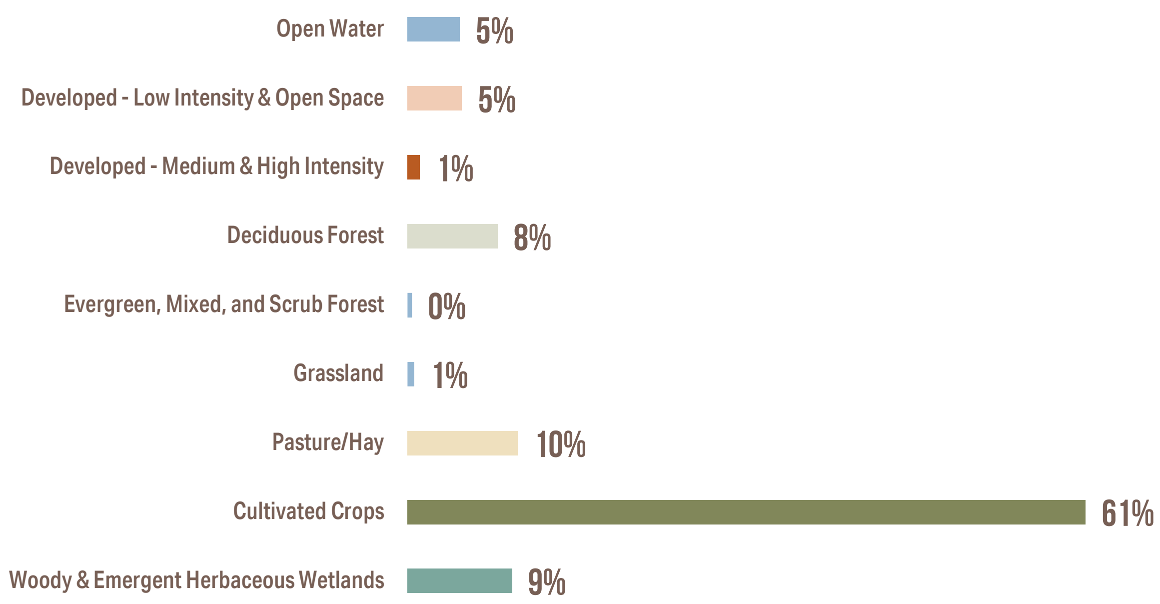


Figure 2-2. SRW Land Cover Percentages From the 2016 National Land Cover Database.

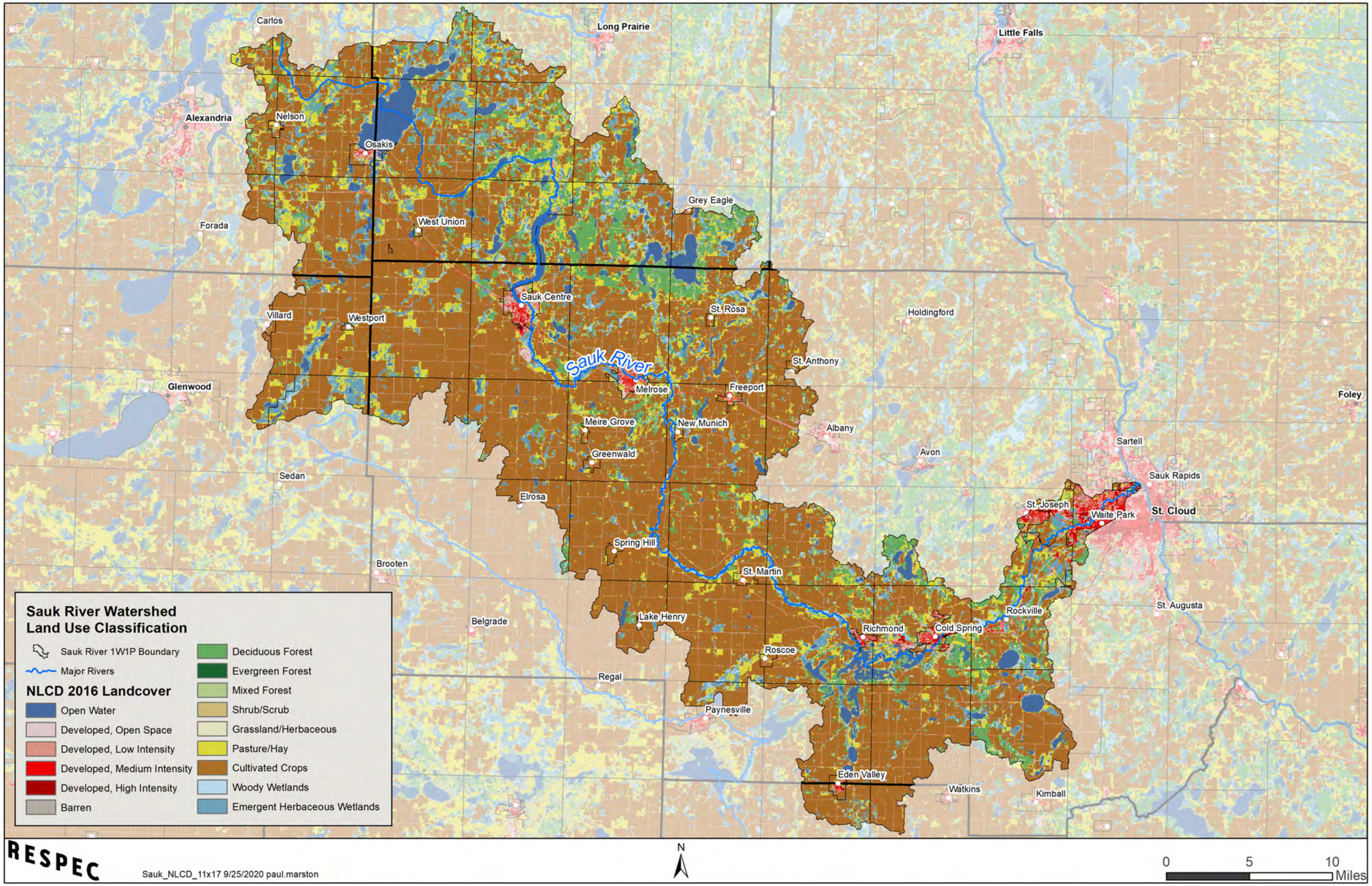


Figure 2-3. Land Cover Classifications Within the SRW.

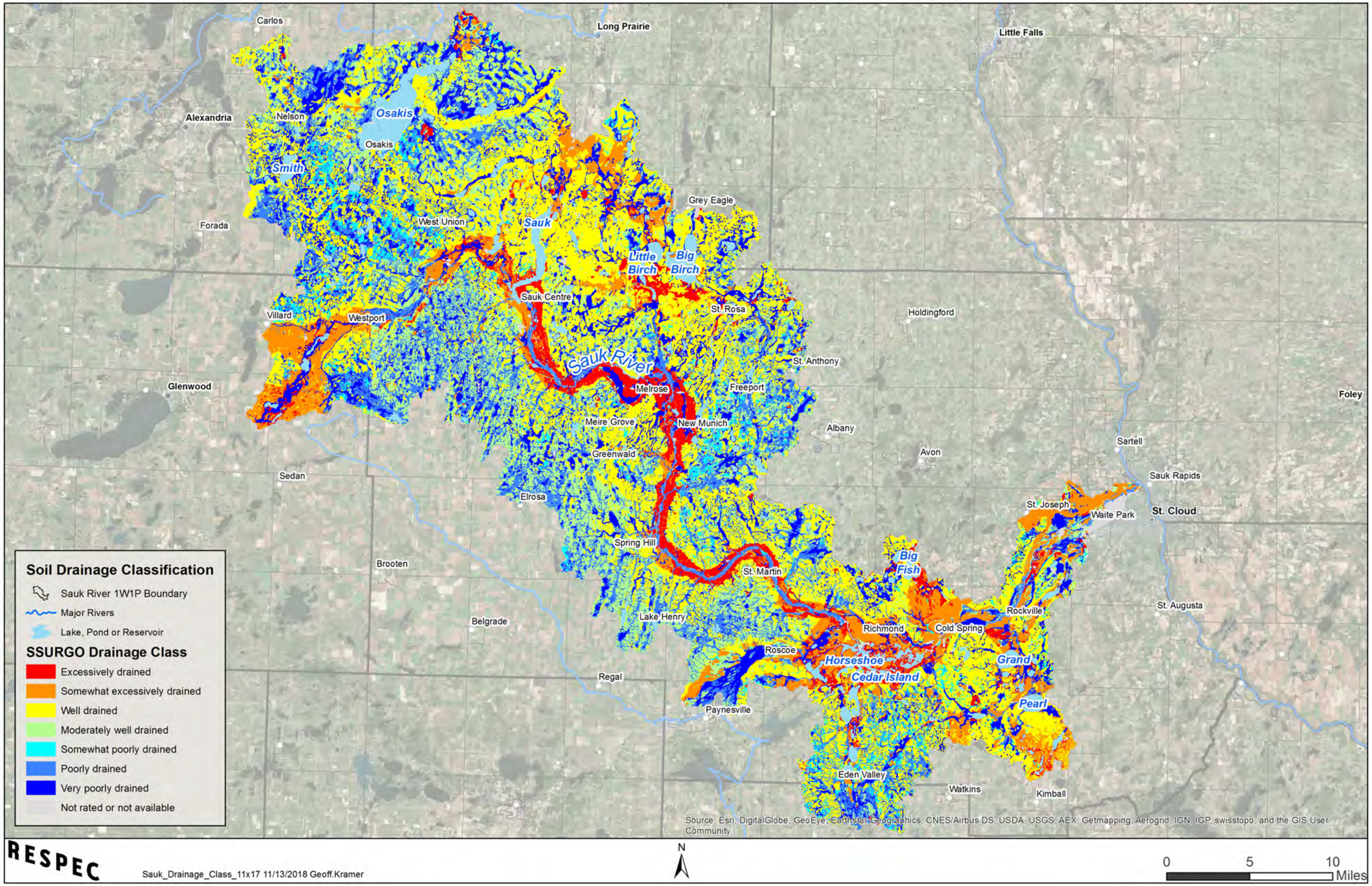


Figure 2-4. Soil-Drainage Classifications in the SRW.

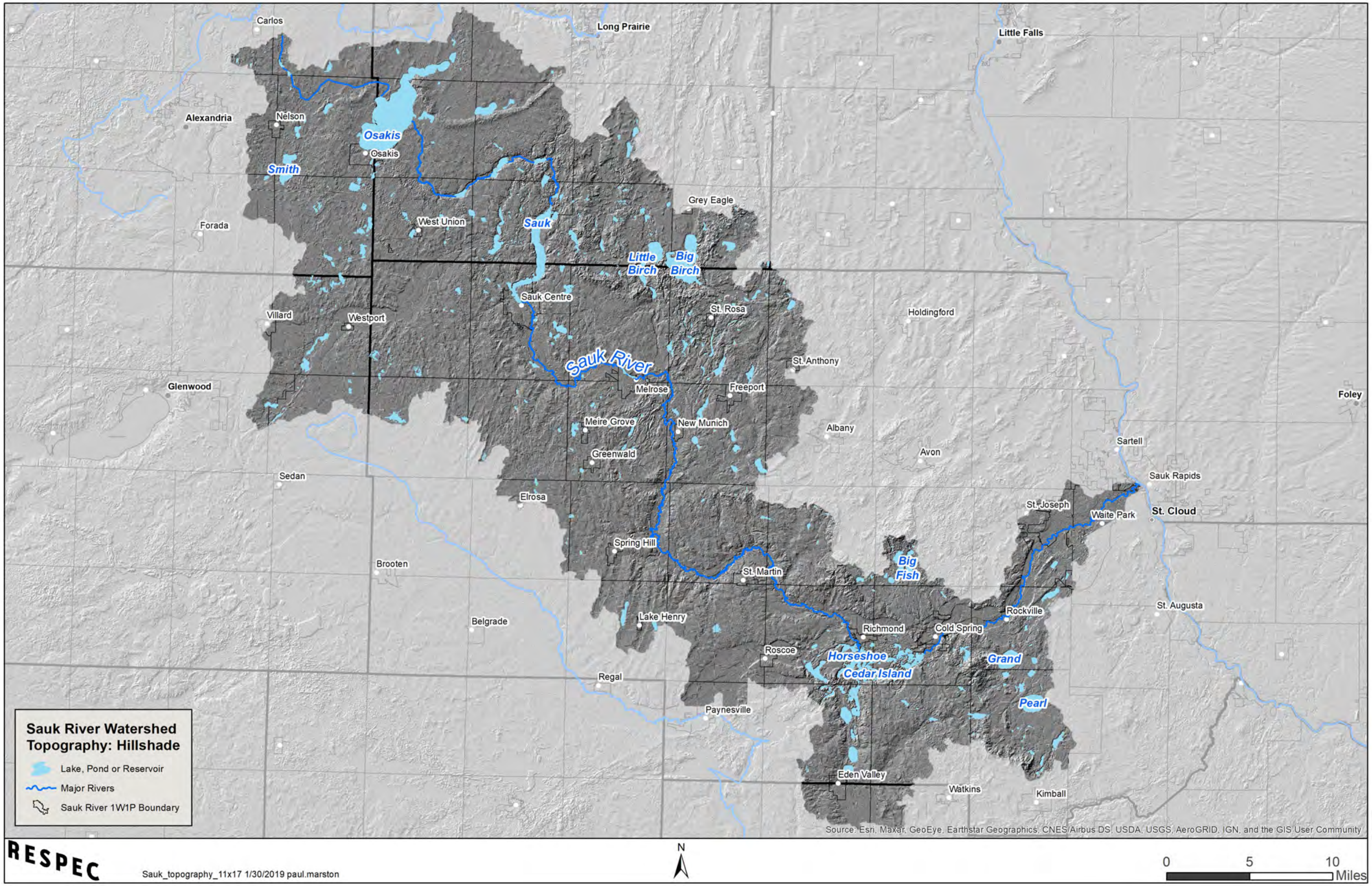


Figure 2-5. Hillshade Topography in the SRW.

Table 2-2. SRW SSURGO Drainage Classifications

SSURGO Drainage Classification	Percent of Sauk River Watershed (%)
Excessively drained	5
Somewhat excessively drained	9
Well drained	30
Moderately well drained	15
Somewhat poorly drained	3
Poorly drained	19
Very poorly drained	12
Not rated or not available	5

SSURGO = Soil Survey Geographic database (Natural Resources Conservation Service, 2018).

Table 2-3. Major Streams in the SRW

Stream	Length (mi)	Watershed Area (mi^2)
Sauk River	134.9	1,043
Adley Creek	4.8	89
Ashley Creek	27.5	113
Getchell Creek	16.1	67
Hoboken Creek	10.5	28
Stony Creek	11.1	26
Mill Creek	11.1	48

The SRW includes 371 lakes. The largest lake is Lake Osakis, which is the headwaters of the Sauk River and a recreation and outdoors destination. As the Sauk River runs through the watershed, it flows through numerous lakes in the northern portion of the watershed, including a string of small lakes from Lake Osakis to Sauk Lake. In the southern portion of the watershed, the Sauk River flows through the Sauk River Chain of Lakes with 13 lakes that provide abundant recreational and tourism opportunities. The Sauk River also provides recreational opportunities as one of the 35 state water trails in Minnesota. Other major lakes that are not on the Sauk River include Big Birch, Little Birch, Big Fish, Big, Fairy, Grand, Pleasant, Pearl, and Smith Lakes.

Agriculture is an important economic driver in the SRW. The 2017 US Department of Agriculture (USDA) Census of Agriculture (National Agricultural Statistics Service [NASS], 2019) data were collected for the five counties within the watershed (NASS, 2017a; 2017b; 2017c; 2017d; 2017e). The total market value of agricultural products produced within the SRW was estimated at $536 million from Census of Agriculture data on a county-by-county basis, prorated for the portion of each county within the SRW. The total market value of agricultural products produced in the entire five-county area is

Watershed Stats

586

Intermittent and Perennial Streams

1,682

Miles of Streams

371

Lakes

13

Lakes That Provide Recreational and Tourist Opportunities

$1.492 billion. A total of 7,380 farms are within the entire five-county area, with 12,204 individual producers identified. Approximately one-third of producers are female, and approximately 20 percent of the producers were identified as new or beginning producers. Other minorities represented in the census were those with military service (9 percent) and those identified as Hispanic, Latino, or of Spanish origin (0.5 percent). Statistics on the sizes of farms were also available and are presented in Table 2-4.

County-level statistics may vary from actual farm characteristics for the areas within the SRW; for example, the portion of Todd County within the SRW is more agricultural in nature than the northern portion of the county. County-level statistics for Todd County, therefore, likely underestimate the agricultural intensity within the portion of Todd County in the SRW. Stearns County is the top county in Minnesota for livestock production (NASS, 2017e).

Table 2-4. County Agricultural Statistics

County	Total Area (mi^2)	Land in Farms (ac)	% of County in Farms (%)	Number of Farms	Average Farm Size (ac)	Area Irrigated (ac)	Irrigated (%)
Douglas[a]	634.32	263,265	65	960	274	3,257	1.2
Meeker[b]	608.54	301,439	77	1,028	293	8,832	2.9
Pope[c]	670.14	333,009	78	837	398	32,031	9.6
Stearns[d]	1,334.52	650,821	76	2,951	221	51,762	8.0
Todd[e]	942.02	333,408	55	1,604	208	12,934	3.9

(a) *NASS, 2017a*
(b) *NASS, 2017b*
(c) *NASS, 2017c*
(d) *NASS, 2017d*
(e) *NASS, 2017e*

The most recently available population information estimates that the total population within the five counties in the SRW was 248,840 as of 2015 (Minnesota State Demographic Center, 2019) and is projected to increase to 256,525 in 2050, as shown in Table 2-5; however, these population projections are for the entire county area, not only those living in the SRW. The overall projected increase across the five-county area is approximately 8,000. The population growth distribution varies with most of the increase in Stearns County while Meeker, Pope, and Todd Counties are projected to decline slightly from 2015 to 2050.

Table 2-5. Population Projections for Counties in the SRW Through 2050

County	2015	2020	2025	2030	2035	2040	2045	2050
Douglas	37,008	37,885	38,528	38,940	39,229	39,384	39,453	39,528
Meeker	23,180	23,043	22,841	22,642	22,487	22,359	22,271	22,255
Pope	10,953	10,941	10,894	10,817	10,726	10,620	10,507	10,393
Stearns	153,307	155,587	157,298	158,501	159,445	160,131	160,666	161,217
Todd	24,392	24,041	23,735	23,501	23,339	23,226	23,156	23,132
Total	**248,840**	**251,497**	**253,296**	**254,401**	**255,226**	**255,720**	**256,053**	**256,525**

3 ISSUE PRIORITIZATION: PROCESS AND RESULTS

To make real progress on addressing the restoration and protection needs of the SRW, priority concerns, issues, and resources needed to be identified. By identifying priority concerns and resources, the Sauk River CWMP partners can harness their collective efforts to cohesively implement restoration and protection activities that result in real progress toward their goals. This section of the plan describes the process that was used to identify and prioritize watershed issues.

AGGREGATION OF BACKGROUND INFORMATION

Information and data pertaining to natural resources in the SRW were assembled using two primary data sources that were compiled into a comprehensive list of resource issues and concerns. These two sources included existing plans and reports as well as input received from stakeholders, including comment letters and public meetings. A summary of these sources is provided below. After all of the data had been assembled, issues and concerns were coded according to natural-resource categories, which resulted in developing an issues and concerns affinity map, as shown in Figure 3-1.

Data Sources

~50
Existing plans, studies, and reports.

8
Comment letters that were submitted during the public notice of the planning process.

45
People who participated in the public kick-off meetings.

34
People who completed the online survey.

The Advisory Committee established workgroup teams that were aligned with each major resource category of surface water, groundwater, and habitat, as well as a stressor category to explore emerging issues and external stressors that impact natural resources. The workgroups further categorized resource issues according to concerns and developed preliminary issue statements that characterized the overarching theme presented in the aggregated data for each resource concern. These preliminary resource concern categories and draft issue statements are listed in Table 3-1.

SAUK RIVER CWMP RESOURCE CONCERNS AND ISSUES

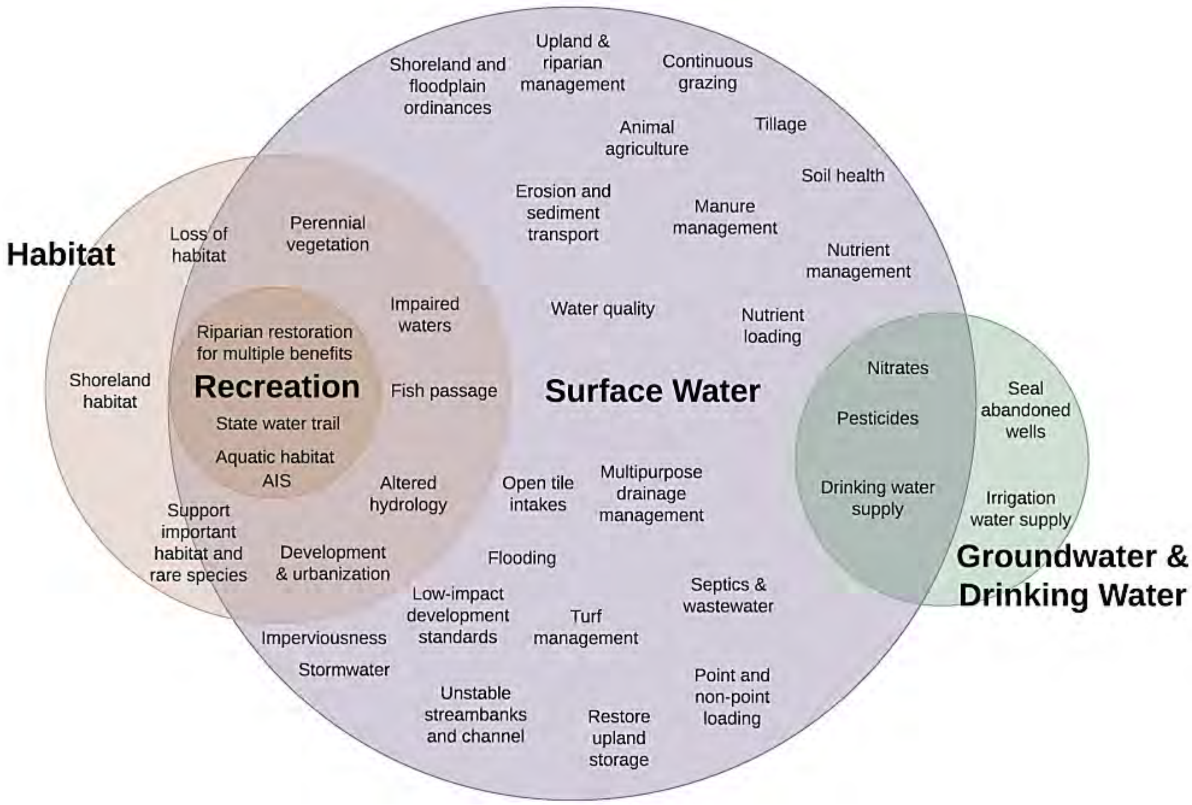


Figure 3-1. Issues and Concerns Affinity Map.

Table 3-1. Preliminary Resource Concerns and Draft Issue Statements

Resource	Resource Concern	Draft Advisory Committee Issue Statements
Surface Water	Surface-water quality	Surface waters face *E. coli* contamination caused by agricultural, urban, and residential uses (e.g., livestock watering, non-compliant septic systems, manure application, and kennels).
	Surface-water quality	Excessive nutrients and sediment are causing aquatic life and recreational-use impairments.
	Surface-water quality	Chloride from snow and ice removal, water softener discharge, and gravel road dust suppressant has negative impacts.
	Surface-water quality	A lack of protection priorities could cause degradation of high-quality lakes.
	Hydrology	High-peak flows from land use alteration and lack of resiliency to changing precipitation patterns are causing accelerated stream bank erosion and sediment loading.
	Hydrology	Accelerated runoff, reduced watershed storage, and reduced connection between surface water and groundwater impacts base flow.
	Hydrology	Altered hydrology causes impacts to lakes, streams, and wetlands.
	Hydrology	Drainage system hydraulics, such as culvert and tile-intake sizing and conveyance system sizing, have resulted in changes to the volume and rate of delivery causing increased peak flows and altered base flows in area streams.
	Hydrology	Alterations to wetlands are impacting downstream quality.
	Stormwater	Runoff quality and quantity can be adversely impacted by improperly managed land uses.
Groundwater	Quantity	Groundwater availability is at risk because of reduced recharge.
	Quantity	Groundwater availability is at risk because of increased withdrawals.
	Quantity/Quality	Altered hydrology causes impacts to groundwater.
	Quality	Alterations to wetlands are impacting groundwater quality.
Drinking Water	Quality–Groundwater	Contaminants are affecting private wells and public drinking water supplies obtained from groundwater.
	Quality–Groundwater	Private wells used for drinking water exceed federal safe drinking water standards.
	Quality–Groundwater	Reductions in nitrate loss to surface water and groundwater sources are economically and environmentally beneficial.
	Quality–Groundwater	Protection is lacking in designated highly vulnerable and surface-to-groundwater contribution drinking water supply management areas.
	Quality–Groundwater	Contaminants of emerging concern in water may cause harm to humans and aquatic life.
	Quality–Surface water	The drinking water for the city of St. Cloud is directly impacted by the Sauk River's water quality.

Resource	Resource Concern	Draft Advisory Committee Issue Statements
Land (all)	All surface waters	Land use change has downstream impacts.
	All surface waters	Land use management decisions can impact long-term sustainability of resource goals.
Land (riparian)	All surface waters	Land use activities in riparian and adjacent areas have impacts on surface waters.
	All surface waters	Riparian areas may lack quality perennial cover and habitat.
	All surface waters	Access of livestock to the waterbodies is impacting habitat and water quality.
	All surface waters	Watercourses may not have effective buffers.
Land (rural/agricultural)	All surface waters	Nutrient stewardship is not being fully implemented, causing water quality impacts.
Habitat	Habitat - General	Loss of wildlife habitat because of land use changes.
	Habitat - General	Protection is lacking for existing natural features that provide multiple benefits.
Upland Habitat	Upland Habitat	Keeping forested areas healthy is important for maintaining high water quality.
	Invasive Species	Spread of terrestrial invasive species threatens biodiversity and the quality of native habitats.
	Upland Habitat	Land conversion has resulted in a loss of upland native grasslands that provide critical habitat.
Aquatic Habitat	Aquatic Habitat	Wetland drainage and degradation impacts wildlife, recreation, and water quality.
	Aquatic Habitat	Trout habitat is at risk of becoming degraded.
	Aquatic Habitat	Reduced groundwater availability may threaten groundwater-influenced biological communities such as fens, trout streams, lakes, and wetlands.
	Invasive Species	Aquatic invasive species spread threatens biodiversity and the quality of native habitats.
	Aquatic Habitat	Healthy fish and game populations depend on high-quality aquatic habitat. Protecting native species in and along the shoreline is an important way to maintain high-quality habitat.
Infrastructure	Infrastructure – Stressor	Precipitation stressors and outdated infrastructure are concerns for water quality.
	Infrastructure – Stressor	Fixed-level structures limit the ability to manage water for multiple benefits.

PRIORITY ISSUES

The first step in prioritizing resource issues to be addressed in the plan was for the Advisory Committee to create and implement a screening process for each issue statement. The Advisory Committee worked in small workgroups to conduct the screening, which consisted of evaluating each issue statement according to the list of questions below.

Advisory Committee

ISSUE STATEMENT SCREENING QUESTIONS:

- Do we have the information we need to develop a meaningful goal?
- Do we understand the current situation? If not, are data available to provide clarity?
- Do clear strategies exist to address the situation?
- Is the issue within the authority/purpose of the partnership to address?

The screening process resulted in eliminating some issues that were beyond the scope of the partners' authority to act on or that lacked information or data to establish a measurable goal or measure progress toward goals. Some of the issues that were lacking in data are considered emerging concerns that will be monitored throughout the course of the 10-year plan. These emerging concerns are discussed below.

Finally, the Advisory Committee examined the impact that each of the remaining issues would create if they were not adequately addressed and the extent to which multiple benefits could be obtained if they were addressed. Presentations regarding altered hydrology as an impacts multiplier were made and discussions were facilitated by BWSR for both the Advisory Committee as and the Policy Committee. Additionally, both of these committees rated the opportunity to achieve multiple benefits as a primary consideration to establishing priorities and selecting implementation actions. Based on these considerations, the Advisory Committee ranked the altered hydrology and sediment and nutrient impairments as the top two priorities to be addressed through implementation actions. The sustainability of land use decisions is also a high priority;

however, this priority concern is addressed primarily through regulatory and land use management tools. The priority concerns and issue statements (Table 3-2) were presented to the Policy Committee and were approved to move forward to goal development.

SRWD TOP RANKING PRIORITY CONCERNS:

1. Altered Hydrology
2. Sediment and Nutrient Impairments

Table 3-2. Priority Resource Concerns and Issue Statements

Resource Category	Resource Concern	Issue Statement
Altered Hydrology	Altered hydrology	Accelerated runoff, reduced watershed storage, and reduced connection between surface water and groundwater are causing adverse impacts to downstream waters, wetlands, groundwater, and habitat.
Surface Water	*E. coli* impairments	Surface waters face *E. coli* contamination caused by agricultural, urban, and residential uses.
	Sediment and nutrient impairments	Excessive nutrients and sediment are causing aquatic life and recreational-use impairments.
	Protecting high water quality resources	A lack of protection priorities could cause degradation of high-quality lakes.
Groundwater and Drinking Water	Quantity and availability	Groundwater availability is at risk because of reduced recharge and increased withdrawals.
	Drinking water quality	Drinking water supplies obtained from groundwater may be contaminated or are at risk of contamination.
	Drinking water	The drinking water for the city of St. Cloud is impacted by the Sauk River's water quality.
Land Use	Sustainability of land use decisions	Land use management decisions can impact long-term sustainability of resource goals.
	Riparian area management	Land use activities in riparian and adjacent areas have impacts on surface waters.
Habitat	Aquatic	Habitat areas have been negatively impacted due to fragmentation, pollution, invasive species, and intensifying land use.
	Wetland	
	Upland	

EMERGING ISSUES

This plan is based on existing knowledge and an evaluation of existing concerns; however, numerous emerging issues may require a shift in focus or could influence the implementation plan priorities. The following concerns are explored further in the following sections, although this assessment is not intended to be comprehensive:

- Climate Change
- Future Growth
- Contaminants of Emerging Concern
- Cl^- Chlorides
- Invasive Species

The multiplier impact of climate change and future growth is of primary concern. These driving forces are complex issues to understand and address in and of themselves. When combined, uncertainty increases in what the overall impact will be to watershed resources. Land use and the need to make land use decisions that provide for long-term sustainability are discussed in more detail in Chapter 4, *Priority Resource Issues*.

To achieve the vision of obtaining resiliency that balances a healthy ecosystem with a vibrant economy, an adaptive management approach will be employed throughout the 10-year-plan timeline. The Sauk River CWMP partners will monitor emerging natural resource concerns using an adaptive management approach to realign programs and priorities to address emerging concerns.

Adaptive Management Approach

Climate Change

To fully address future planning efforts, the impact of extreme climate and precipitation events must be considered. Consequences of the changing climate will influence many factors that directly impact water quality throughout the SRW. Changes in precipitation patterns and air temperatures will drive many of these impacts. Monitoring and modeling these changes will help guide decisions to establish resiliency of the water resources. As the climate changes, precipitation intensity increases, intense rain-event frequency increases, precipitation-event duration increases, and increases in length between precipitation events will occur. These changes in precipitation trends will increase erosion and runoff, thereby increasing pollutant loading from landscapes such as agricultural, urban, and forest areas that have become fragmented, and increase the likelihood of consequences from flooding and potentially droughts. In addition to increasing runoff, streams and rivers are more likely to experience stream bank erosion as the “flashiness” of rain events increases the natural-channel depth and width to accommodate increased flow. A summary of key meteorological trends is shown in Table 3-3.

In addition to the precipitation changes, temperature changes will influence the types of plants and animals that are able to thrive in the region; for example, warming rivers may result in conditions that trout cannot survive in or increased heat and humidity could increase the likelihood and severity of mold infestations on row crops. The local economy, which is agriculturally based, is vulnerable because of the increased risk of disease, pests, and invasive species. Earlier ice-out dates on lakes may result in aquatic life-cycle disruptions, including earlier excessive aquatic plant growth and algal blooms.

Climate trends in the SRW indicate that mean annual temperatures have warmed by 0.2 degrees Fahrenheit (°F) per decade since 1895 with mean annual minimum temperatures having warmed more quickly (0.3°F per decade) than mean annual maximum temperatures (0.1°F per decade).

Temperatures have increased more rapidly in the winter (December to February) at 0.4°F per decade than the summer (June to August) at 0.1°F per decade. Mean annual precipitation has increased by 0.42 inches per decade over the same time period. Mean annual growing season (June to September) precipitation for the period of 1981 to 2018 has remained relatively constant with a slight downward trend of 0.02 inches per decade. Minnesota Department of Natural Resources (MNDNR) ice-out data for Lake Osakis (MNDNR, 2019a) for the period of 1867 to 2019 indicate the ice-out date is trending earlier by approximately 4.8 days per century. Details on climate trends are examined in more detail in Appendix B.

Table 3-3. Key Meteorological Criteria and Trends

Weather	Trend	Description
	↑	Mean annual precipitation has increased by 0.42 inches per decade since 1895.
	—	Mean annual growing season (June to September) precipitation for the period of 1981 to 2018 has remained relatively constant with a slight downward trend of 0.02 inches per decade.
	↑	Mean annual temperatures have increased by 0.2°F per decade since 1895.
	↑	Mean annual minimum temperatures have increased by 0.3°F per decade since 1895.
	↑	Mean annual maximum temperatures have increased by 0.1°F per decade since 1895.
	↑	Temperatures have increased more rapidly in the winter (December to February) at 0.40°F per decade than the summer (June to August) at 0.1°F per decade since 1895.
	↑	MNDNR ice-out data for Lake Osakis (MNDNR, 2019a) for the period of 1867 to 2019 indicate the ice-out date is trending earlier by approximately 4.8 days per century.

Action Items:

- Continued monitoring of hydrologic and meteorological conditions.
- Establishing baseline hydrographs for public drainage systems and streams to evaluate changes over time.
- Modeling climate change impacts to hydrology and water quality using the Climate Change Module in the HSPF-SAM model and using the resulting information to improve and refine implementation strategies and programs.

Future Growth

Population growth and corresponding development pressure are an important consideration in the SRW, especially the potential conversion of agricultural land to developed land and associated impacts to remaining wetlands and forests. Future development must be managed so that impacts to the natural environment are anticipated and mitigated. Mitigating future impacts primarily relies on implementing regulatory and land use planning tools that guide development to suitable areas and define standards that restrict harmful actions. The planning partnership will need to evaluate the ability of existing regulatory programs to meet future growth demands and consider the potential increased impacts caused by climate change.

Analyses were completed by Dr. Christina Locke at the University of Minnesota using the Maxent program to determine the likelihood of development or conversion to agricultural land use throughout the state. The results are useful in predicting the probability of land use conversion to development or cropland and were determined through statistical analysis on areas that were converted to developed or cropland between National Land Cover Databases 2006 and 2011. While the study was not completed at the time of this plan being written, the results provide a basis to begin considering the types of land use management, resource protection, and mitigation strategies that should be employed to avoid adverse impacts from these potential land use changes.

The 25 percent likelihood scenario results indicate that the risk for conversion to cropland (Figure 3-2) is lower than the risk for conversion to developed land use (Figure 3-3) in the SRW, which is probably because cropland is already the primary land cover. This analysis uses data related to land and parcel information only, such as distances to urban areas, lakes, and highways; soils; and crop productivity. Because the analysis does not consider existing policies and land use ordinances, its usefulness is in considering where development pressures are likely to occur and evaluating the ability of current regulatory controls to meet demand in the context of current and future resource issues.

Action Items:

- Identify priority farmland protection areas and encourage working land easements and other farmland protection tools.
- Increase education efforts focused on smart growth, green infrastructure, and sustainability tools for land use decision making authorities, developers, planners, and interested stakeholders.
- Prioritize forest management and protection programs in growth areas and especially subwatersheds of high-water quality lakes.

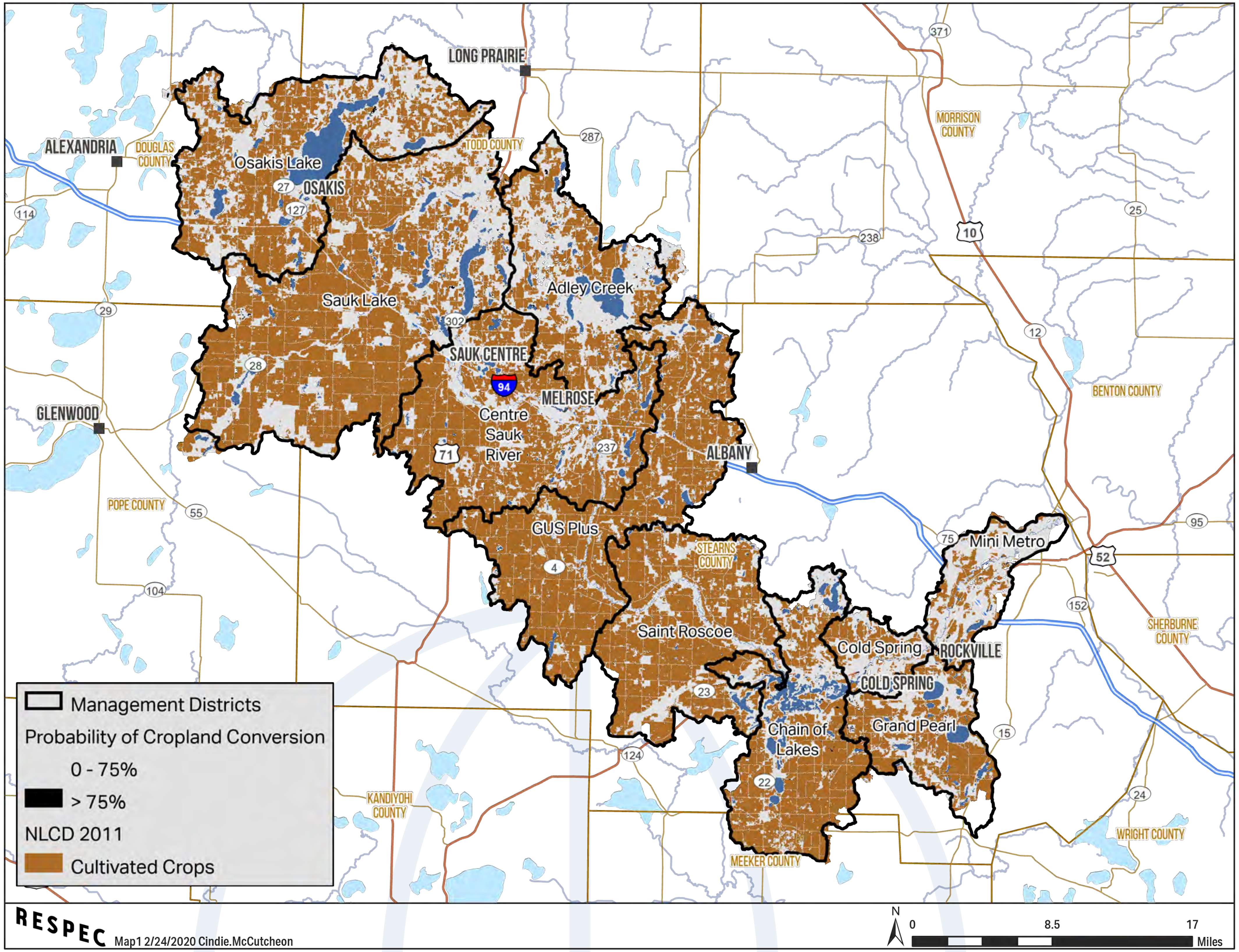


Figure 3-2. Areas That Have a 25 Percent Probability of Being Converted to Cropland.

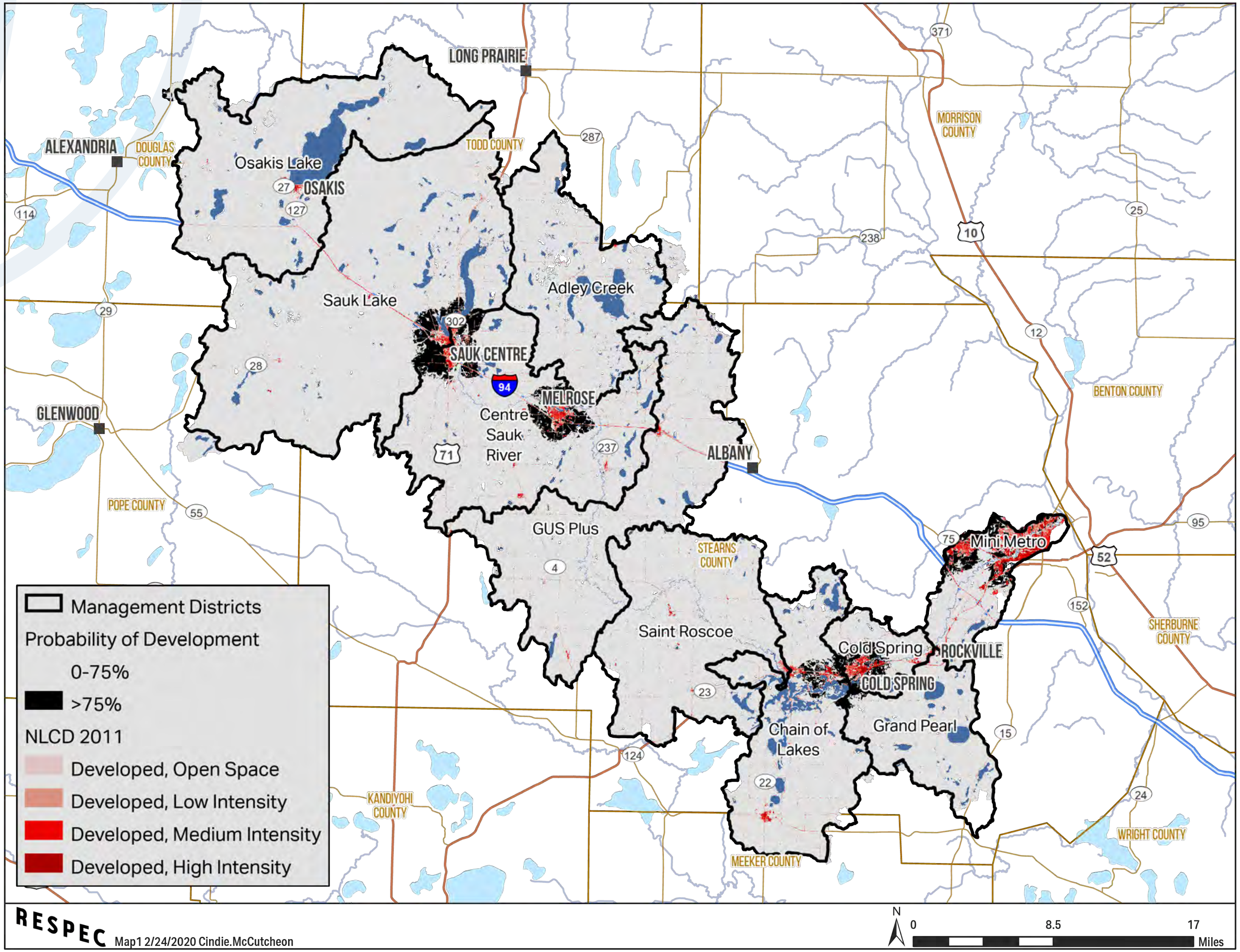


Figure 3-3. Areas Currently in Cropland That Have a 25 Percent Probability of Being Converted to Developed Land Use Because of Growth.

Contaminants of Emerging Concern

Contaminants of emerging concern (CECs) include pharmaceuticals, personal care products, and laboratory-derived and naturally occurring chemicals. These contaminants can make their way into surface waters and groundwaters and pose a threat to plants, animals, and humans.

The presence of CECs has been detected in Minnesota Pollution Control Agency (MPCA) groundwater-test wells, although none of the detected CECs were found to be above water quality guidelines. The most commonly detected CECs are listed in Table 3-4.

Table 3-4. Most Commonly Detected Contaminants of Emerging Concern and Common Uses

Most Commonly Detected CECs in the SRW	Common Uses
Bisphenol A (BPA)	» Plastic containers including water bottles and baby bottles » Resin lining of canned food containers
Perfluorobutanoic Acid (PFBA)	» Nonstick and stain-resistant products » Food packaging » Firefighting foam
Diethyltoluamide (DEET)	» Insect repellent
Arsenic	» Naturally occurring

The toxic chemicals produced by algae are also CECs. Blue-green algae blooms on lakes, streams, and wetlands can include the proliferation of bacteria that contain cyanotoxins. These types of algae blooms are often referred to as HABs. Cyanotoxins in HABs can cause illness to people who are exposed to them. The impact severity is worse on pets and livestock, and exposure may result in death. Discovering if cyanotoxins are present in an algae bloom is difficult, so precautionary measures should be taken to limit the potential exposure to people, pets, and livestock. No clear indication exists as to why an algae bloom may become toxic. Recent research has shown that warmer surface waters or higher nitrogen-to-phosphorus ratios increase the likelihood of HABs; however, no definitive links are known at this time.

Action Items:

- Increase participation in drug take-back programs. Make a simple online map of where drop-off points are located.
- Increase education efforts by teaching SRW residents proper handling and disposal of laboratory-created compounds, including personal care products and pharmaceuticals.
- Increase awareness of HABs and reducing pet and livestock exposure.

Cl⁻ Chlorides

Chlorides in surface waters are a concern, and if levels exceed the water quality standard of 230 milligrams per liter (mg/L), chlorides can be toxic to aquatic life (MPCA, 2019a). Chloride is persistent in the environment and is considered a "permanent pollutant" due to the difficulty in removing it from a waterbody. Chlorides can only be removed by large reverse-osmosis facilities that are cost prohibitive. Major chloride sources include salt used as a deicer on roads, parking lots and sidewalks, agricultural fertilizer (Potassium Chloride), and water softener discharge to water treatment facilities or septic systems (MPCA 2019a). Calcium chloride is also a concern because of its wide use for dust control on rural roads. The environmental effects of calcium chloride are similar to sodium chloride; however, calcium chloride does not cause sodium accumulation in soils and actually improves soil structure and increases permeability (MPCA, 2019a). No chloride impairments currently exist in the SRW; however, an MPCA analysis suggests that waterbodies in watersheds that have roads covering more than 18 percent of the watershed area are at risk of chloride impairments. Several subwatersheds in the SRW exceed 18 percent road coverage. These areas are in St. Cloud/Waite Park, Rockville, Cold Spring, and Richmond, and are shown in pink in Figure 3-4. These areas may be at risk for chloride impairments in the future as urbanized areas expand and the need for deicing grows. No assessment of the extent of calcium chloride use for dust control within the watershed has been completed.

Action Items:

- The SRWD has begun monitoring streams for chloride. An annual assessment of the chloride status and trends will be used to evaluate future intervention measures.
- Work with road authorities to determine the extent of calcium chloride use in the SRW.
- Incorporate information regarding best practices for purchasing and maintaining water softeners into educational programming.

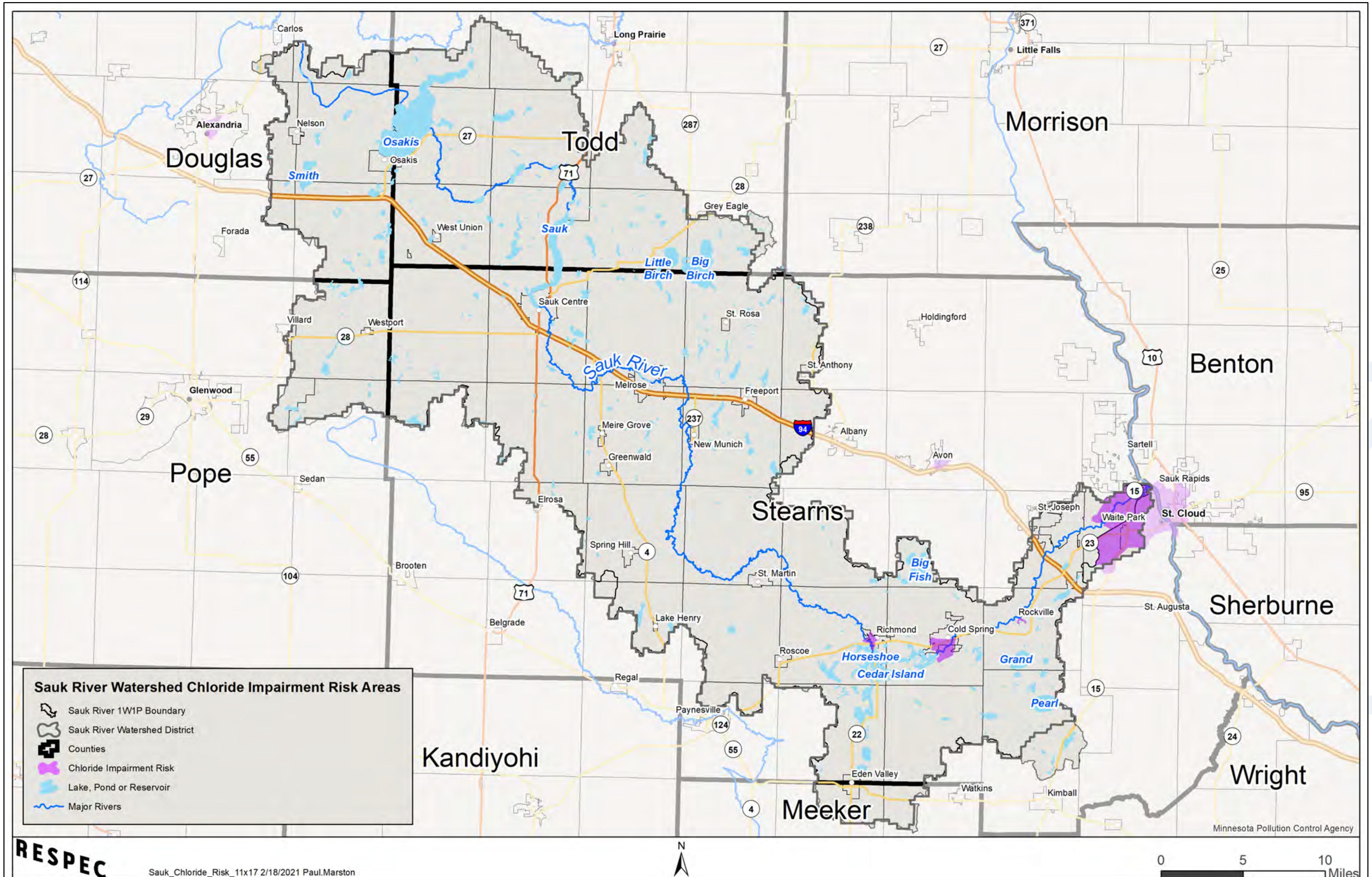


Figure 3-4. Subwatersheds (Pink) at Risk of Chloride Impairment Because of Greater Than 18 Percent Impervious Area.

Invasive Species

Aquatic and terrestrial invasive species are a current and emerging issue. The SRW partners have developed and are implementing programs to address known invasive species, including aquatic species and terrestrial invasive species, particularly those that pose a threat to agriculture and water quality. Because existing programs already include early detection and management, the action items continue to implement existing programs using a flexible approach that allows for resources to quickly be redirected to address newly identified threats.

TERRESTRIAL

Terrestrial invasive species are often not a priority when considering the watershed health; however, the effect of these land-based, non-native plants and animals should not be underestimated. This awareness is especially important as agriculture, stream bank stabilization, and habitat restoration are priorities in the Sauk River CWMP. These invasive species can quickly destroy agricultural crops, tree foliage in forests, and decimate vegetative cover adjacent to waterways. Such impacts can result in major short- and long-term changes to the watershed hydrology and cause increased runoff and stream bank erosion as well as increased risk to infrastructure such as culverts and dams that are not sized to accommodate the increased flow. Terrestrial invasive species can often be highly mobile—either by their own power or by hitching a ride—which makes controlling their spread difficult.

Local Terrestrial Invasive Species Management

Many agencies in the SRW, including the cities, townships, MNDNR, USDA, county governments, University of Minnesota Extension Service, US Fish and Wildlife Service (USFWS), and local nonprofit groups are working to control the spread of terrestrial invasive species. Pope SWCD leads a cooperative weed management program in partnership with the Pope County Ag Inspector. By consolidating local planning efforts and forming a joint effort built on the existing Minnesota planning frameworks, the terrestrial invasive species program implementation could be improved to match the scale of local aquatic invasive species (AIS) efforts.

AQUATIC INVASIVE SPECIES (AIS)

AIS are introduced, nonindigenous plants and animals that live in or near water that have often adapted quickly to their new environments and reduce the overall number of native species through competition. AIS pose economic and environmental threats to Minnesota waters and are managed throughout Minnesota by the MNDNR, which receives support from research and academic institutions and counties. Public education and inspection play a vital role in defending against their continued spread and growth.

Local Aquatic Invasive Species Management

The SWCDs, counties, and Environmental Service Departments have programs for managing AIS. The local AIS plans encompass public awareness and education; prevention such as watercraft inspection and decontamination; early detection; rapid response and containment; and mitigation and management.

Watershed Partners in Action!

A collaborative partnership between the Grand Lake Improvement District (GLID), MNDNR, and Minnesota Aquatic Invasive Species Research Center (MAISRC) has resulted in the successful containment of a starry stonewort infestation in 2018 and 2019 at Grand Lake near Rockville.

Starry stonewort was discovered in Grand Lake on August 4, 2017, during the annual Starry Trek program organized by the MAISRC and University of Minnesota Extension Service and coordinated locally by the Stearns County Coalition of Lake Associations. Volunteers performing public-water access sampling discovered the infestation at the Grand Lake public-water access. The infestation was out from the boat ramp in an 8-foot × 8-foot area.

Starry stonewort is a large, submerged, plant-like alga that can form dense mats in waterbodies. These mats can interfere with boating, fishing, swimming, waterfowl hunting, and other recreational activities. In addition, starry stonewort may choke out native plant communities and cause ecological harm. The species can spread by clinging to watercraft, trailers, and equipment.

A plan was implemented that included a lake survey to determine the extent of the infestation, hand removal of starry stonewort, additional lake surveys to assess removal success, and increased access inspection hours. The MNDNR and GLID will implement this strategy again in 2020 to further evaluate whether it continues to deliver the success achieved so far. To date, complete eradication of starry stonewort from an infested water has not proven to be successful anywhere in the US.

For more information, please visit the **Stearns County website**: https://co.stearns.mn.us/Environment/WaterResources/AquaticInvasiveSpecies

4 PRIORITY RESOURCE CONCERNS

This chapter describes the overall approach to establishing goals and tracking progress towards those goals. Then for each priority resource concern, the following information is provided:

- » An assessment of each priority resource concern
- » The processes used to prioritize specific resources and the results of these processes
- » Goal statements, measures, and metrics to indicate progress toward goal achievement
- » Key strategies and programs employed to address the resource concern.

ESTABLISHING GOALS

Once the issue statements were completed, the Advisory Committee developed initial goal statements and identified strategies and actions that would address each resource concern and goal. Existing goals were adosepted when appropriate, such as those established through TMDL studies.

Preliminary goals were a starting point to determine the strategies and actions that would best assure that the goals would be achieved. Throughout the process of defining the measurable goals, the Advisory Committee considered a set of clarifying questions to ensure that meaningful and achievable goals were established. The goals were refined for specific resources or management areas, as appropriate. For example, the altered hydrology goal is to obtain discharge from the Sauk River that is proportionate to rainfall. To meet that goal, specific water-storage goals have been established for priority subwatersheds.

After the preliminary goals had been established, specific priority resources were identified through various ranking processes in which criteria were established and individual resources in each category were evaluated using the criteria. Prioritized resources were determined by establishing ranking thresholds and in certain cases through professional judgement contributions of the Advisory Committee.

Clarifying Questions:

? What is the desired future condition? What needs to change, and by how much, to get there?

? What is our current level of effort and how much change can we make during the 10-year plan period?

? What actions can we take that effectively work toward our goal (output), and what do we specifically expect to accomplish (outcome)?

? Can our outcomes be measured directly? What indicator will we use?

? Who else needs to be involved, what are their roles, and what can we do to motivate them?

? What other assumptions are we making about the results of our work? What evidence (e.g., existing data, models, literature values, anecdotes) leads us to believe our collective actions will lead to the desired results? How confident are we?

? Do people care enough about the issue to make the required investments to reach the goal?

The achievability of the preliminary goals was evaluated once prioritized resources and implementation actions were identified. The Advisory Committee members provided the details regarding what should be accomplished, who will be involved, how long it will take, the location of any strategy, and the purpose. This information was used to develop the targeted implementation schedule for on the ground actions and supporting programs.

Measurable goals were finalized based on multiple factors such as attainability, modeling, and existing accomplishments based on the current level of effort. Nutrient and sediment reduction estimates were determined using the Hydrologic Simulation Program Fortran (HSPF) model application for the Sauk River Watershed, which has been calibrated to monitoring data through 2015. The Scenario Application Manager (HSPF-SAM) was used to run the Sauk River HSPF model application to generate results that provided an assessment of nutrient and sediment reduction achievability. To easily and efficiently move from the planning to the implementation process, the Advisory Committee requested that the implementation table would be populated with the reduction coefficients, costs, and assumptions established in HSPF-SAM. Therefore, in most cases, the final BMP reduction estimates contained in the on the ground implementation schedule are based on automated formulas and calculators that use the BMP reduction coefficients, efficiencies, and costs from HSPF-SAM. However, in some cases, particularly stormwater BMPs, reduction information was based on preliminary engineering study reports. These reduction estimates will be updated at the time of project development and selection.

PACE OF PROGRESS

Each measurable goal has associated metrics to demonstrate progress towards goal achievements. The pace at which progress is being made towards achieving measurable goals will primarily be tracked using the implementation schedule template. If the HSPF-SAM automated calculators contained in the implementation spreadsheet are not applicable, other methods (e.g., tracking the number of practices implemented or acres protected, or estimating nutrient and sediment reductions using professionally accepted calculators such as the MPCA MIDS calculator) should be used. Progress may also be tracked using field collected evidence, such as monitoring pollutant loads at targeted endpoints on the Sauk River, or by modeling results using HSPF-SAM, which is a publicly available modeling tool developed and provided by the MPCA. The pace of progress will be assessed annually and evaluated on a biennial basis as a component for developing the biennial work plan.

ALTERED HYDROLOGY

Altered hydrology is a term that refers to alterations from the original land use as well as straightening, channelizing, and impounding rivers. The main causes of altered hydrology in the SRW are land use change and imperviousness associated with urbanization and development and agricultural drainage. Drainage in agricultural and urban areas provides value by ensuring increased crop production and protection of land and structures from the impacts of large rain events and floods; however, these alterations combine to cause differences in the amount and timing of runoff. Accelerated runoff can lead to increased flooding (higher flows and flashier responses), reduced groundwater recharge, and higher water yield and runoff. Altered hydrology is considered a primary concern because it causes these cascading impacts.

Increased impervious areas (e.g., buildings, homes, roads) and compacted soils in urbanized areas produce more runoff, and runoff generally occurs more quickly and with a higher peak-flow rate. Artificial drainage in agricultural areas of Minnesota includes original, large-scale drainage and more recent pattern tiling to optimize crop yields. Original, large-scale drainage was undertaken to increase the amount of land available for production, increase the productivity of land in production, improve transportation systems, and reduce the risk of malaria (Palmer, 1915). Recent agricultural drainage has focused on more intensive drainage (i.e., pattern tiling) to optimize crop yields, reduce the variability of crop yields, and simplify agricultural operations by eliminating or reducing the extent of wet areas or areas of standing water within fields. Artificial drainage has reduced the wetland area in Minnesota from approximately 18.6 million acres before statehood to the current 10.6 million acres (Minnesota BWSR, 2019). Wetland losses are more pronounced in the SRW, as shown in Table 4-1. Artificial drainage also increases the amount of water leaving a watershed because it intercepts water that would have infiltrated, thereby limiting groundwater recharge. Half of all of the watercourses in the SRW have been altered, as shown in Table 4-2 and Figure 4-1. A combination of practices will be used to achieve the storage goals by reducing tile drainage runoff, restoring altered waterways, and expanding floodplains with the focus being establishing permanent storage.

To assess impacts of altered hydrology, the flow at the USGS gage in St. Cloud will be monitored relative to precipitation. This approach will be updated at the end of the 2021 fiscal year when analysis is completed by the MNDNR to better establish the relationship between precipitation and stream flows. To establish measurable goals for each management district a target of 5% reduction in flows at the USGS gage in St. Cloud was used. This target was established by the Advisory Committee to calculate storage goals prior to the MNDNR analysis being completed. HSPF model flows were used to calculate reductions and assign storage goals to each management district which are reported in Chapter 5.

Table 4-1. Comparison of Presettlement and Current Wetland Areas by County (MNDNR, 1997)

County	Presettlement Wetland Area (ac)	Percentage of Presettlement Wetland Area Remaining (%)	Approximate Current Wetland Acreage (calculated) (ac)
Douglas	12,000	35.3	4,200
Meeker	26,000	21.7	5,600
Pope	14,000	23.3	3,300
Stearns	32,000	21.9	7,000
Todd	112,000	53.1	59,500

Table 4-2. Altered Watercourses in the Sauk River Watershed

Channel Type	Length (mi)	Percent of All Watercourses
Altered	832.5	50
Impounded	48.0	3
Natural	384.4	23
No Definable Channel	389.9	24
Total	1,654.7	

mi = miles

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

Accelerated runoff, reduced watershed storage, and reduced connection between surface water and groundwater is causing adverse impacts to downstream waters, wetlands, groundwater, and habitat.

DESIRED FUTURE CONDITION:

SRW runoff at the USGS gage in St. Cloud is less than or equal to the increase in precipitation.

10-YEAR PLAN GOAL:

A) Maintain current average annual discharge relative to precipitation.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

Discharge does not increase relative to precipitation at the USGS gage station in St. Cloud. *Mean annual discharge from 1999-2019 was 466.19 CFS. Mean annual rainfall volume is 1,569,009 acre-feet.*

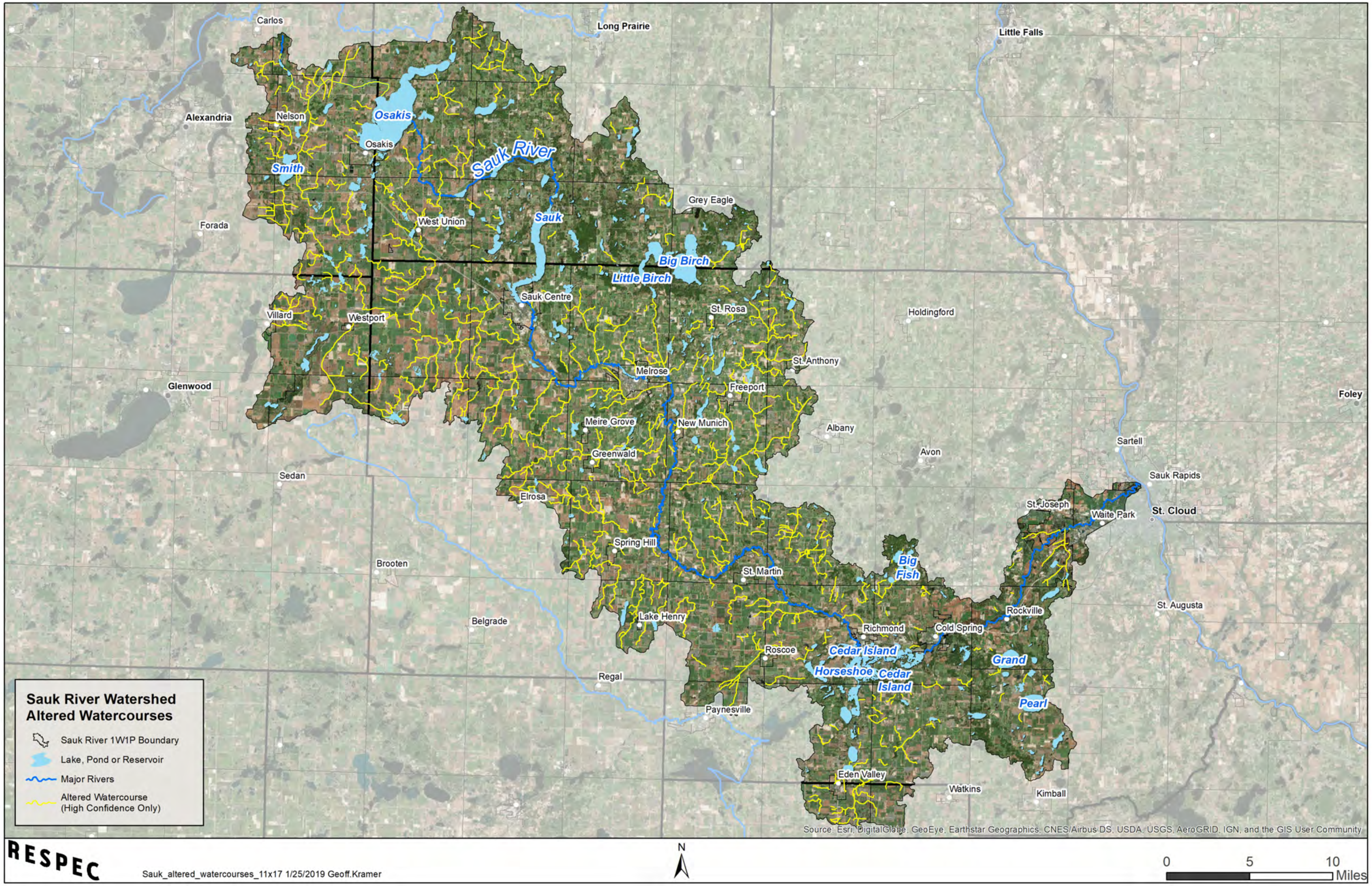


Figure 4-1. Altered Watercourses in the Sauk River Watershed.

PRIORITY RESOURCES

The watershed partners will prioritize the restoration of resources that have been impacted by altered hydrology and those that have the greatest potential to reduce future impacts of altered hydrology. These resources include public-drainage systems, drained and tiled wetlands, failing stream banks, stream channels that are no longer providing their ecological functions, and developing and urbanized areas, as illustrated in Figure 4-2. Some specific geographic areas that have the potential to generate the most multiple benefits have been identified, such as Stony Creek, because of the extent of impacted wetlands, high stream bank failure rates, as well as *E. coli* and TSS impairments stream. However, additional information and data must be obtained to evaluate potential opportunity of site-specific locations here as well as throughout the priority subwatersheds and resources. Project types and the information that will be used to target specific locations for these projects are provided below.

- Stream bank and stream channel restoration projects will be guided by the results of the MPCA and MNDNR fieldwork that has been completed in Phase 2 of the Watershed Restoration and Protection Strategy (WRAPS) program. Stream assessments will be conducted as necessary to diagnose systemic stream channel and stream bank issues.
- Wetland restorations and water-storage opportunities will be targeted after the hydrologically corrected digital elevation maps (DEMs) are completed. Site specific targeting will include the use of GIS analysis tools to identify non-contributing areas, restorable wetlands, and depressional areas.
- Public drainage systems provide a systematic, comprehensive, and cost-effective approach to target implementation actions. The partnership will work with its public drainage authorities to incorporate implementation strategies in priority subwatershed areas as drainage systems are maintained or improved.
- Stormwater management projects and retrofits are targeted to the subwatersheds that have been priorities for nutrient and sediment reductions to achieve multiple benefits. These subwatersheds are primarily located in the Centre Sauk, GUS Plus, and St. Roscoe management districts. The stormwater management program will be led by the SRWD through its stormwater reconstruction program.

Strategies

KEY STRATEGIES TO ADDRESS ALTERED HYDROLOGY CONCERN

Program	Strategy
On-The-Ground Implementation Activities	Increase water storage by implementing: » Two-stage ditches that are designed for a 25-year storm event » Floodplain detention and floodplain forest management » Wetland restorations » Urban retrofits.
	Stabilize and restore stream channels and stream banks that have been impacted by high flows.
	Increase soil water holding capacity and infiltration to subsurface soils and groundwater by implementing: » Hayed buffers » Perennial cropping systems » Cover crops » Forestry in riparian areas » Stormwater infiltration projects » Wetland restorations.
	Prioritize implementation actions that address multiple benefits, such as stream restoration that builds storage while addressing habitat and wetland restoration targeted in a location that provides groundwater recharge.
Land Use and Regulatory	Limit non-hydrologically connected areas from being connected and contributing to downstream volume.
	Reduce the potential impact of growth and development by strengthening impervious surface-coverage ordinances.
	Reduce the potential impact of additional drainage by implementing a no-net-increase in volume policy while providing incentives for conservation and controlled tile-drainage systems.
	Limit the loss of unprotected wetlands (e.g., wet meadow) by using conservation easements and improved ordinances.
	In public-drainage systems, explore requiring all new drain tile above 4 inches in diameter to have metered release and/or other conservation drainage management systems installed
	Evaluate opportunities to convert urbanized public drainage systems, such as County Ditch (CD) 17, to a stormwater utility.
Monitoring, Studies, and Panning	Create hydrologically conditioned DEMs, which can be used to determine non-contributing areas and identify potential locations for water-storage activities.
	Develop a field-verified, hydrologically conditioned, DEM. This information is fundamental to understanding hydrology and targeting restoration practices related to restoring hydrology, improving surface water quality, and restoring habitat.
	Assess the contribution of urban areas by developing runoff models, and then prioritize implementation activities based on the ability to meet goals
	Assess baseflow and develop hydrographs for public drainage systems. This information will be used to refine storage goals and target implementation actions.
	Complete culvert inventories in prioritized subwatersheds and where street, road, and bridge projects are occurring. Assess for opportunities to improve habitat, store or slow water, and implement sediment and erosion reduction enhancements, and recommend actions.
	Assess issued Wetland Conservation Act (WCA) exemptions and corresponding impacts in the past 10 years to evaluate if more stringent measures are needed; develop recommendations as appropriate.
Outreach and Education	Create and execute at outreach campaign to landowners within public drainage areas on conservation cost-share programs.
	Provide continuing education for drainage authorities to explore comprehensive drainage system management opportunities.
	Promote awareness of wetland banking opportunities.

Benefits

TWO-STAGE DITCHES

Two-stage ditches provide a more natural and stable channel geometry than trapezoidal ditches. Two-stage ditches mimic natural, stable channels by constructing a small low flow channel between two benches, which act as floodplains. Two-stage ditches can provide a more self-sustaining geometry that achieves multiple benefits: reduced maintenance costs, reduced local and downstream flooding, improved aquatic habitat, and water quality improvements. More specific benefits afforded by the low-flow channel and the benches and larger cross are listed below:

- The low-flow channel confines channel flows during most of the year, which helps to:
    a. Keep erosive forces away from outside ditch banks
    b. Reduces saturation of the outside ditch banks, thereby improving bank stability and reducing erosion
    c. Mimic natural stream dynamics by providing adequate sediment transport at low flows, thereby reducing sediment aggradation that is common in trapezoidal ditches
    d. Enhance in-channel aquatic habitat (e.g. allowing for pool-riffle development and coarse substrates to support macroinvertebrates).
- The larger cross-section and benches provide several benefits:
    a. Reduced velocities during large storm events, which reduce shear stress on banks
    b. Increased channel storage locally (i.e. reduced field inundation)
    c. Reduced peak flows downstream as a result of increased channel storage
    d. Sediment and nutrient filtering during large events, similar to vegetated floodplains of natural systems
    e. Enhanced nutrient removal (e.g. denitrification) due to increased channel vegetation and plant-soil-water contact
    f. Protect drainage capacity of tile outlets by lowering in-channel water levels.
    g. Enhanced riparian habitat (e.g. birds, amphibians)

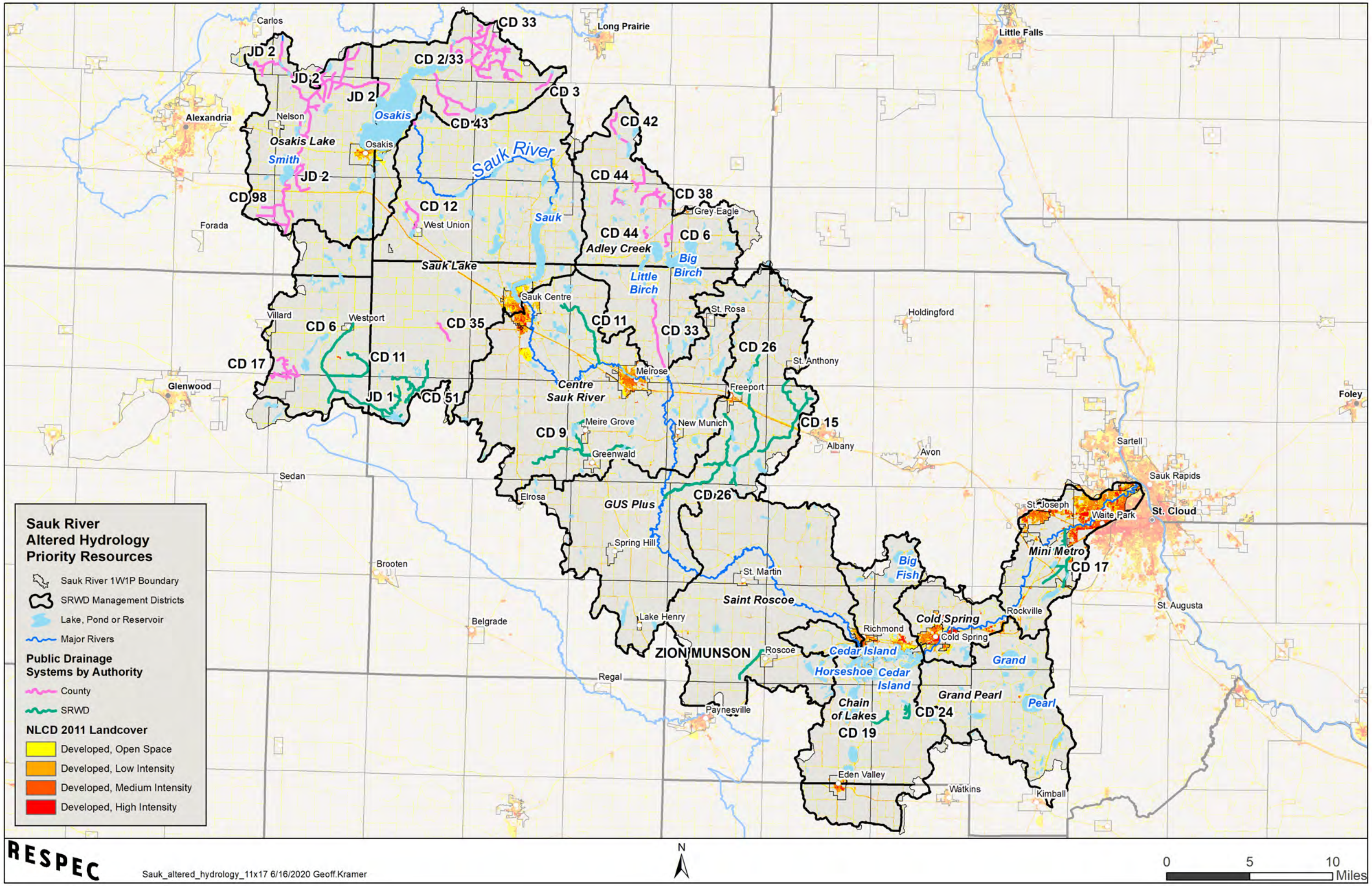


Figure 4-2. Altered Hydrology Priority Resources in the Sauk River Watershed.

E. COLI IMPAIRED STREAMS

According to the 2020 draft impaired waters list (MPCA, 2019b), 17 unique stream assessment units, which are referred to as assessment unit identification (AUIDs), do not meet the water quality standards because of excessive *E. coli* and one AUID does not meet water quality standards because of excessive fecal coliform (fecal coliform was the water quality standard before the current *E. coli* standard) in the SRW (Figure 4-3). Streams that exceed water quality standards for *E. coli* are considered impaired for the beneficial use of aquatic recreation because the potential human health impacts of *E. coli*.

Minnesota's surface water standards for bacteria apply only to streams, not wetlands or lakes. Major bacteria sources to streams within the SRW include various aspects of animal agriculture, such as manure spreading, feedlot and pasture runoff, and livestock defecation in streams, as well as failing subsurface sewage treatment systems (SSTS) and pet and wildlife defecation in streams or runoff to streams. The pollution sources that are addressed in this plan are from primarily animal agriculture and SSTS. Other sources of *E. coli* are addressed through state permitting programs for wastewater treatment and urban stormwater

What is an AUID?

AUID

A stream assessment unit usually extends from one significant tributary to another or from the headwaters to the first significant tributary and is typically less than 20 miles in length. Each stream reach is identified by a unique waterbody identifier code called an AUID. For streams, the code is comprised of the USGS eight-digit subbasin code plus a three-character code that is unique within each subbasin (MPCA, 2019c).

Defining Impairment

WHAT AMOUNT OF *E. COLI* CAUSES A STREAM TO BE LISTED AS IMPAIRED?

Two criteria, chronic and acute, are used for sampling from April 1 to October 31.

CHRONIC

Monthly geometric mean (minimum of 5 samples) exceeds 126 organisms per 100 milliliters (org/100 mL) sampled water.

ACUTE

More than 10 percent of samples collected during a calendar month are over 1,260 organisms/100 mL sampled water.

17
Impaired AUIDs (2020)

8
Completed Total Maximum Daily Load (TMDL) Studies

management. However, the urban stormwater permit is only required for municipalities in the St. Joseph, Waite Park, and St. Cloud area. Therefore, the SRCWMP partners will address urban sources of *E. coli* in priority streams, and specifically Cold Spring Creek.

E. COLI SOURCES

Livestock agriculture is an important economic driver for the SRW. Stearns County is the number one county in Minnesota for livestock production (National Agriculture Statistics Service, 2017d). The SRW has 1,850 active feedlots with a total of 284,872 animal units (AU). These numbers reflect what is registered or allowed as a maximum but does not reflect what is actually stocked. The average number of AU per feedlot is 153, and more than 975 feedlots have less than 91 AU (Table 4-3). AU are a unit of measure for animal feeding operations rather than a tally of the number of animals; for instance, a milking cow is 1.4 AU while a chicken that weighs less than 5 pounds is 0.003 AU. All of the counties in the watershed are delegated to implement MPCA feedlot rules. Feedlot locations, according to size and proximity to *E. coli* impaired streams, are provided in Figure 4-3. In addition to runoff from feedlots, runoff from manure application and pastures or livestock that have direct access to surface waters contributes to *E. coli* impairments.

Failing SSTS that do not provide adequate wastewater treatment may be an important source of bacteria to surface waters. In addition to failing SSTS that do not provide adequate treatment, others may be considered an imminent threat to public health and safety (ITPHS) because they are discharging raw sewage, including from direct pipes that discharge to surface waters and into ditches, streams, and lakes. A summary of compliance rates by county is shown in Table 4-4.

Table 4-3. The Number of Feedlots Within Each Range of Animal Units Within the Sauk River Watershed

AU	Number of Feedlots
Up to 90	978
91 to 249	597
250 to 580	193
581 to 1,247	52
1,248 to more than 2,800	30

Table 4-4. Subsurface Sewage Treatment System Compliance Rates by County for the Year Specified

County	Septic System Compliance Percentage (Year)
Douglas	87 (2016)[a]
Meeker	81 (2016)[a]
Pope	85 (2016)[a]
Stearns	90 (2016)[a]
Todd	83 (2016)[a]

(a) MPCA, 2016

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

Surface waters face *E. coli* contamination caused by agricultural, urban, and residential uses.

DESIRED FUTURE CONDITION:

All surface waters with known livestock and anthropogenic (human) impacts achieve water quality standards.

10-YEAR PLAN GOAL:

B) Reduce *E. coli* in surface waters.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

» Reduce the occurrence of acute *E. coli* exceedances by 70 percent on prioritized streams

» Reduce the occurrence of chronic *E. coli* exceedances by 15 percent on prioritized streams.

PRIORITY RESOURCES

The implementation efforts to address *E. coli* and fecal coliform are prioritized to those stream impairments that have a completed a TMDL report (as shown in Figure 4-3) because each TMDL report provides the details necessary to target specific bacteria sources; for instance, each TMDL report assesses *E. coli* levels based on stream flow. When *E. coli* levels are elevated in the highest stream flows, the main sources typically come from runoff from upland pastures rather than pastures that are near to the stream. When *E. coli* levels are elevated in low stream flows, the main sources typically come from pastures that are near to the stream, livestock that are not prevented from defecating in streams, or failing septic systems. The *E. coli* and fecal coliform impairments that have completed TMDL studies include Ashley Creek, Stony Creek, Adley Creek, Mill Creek, and the Sauk River from Getchell Creek to State Highway 23 (SH 23). Mill Creek, located in the Grand Pearl Management District, is the number one priority because of its potential impact on the city of St. Cloud's drinking water. Cold Spring Creek was also included as a priority even though it does not have a completed TMDL study because of its status as a cold-water trout stream. The list of prioritized *E. coli* impaired streams and their number of exceedances of the standard are shown in Table 4-5.

Sauk River (from Adley to Getchell Creeks) and Unnamed Creek (-542): The TMDL studies for these impairments are scheduled to be completed in 2021. Because these subwatersheds are also prioritized for other resource concerns and TMDL studies are pending, these impairments have been prioritized; however, until the TMDL is completed, targeting is limited to management practices located within 500 feet of each of these reaches. Targeting will be updated based on the results of the pending TMDL studies.

Table 4-5. Prioritized *E. coli* Impaired Streams, Standard Exceedance Rates

Stream	AUID (last three digits)	Current [a] (sample period dates)	Number of Samples	Number and % of Chronic Exceedances	Number and % of Acute Exceedances
Adley Creek	-527	2010–2019	51	33(65%)	11 (22%)
Ashley Creek	-503	2012–2019	28	23 (82%)	5 (18%)
Cold Spring Creek	-567	2007–2009	51	23 (45%)	2 (4%)
Getchell Creek	-729, -727	2010–2019	47	19 (40%)	6 (13%)
Mill Creek	-665, -676	2012–2019	356	240 (67%)	44 (12%)
Sauk River (Cetchell Creek to SH 23)	-508	2010–2019	135	79 (59%)	19 (14%)
Sauk River (Adley Creek to Getchell Creek)	-505	2010–2019	68	28 (41%)	4 (6%)
Stony Creek	-724, -725, -726	2007–2013	83	61 (73%)	23 (28%)
Unnamed Creek (Unnamed Creek to Sauk River)	-542	2010–2019	44	39 (89%)	22 (50%)

[a] MPCA, 2019e (EDA website, data accessed 2/12/2020 https://www.pca.state.mn.us/eda-surface-water-data)

KEY STRATEGIES TO ADDRESS *E. COLI* CONCERN

Program	Strategy
On-The-Ground Implementation Activities	Improve pasture management practices, including rotational grazing in pastures and flash grazing along stream banks and shorelines.
	Exclude livestock from streams and lakes and provide alternative watering facilities.
	Expand and improve buffer strips along waterways to filter pasture runoff.
	Expand acres covered by manure management plans and improve manure management by injecting or incorporating manure immediately after application, managing runoff from feedlots and barns, and eliminating open-tile intakes in feedlot areas.
	Reduce the practice of winter manure application, particularly in unsuitable areas such as slopes that lead to surface water.
	Replace failing and out-of-compliance septic systems.
Land Use and Regulatory	Review existing ordinances and requirements regarding SSTS to develop uniformity across the watershed and ensure SSTS are being inspected with an interval of regularity to ensure threats to public health, groundwater, and/or surface waters are being addressed in a timely manner.
	Explore greenbelts in areas of the watershed where incentive programs have proven to be unsuccessful in addressing livestock access to surface waters. Greenbelts are designated areas in which programs or rules such as livestock exclusion may be implemented.
Monitoring, Studies, and Panning	Complete the three *E. coli* TMDL studies planned for in Phase 2 of the SRW WRAPS (MPCA, 2015), starting in 2020.
	Continue water quality monitoring on the main Sauk River and primary tributaries.
	Conduct inspections on feedlots within the shoreland district of *E. coli* impaired waters or direct tributaries to *E. coli* impaired waters. The shoreland district is within 1,000 feet of lakes and 300 feet of rivers.
	Evaluate and potentially update the time of travel to the city of St. Cloud's drinking water treatment facility with a focus on key sites in the watershed that are particularly concerning. Review for accurate flows and fluctuations related to the weather.
Outreach and Education	Host field days that promote the following for feedlot owners: emergency response training, manure crediting, equipment calibration, and the manure-testing process.
	Provide educational programming on pasture management, including field days and site visits.
	Enhance training tools and outreach opportunities for landowners implementing manure management plans.
	Provide educational programming on proper septic-system maintenance.

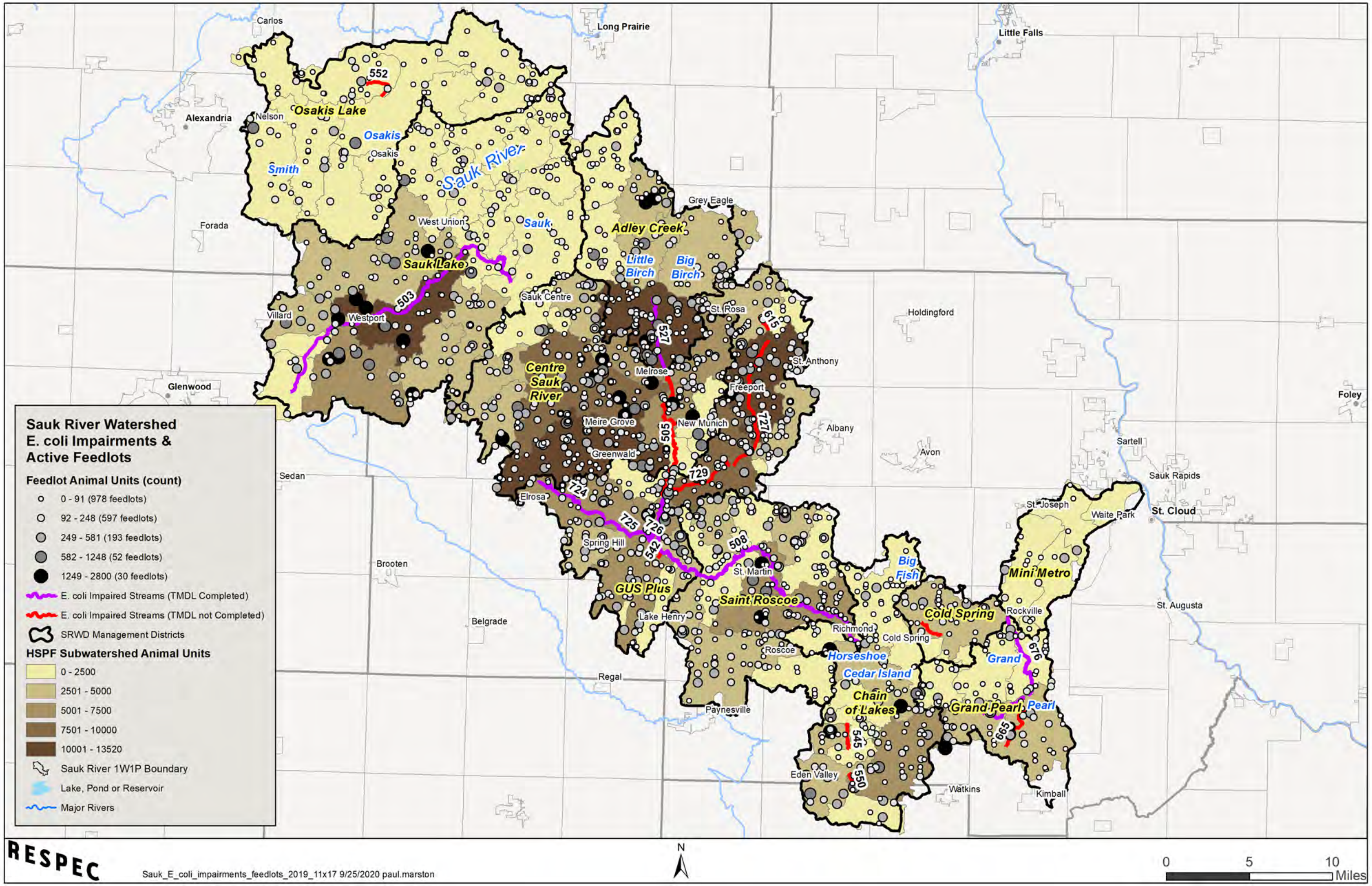


Figure 4-3. *E. coli* Impaired Stream AUIDs, *E. coli* Total Maximum Daily Load Report Status, and Feedlots According to Animal Unit Size in the Sauk River Watershed.

EXCESSIVE NUTRIENTS AND SEDIMENT IMPAIRMENTS

Excessive nutrients and sediment have a major impact on lakes and rivers in the SRW. This prioritized resource concern addresses these surface-water resources. In addition to traditional impairments based on chemistry and water sampling, excessive nutrients and sediment can cause biological impairments because fish and bug populations can be stressed when breeding habitat is diminished, hydrologic changes are unsuitable, or by other stressors. Impairments because of these stressors are not specifically addressed in this plan; however, most of the implementation actions that address the priority concerns in this plan will improve conditions and increase the diversity, density, and geographical footprint of native fish and bugs.

The SRW contains more than 250 basins that are over 10 acres in size (SRWD, 2014). Fifty-two lakes have been or are currently being assessed for water quality, of which eight are classified as shallow and the remaining forty-four are classified as deep. The distinction is important because the water quality standard is different for each classification. Lakes classified as impaired are considered as eutrophic or hypereutrophic. Hypereutrophic lakes are characterized by heavy algal blooms, algal scum, a dominance of rough fish, and potentially fish kills caused by a lack of oxygen in the water column. A summary of the lake-water quality standards, number of the assessed lakes that are impaired because of eutrophication, and number of TMDL studies completed is provided in Table 4-6. The MPCA will determine a timeline for addressing the four impaired deep lakes that do not currently have an approved or pending TMDL study.

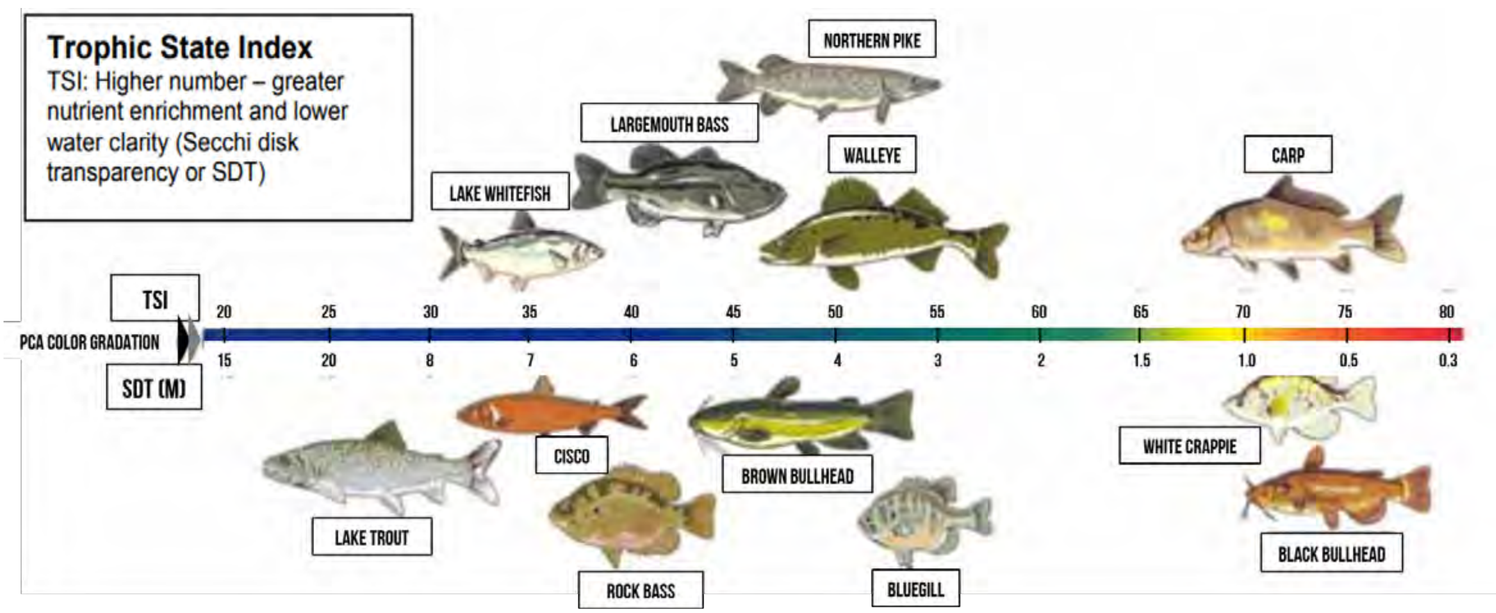


Table 4-6. Summary of Deep and Shallow Assessed Lakes and the Number of Impairments for Each Category

Minnesota North Central Hardwood Forest Ecoregion Standards	Total Phosphorus Standard (µg/L)	Chlorophyll-*a* Standard (µg/L)	Secchi Depth Standard (meters)	Number of Impaired Lakes	Number of Approved TMDLs	Number of Pending TMDLs
Deep Lakes	≤ 40	≤ 14	≥ 1.4	24	8	12
Shallow Lakes	≤ 60	≤ 20	≥ 1.0	7	5	2
Sauk River Chain of Lakes Site-Specific Standards						
Flowage Lakes (on the Sauk River Channel): Horseshoe (north), East, Koetter, Zumwalde, Great Northern, Krays, Knaus	90	45	0.8	7	Included in above tally.	
Non-Flowage Lakes: Horseshoe (west), Horseshoe (south), Bolfing, Cedar Island (main)	55	32	1.4	4		

µg/L = micrograms per liter

An estimated 1,682 stream miles (MPCA, 2015) are in the SRW. Most of the smaller creeks and ephemeral streams drain to the Sauk River through a network of major tributaries such as Ashley Creek, Hoboken Creek, Adley Creek, Getchell Creek, Stony Creek, Cold Spring Creek, and Mill Creek. The criteria for assessing the impairment status include excess nutrients (total phosphorus [TP] specifically) and total suspended solids (TSS), as well as low dissolved oxygen (DO) caused by excess TP. A summary of the stream water quality standards, number of impaired streams according to the listing criteria, and number of TMDL studies completed is provided in Table 4-7. The MPCA will determine a timeline for addressing the impaired AUIDs that do not currently have a completed TMDL study.

Table 4-7. Summary of Stream Impairments According to Impairment Category

Minnesota North Central Hardwood Forest Ecoregion Standards	Standard	Number of Impaired AUIDs	Number of Completed TMDLs
Dissolved Oxygen	Not less than 5 mg/L as a daily minimum 24-hour fluctuation (diel flux) ≤ 3.0 mg/L	9	0
Nutrients/Eutrophication	TP of less than or equal to 100 µg/L	2	0
Turbidity/TSS	30 mg/L	2	2

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

Excessive nutrients and sediment are causing aquatic life and recreational use impairments.

DESIRED FUTURE CONDITION:

All surface waters achieve water quality standards (except natural background impairments).

10-YEAR PLAN GOAL:

C) Reduce phosphorus and sediment loading and concentration in surface waters.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

» **Lakes:** Achieve the 10-year phosphorus reduction goals established by the MPCA for each prioritized lake.

» **Streams:** Achieve a 10 percent reduction in TP and TSS at targeted endpoints on the Sauk River. (Modeled goals shown by endpoint in table below.)

Accomplishment at Each Priority Endpoint Reach	Priority Endpoint Reach (in priority order)			
	A370	A150	A230	A10
TP Average lbs./year Reduced	14,216	5,851	8,548	691
TSS Average tons/year Reduced	937	444	624	102

PRIORITY RESOURCES

Because the Sauk River is the resource that links to major economic and recreational lake resources in the SRW, the Advisory Committee (AC) prioritized the Sauk River. Because the river runs through the entire watershed, developing geographical priorities was needed. Figure 4-4 shows the HSPF model subwatershed boundaries and model reaches that are referenced throughout this plan. These model subwatersheds were roughly aligned with management district's boundaries to establish eight targeting end points (Figure 4-5). Five metrics were used to prioritize these endpoints. A summary of each metric and scoring breakpoints are provided in Appendix A. The data sources for the altered hydrology, number of impairments, direct tributary to an impaired lake, and disturbed area are GIS layers provided by the State of Minnesota geospatial commons website (https://gisdata.mn.gov).

The achievability metric is based on a Scenario Application Manager (SAM) analysis evaluating the cost benefit of reducing TSS and TP in the entire drainage area of each breakpoint. Two scenarios were run at each breakpoint to determine the cost of reducing sediment and TP by 10 percent using a suite of common best management practices (BMPs). The default pollutant reductions and costs were applied to the BMPs used in the scenarios. The result of the scenarios is the cost of reductions per year, or dollars per ton per year ($/ton/yr) for TSS and dollars per pound per year ($/lb/yr) for TP reduced. The values for each metric were converted to a score of 0 to 1 to value each metric equally with the metric scores summarized in Table 4-8. The result of the prioritization is that the inlet of the Sauk River Chain of Lakes (SRCOL) (Reach A370) was the top priority, followed by the Sauk River just downstream from Melrose where Adley Creek enters the Sauk River (Reach 150), followed by the reach where Getchell Creek enters the Sauk River (Reach 230) and then Judicial Ditch 2 (JD2) (Reach 10).

After the Sauk River endpoints had been prioritized, a fate and transport analysis using HSPF-SAM was completed to determine which upstream subwatersheds contributed the most TSS and TP to the endpoints. Figures 4-6 and 4-7 present the results of the fate and transport analysis for the top-priority Endpoint 370 with results for the rest of the endpoints in Appendix H. These reaches are referred to throughout this planning document, particularly in the *Geographic Management Areas* chapter (Chapter 5) and the implementation table.

Table 4-8. Individual Metric and Ranking for Main-Stem Sauk River Breakpoints

Endpoints	Altered Hydrology	Number of Impairments	Achievability (TSS)	Achievability (TP)	Connected to Impaired Lakes	Disturbed Area	Total Score	Total Ranking
370	0.5	1	0.83	0.99	1	1	5.32	1
150	0.5	1	0.91	0.93	0	0.75	4.09	2
230	0.5	0.75	1.00	1.00	0	0.5	3.75	3
10	1	0.25	0.02	0.30	1	0.75	3.32	4
420	0.5	0.5	0.35	0.94	0	0.5	2.78	5
70	0.5	0.5	0.00	0.00	1	0.5	2.50	6
430	0.25	0.25	0.37	0.88	0	0.5	2.24	7
490	0.25	0.5	0.33	0.85	0	0.25	2.18	8

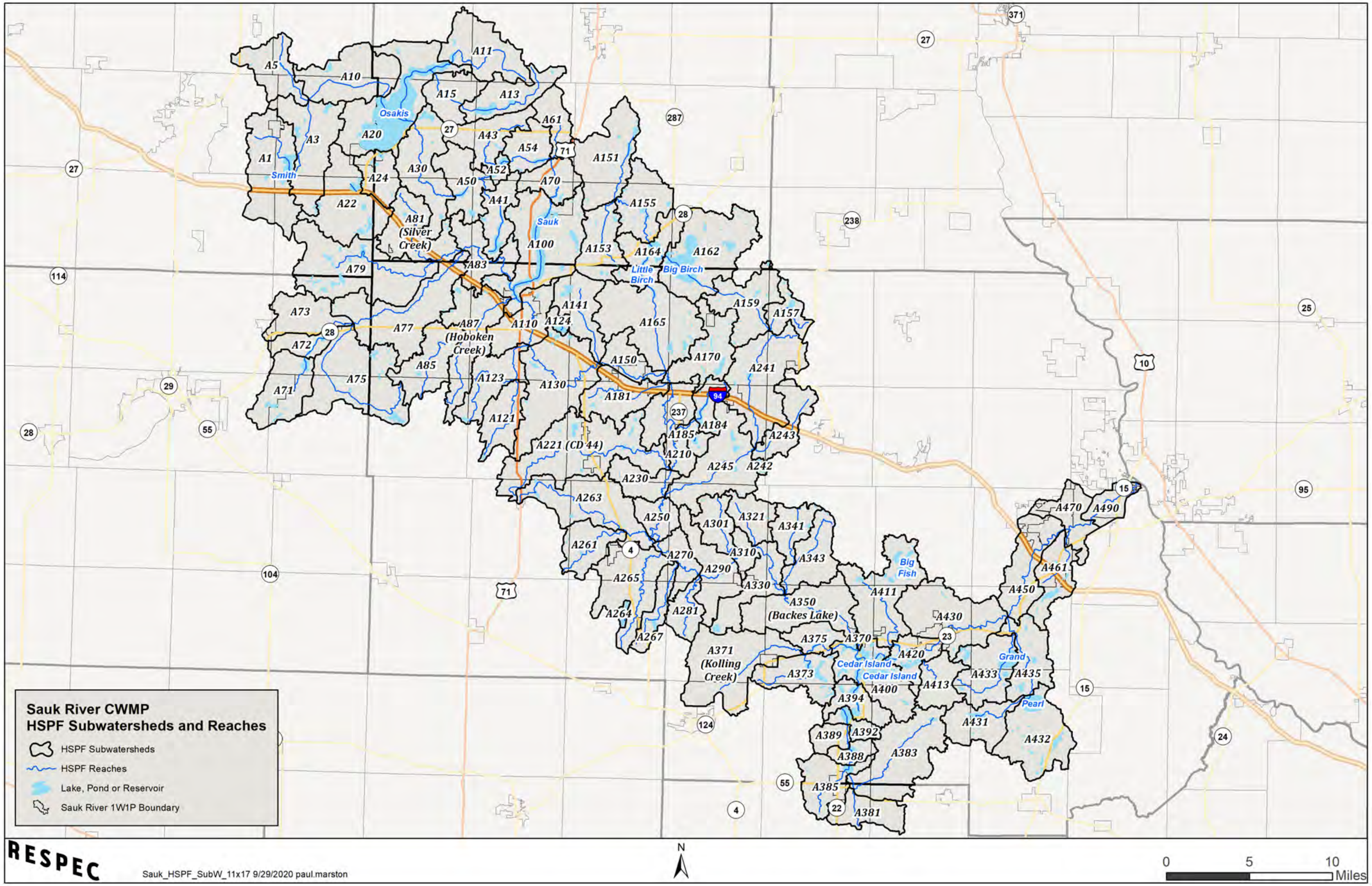


Figure 4-4. Sauk River HSPF Subwatersheds and Reaches.

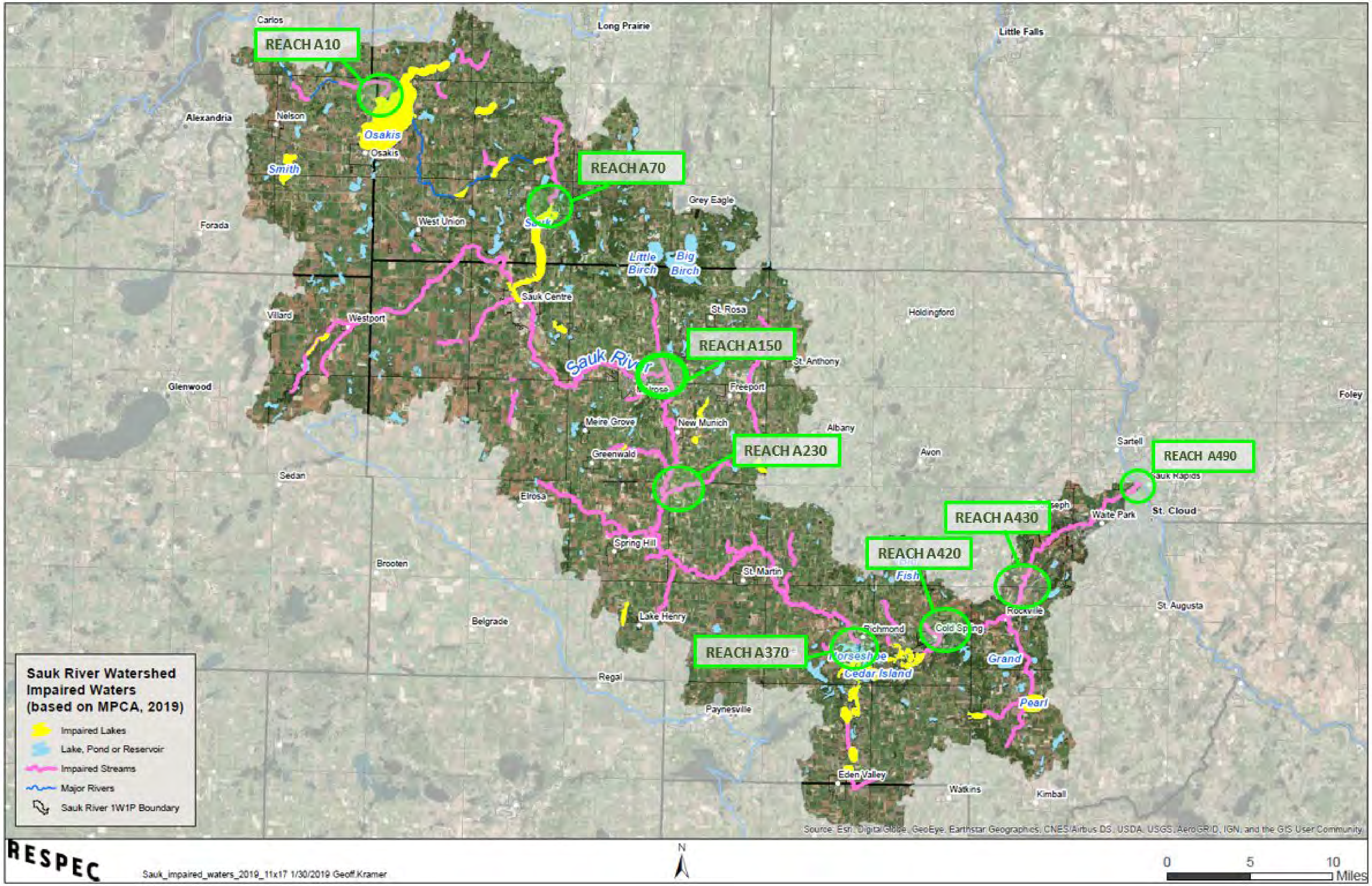


Figure 4-5. Priority Stream Reaches Along the Main Stem of The Sauk River.

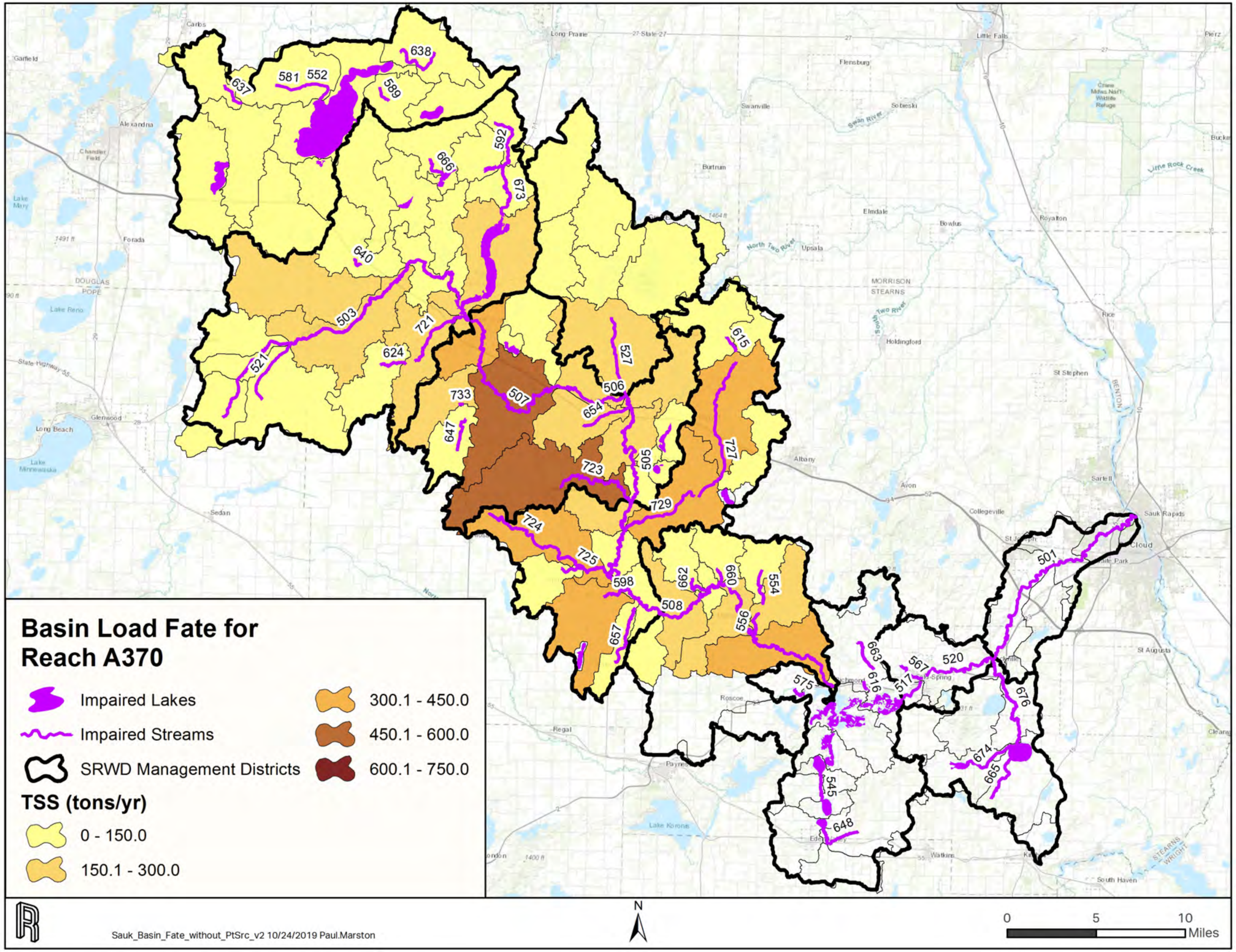


Figure 4-6. Total Suspended Solid Source and Fate Map To Priority Reach A370.

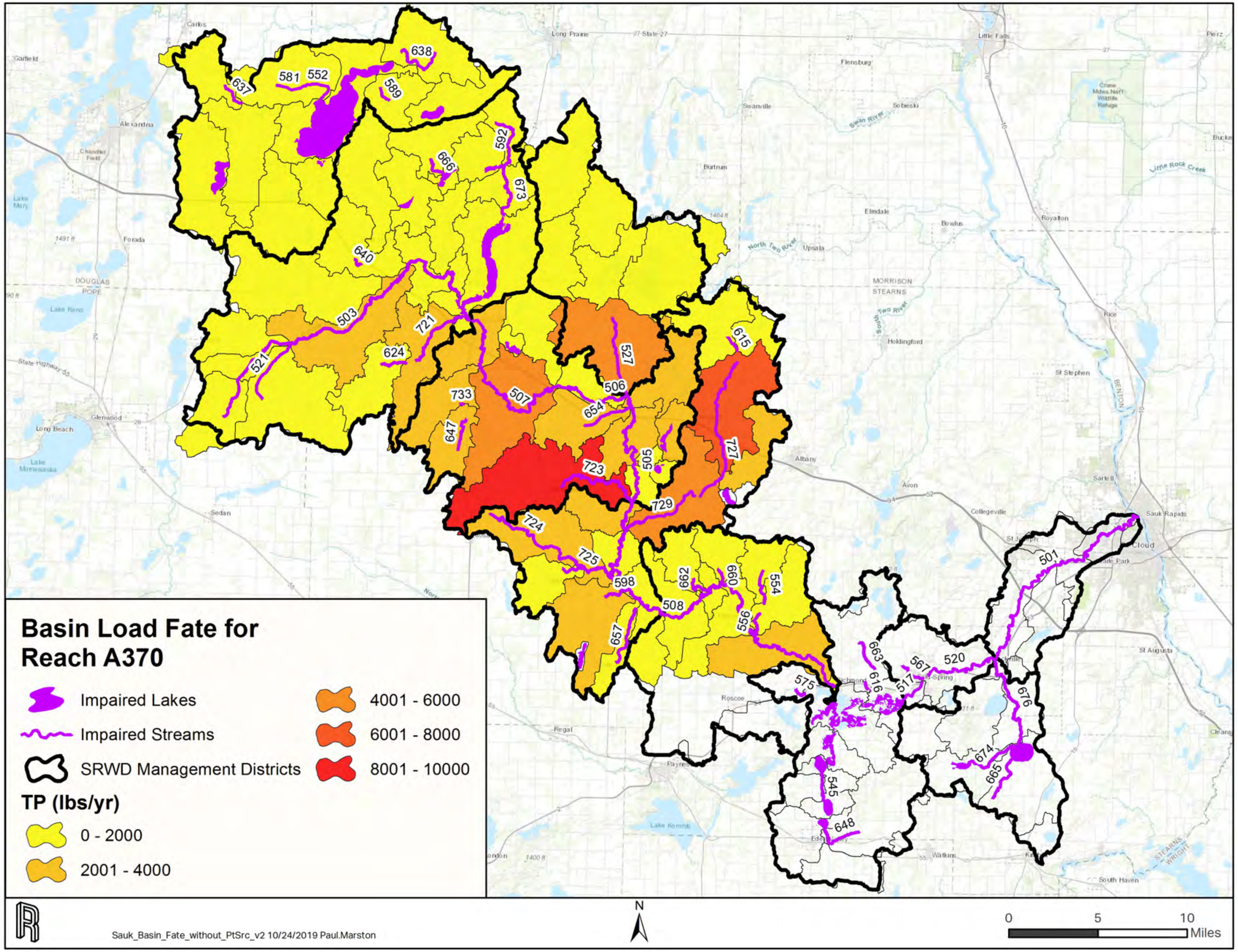


Figure 4-7. Total Phosphorus Source and Fate Map To Priority Reach A370.

Priorities

PRIORITY IMPAIRED LAKES

Because the Sauk River was the prioritized impaired resource, impaired lakes along the run of the Sauk River have a higher priority than impaired lakes located in the watershed, meaning that work will be focused on river-run impaired lakes before lakes in the watershed that are not on the Sauk River. River-run impaired lakes are prioritized according to each lake's geographic location in the stream-prioritization process because the actions to reduce stream loading will concurrently address the lake impairment. The result of this approach is that the SRCOL are the number-one priority resource, followed by Osakis Lake, Sauk Lake, and the chain of lakes upstream from Sauk Lake (Guernsey, Juergens, and Little Sauk Lakes), as listed in Table 4-9. Focus will be on actions to address top-ranked or Tier 1 lakes in Table 4-9 before moving on to Tiers 4 and 5. Impaired lakes in the watershed that are not on the river run (Figure 4-8) were prioritized using a process that evaluated each impaired lake according to a set of criteria selected by the Advisory Committee. Metrics were determined for each criteria and breakpoints were established to rank lakes and establish three prioritized tiers. Detailed information on the process, metrics, and ranking is provided in Appendix A.

Table 4-9. On-Channel Impaired Lakes Prioritized Based on Mainstem Sauk River Impairments

Corresponding Rank of the Prioritized Stream Reach	Lake Name	Immediate Downstream Resource	AUID	County	10-Year Plan Reduction Goal (lbs/year)
1	Cedar Island (Koetter Lk)	Sauk Chain	73-0133-03	Stearns	58
	Horseshoe	Sauk Chain	73-0157-00	Stearns	3,606
	Great Northern	Sauk Chain	73-0083-00	Stearns	2,208
	Knaus	Sauk Chain	73-0086-00	Stearns	3,066
	Krays	Sauk Chain	73-0087-00	Stearns	2,446
	Zumwalde	Sauk Chain	73-0089-00	Stearns	2,195
4	Osakis	Lake Osakis	77-0215-00	Douglas	429
5	Sauk	Sauk South Bay	77-0150-01/02	Stearns	1,836
	Guernsey	Sauk River	77-0182-00	Todd	128
	Juergens	Sauk River	77-0163-00	Todd	178
	Little Sauk	Sauk River	77-0164-00	Todd	167

The results of the ranking process are provided in Table 4-10. The tiers indicate the level of priority. Lakes in Tier 3 are not under consideration in the 10-year plan. Lakes in Tier 2 will be addressed only if Tier 1 lakes have been addressed or barriers to implementation prevent action; however, the Eden Valley Creek Chain of Lakes and, specifically, North Browns Lake, were identified as local priorities early in the planning process because of urgent concerns on gully formation, landowner readiness, and the need to address sediment plumes in North Browns Lake that are causing significant resource and navigation issues.

Table 4-10. Off-Channel Impaired Lakes Prioritized By Potential to Restore

Priority Tier	Lake Name	MNDNR Lake I.D. Number	Depth Class	Total Ranking	10-Year Plan Reduction Goal (lbs/year)
Tier 1	Pearl	73003700	Deep	1	91
	Bolfing	73008800	Deep	2	11
	Goodners	73007600	Deep	3	50
	Schneider	73008200	Deep	4	44
	McCormic	73027300	Shallow	5	21
	Smith	21001600	Deep	6	49
Tier 2	Long	73013900	Deep	7	277
	North Browns	73014700	Deep	8	759
	Eden	73015000	Deep	9	356
	Westport	61002900	Shallow	10	39
	Sand	73019900	Shallow	11	66
	Maple	77018100	Deep	12	76
	Vails	73015100	Deep	13	414
	Uhlenkolts	73020800	Shallow	14	132
Tier 3	Maria	73021500	Deep	15	
	Henry	73023700	Shallow	16	
	Ellering	73024400	Deep	18	

KEY STRATEGIES TO ADDRESS EXCESS NUTRIENTS AND SEDIMENT

Program	Strategy
On-The-Ground Implementation Activities	Prioritize implementing conservation practices that build soil health and reduce the risk of soil erosion and runoff, such as cover crops, conservation crop rotation, and manure incorporation.
	Implement practices that control and trap agricultural runoff, such as enhanced buffers, Water and Sediment Control Basins (WASCOBs), and restore tiled wetlands.
	Install projects that decrease the runoff rate and volume, such as controlled tile inlets, infiltration basins, and conversion to perennial cover, including turf-to-native conversion in urban areas.
	Reduce the impact from urbanizing and urbanized areas by implementing stormwater practices that trap and treat pollutants, such as wet ponds and rain gardens.
	Restore stream banks and shorelines to reduce sedimentation and restore habitat.
	Implement projects that reduce internal loading by sequestering phosphorous or managing rough-fish populations.
	Upgrade septic systems that are out of compliance or pose an imminent health threat.
Land Use and Regulatory	Explore ordinances and requirements to increase restrictions on impervious coverage.
	Explore establishing a consistent excessive soil-loss ordinance or requirement.
	Jointly review existing shoreland ordinances throughout the watershed to determine differences; work together to achieve uniformity and potential improvements.
	Explore establishing a greenbelt protection corridor—specific details to be developed.
	Coordinate the development of consistent postconstruction stormwater requirements with all Municipal Separate Storm Sewer System (MS4) permittees and the SRWD—specific details to be developed.
Monitoring, Studies, and Panning	Identify wetland restoration areas and priority areas that will have a high probability of promoting infiltration and recharge.
	Develop and implement an assessment and monitoring program for existing stormwater ponds to determine which ponds are releasing or have the highest potential to release phosphorus.
	Create hydraulic models for subwatersheds within the city of St. Cloud to evaluate stormwater drainage and prioritize projects that improve water quality.
	Support and assist updating the city of St. Cloud's 2011 stormwater BMP implementation plan within the SRWD.

Program	Strategy
Monitoring, Studies, and Panning	Finalize and implement the stormwater management program for municipalities, including assistance with annual stormwater pond maintenance and identifying stormwater treatment opportunities for street reconstruction projects.
	Continue water quality monitoring on the main Sauk River and primary tributaries, as well as the rotational lake-monitoring program.
	Investigate the feasibility of reducing internal loading on priority impaired lakes. Opportunities may include rough-fish management on in-channel lakes, invasive aquatic plant management, alum treatments, and other management strategies as determined through a feasibility study.
	Implement stormwater monitoring in the mini-metro watershed to help calibrate the stormwater modeling that will be created for the Sauk River TMDL that will assign a wasteload allocation (WLA) to MS4s.
	Identify barriers to adopting BMPs.
Outreach and Education	Provide educational programming on pasture management, including field days and site visits.
	Provide educational programming on the need for cover crops on all new drain-tile and drainage projects.
	Enhance training tools and outreach opportunities for landowners implementing manure management plans.
	Develop and conduct outreach and education programs on soil health, BMPs, and conservation practices for new and nontraditional farmers.
	Continue to conduct Central Minnesota Water Education Alliance (CMWEA)/stormwater education and outreach related to MS4 and stormwater pollution prevention plan (SWPPP) requirements.
	Implement education and outreach at/for completed stormwater and/or native planting projects within the city of St. Cloud (e.g., interactive signage at the Whitney Streambank site).
	Promote, support, and assist the implementation actions of the city of St. Cloud's stormwater public education and outreach implementation plan.
	Provide educational programming on BMPs for development such as silt fencing as well as assistance to developers.
	Provide educational programming on proper septic-system maintenance.

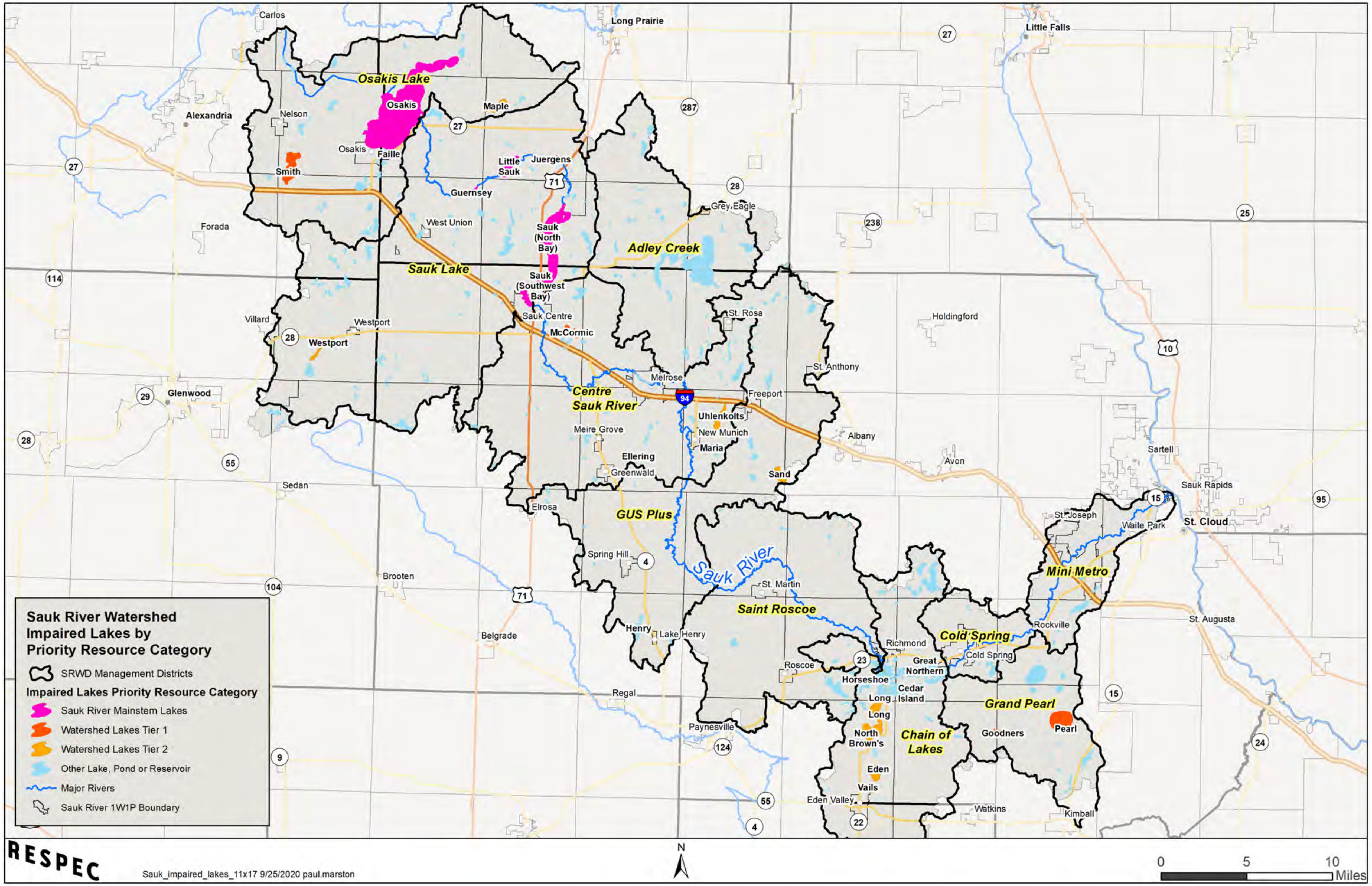


Figure 4-8. Impaired Lakes in the Sauk River Watershed by Priority Resource Concern.

HIGH WATER QUALITY LAKES

The SRW contains 20 lakes that have high water quality; however, seven of these lakes (Big Birch, Big, Carnelian, Kings, Long-Adley Creek, Grand, and Mud Lakes) are within 10 percent of the water quality standard for TP. Little Birch Lake is 20 percent over the TP standard and Becker Lake is approximately 65 percent over the TP standard while still meeting the transparency standard.

Adverse land use impacts are the greatest threat to high water quality lakes. To reduce this threat and provide resiliency to these lakes, protection measures that are primarily accomplished through land use controls should be considered. Such measures are currently in place as a conservation district overlay in the Big Fish Lake and Long Lake area of Stearns County. AIS also pose a threat to these lakes, some of which already have been designated as infested with zebra mussels, including Big Fish Lake, Big Birch Lake, and Little Birch Lake.

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

Adverse land use impacts and aquatic invasive species are a threat to the health of high-water quality lakes.

DESIRED FUTURE CONDITION:

Lakes with high water quality are protected from future degradation caused by human, livestock, and land use impacts.

10-YEAR PLAN GOAL:

D) Maintain or enhance the water quality in high water quality lakes.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

Achieve the 10-year phosphorus reduction goals established by the MPCA for each prioritized lake.

PRIORITY HIGH WATER QUALITY LAKE RESOURCES

To prioritize specific resources, the AC selected a set of the screening criteria to evaluate the high-water quality lakes against. The seven criteria were:

- Lake-size to drainage-area ratio
- Lakeshed land use disturbance percentage
- Within 10 percent of the water quality standard
- Phosphorus sensitivity
- Water-clarity trend
- Lakes of biological significance
- Lake benefit and cost-priority score.

Metrics were determined for each criteria and breakpoints were established to rank lakes according to three tiers. The breakpoints between the tiers were very clearly demarcated. Four top-priority lakes are in the first tier and nine lakes are in the second tier; these thirteen lakes are shown in Figure 4-9. Tier 2 lakes will only be addressed if the top-priority lakes have adequately been addressed or barriers to implementation prevent action. The remaining lakes that are not in one of the top tiers will not be addressed during the 10-year plan time frame. Detailed information on the process, metrics, and ranking is provided in Appendix A.

High Water Quality Lakes

Tier 1

Big Fish Lake
Big Birch Lake
Long Lake (Todd County)
Long Lake (Steans County)

Tier 2

IMPROVING TRANSPARENCY TREND	DECLINING TRANSPARENCY TREND
Big Lake	Bass Lake
Fairy Lake	Kings Lake
Grand Lake	Cedar Lake (north of Sauk Lake)
Pleasant Lake	Carnelian Lake
	Cedar Lake (east of Sauk Lake)

Strategies

KEY STRATEGIES TO ADDRESS HIGH QUALITY LAKES

Program	Strategy
On-The-Ground Implementation Activities	Protecting and preserving forest resources through forest management planning, forest stand improvement, and conservation easements.
	Improve the quality and width of riparian areas.
	Upgrade septic systems that are out of compliance or pose an imminent health threat.
	Continue to implement AIS early detection and rapid-response plans.
Land Use and Regulatory	Reduce the potential impact of land use change by increasing setbacks or reducing the allowable impervious surface.
	Review ordinances regarding land use management that pose the greatest risk to high water quality lakes.
	Explore the adoption of ordinances and requirements for any changes in land use that will significantly alter the hydrology in the watershed to identify those impacts, and proposed solutions to mitigate the impact if the change were to be approved.
	Jointly review existing shoreland ordinances throughout the watershed to determine differences; work together to achieve uniformity and potential improvements.
Monitoring, Studies, and Panning	Assess the runoff potential from the lakeshed to prioritize locations to implement conservation easement and acquisition programs and implement nutrient-reduction efforts.
	Determine non-contributing areas in the watershed and develop regulatory controls that restrict the creation of a hydrologic connection.
	Continue water quality monitoring on the main Sauk River and primary tributaries as well as the rotational lake-monitoring program.
Outreach and Education	Provide forest management programming to private forest landowners.
	Conduct educational programs on maintaining and enhancing shoreline and aquatic vegetation.
	Provide educational programming on proper septic-system maintenance
	Develop outreach to decision-making bodies such as county boards, boards of adjustment, planning commissions, city councils, and township boards, lake associations and lake improvement districts (LID) on their roles in protecting water resources.
	Provide ongoing educational programming on preventing the spread of AIS.

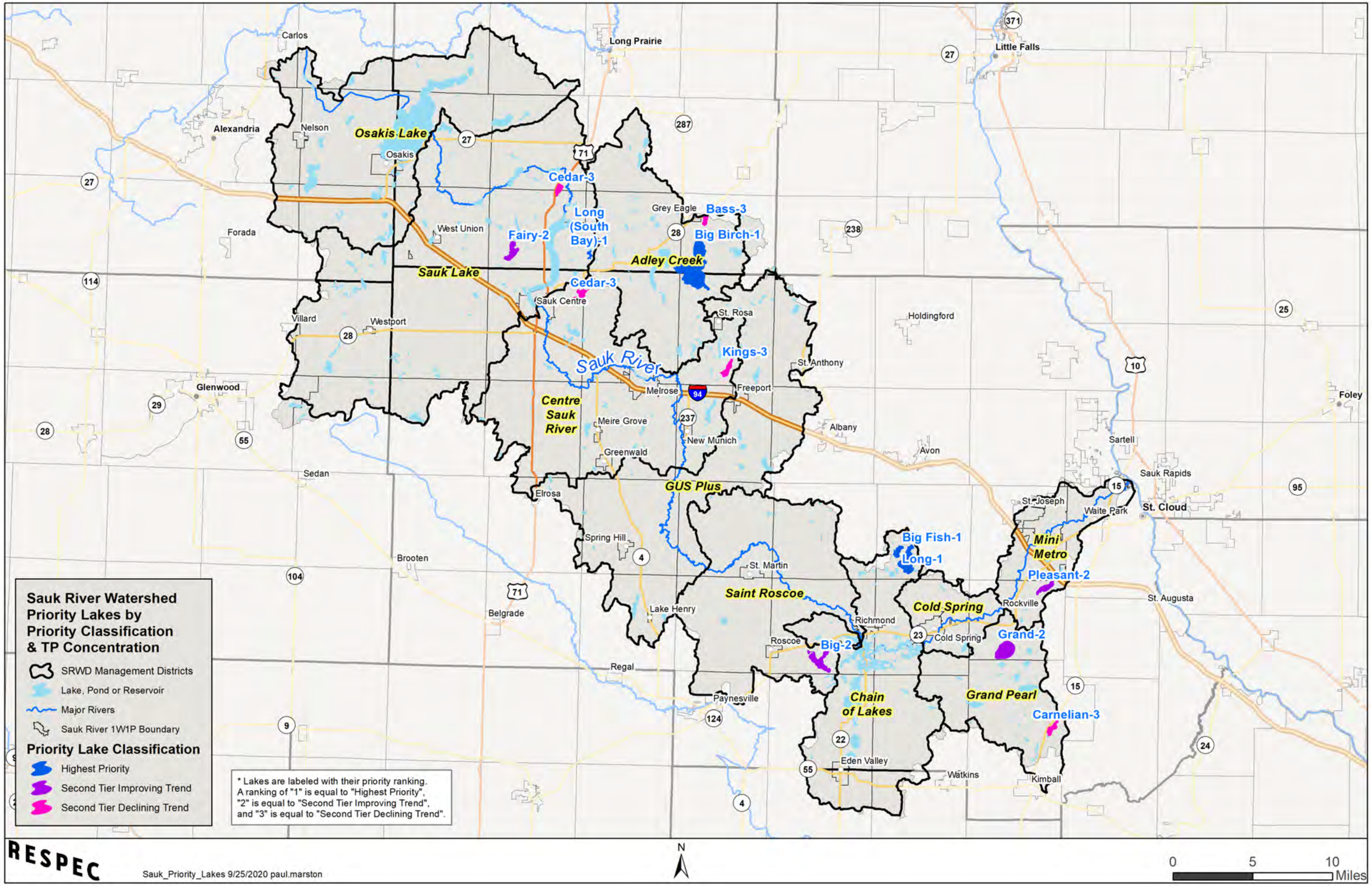


Figure 4-9. High Water Quality Lakes in the Sauk River Watershed, Classified by Depth and Total Phosphorus Concentration.

GROUNDWATER AVAILABILITY

Groundwater is an important resource in the SRW because it is the primary source of drinking water for most of the residents in the watershed and is vital as the irrigation source for the agricultural community. Groundwater and surface water interact dynamically throughout the watershed. Some wetlands are effective at recharging groundwater while others, such as rare calcareous fens, are dependent on groundwater to maintain their ecological function. A high degree of dynamic interaction exists between surface water and groundwater around lakes and rivers as well. Because of the strong linkage between, surface water and groundwater, the SRCWMP deemed groundwater as a priority issue.

Groundwater abundance varies throughout the watershed. Most SRW residents enjoy abundant, clean groundwater but some areas lack a reliable water source for irrigation or a quality source for drinking water. This chapter addresses groundwater abundance, use, threats, and goals.

Groundwater is sourced primarily from the surficial sand aquifer (50 to 60 percent) and buried sand and gravel aquifer (30 to 40 percent). Less than 1 percent of groundwater comes from bedrock aquifers. Several areas of concern exist regarding groundwater availability, including the Bonanza Valley and the city of Cold Spring. Significant work has already been accomplished that has led to developing a groundwater management plan for the Bonanza Valley area, and additional studies are currently underway that will lead to a management plan for Cold Spring. These management plans and studies are largely the undertaking of state agencies; however, the SRCWMP partners support implementing these efforts and will seek to take these opportunities with strategies that complement the State’s ongoing efforts.

Priorities

PRIORITY RESOURCES

Known areas at risk for groundwater depletion from overuse are Cold Spring, Bonanza Valley, and Sauk Centre. These areas are located in the Sauk Lake and Cold Spring Management Districts; however, other areas, such as the sand plains in the Grand Pearl Watershed Management District also have numerous high-capacity irrigation wells that may impact groundwater availability. Active permitted wells in the SRW are shown in Figure 4-10. Areas with high recharge potential are shown in Figure 4-11.

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

Groundwater availability is at risk because of reduced recharge and increased withdrawals.

DESIRED FUTURE CONDITION:

A sustainable, safe-yield groundwater supply is available for all uses.

10-YEAR PLAN GOAL:

G) Increase groundwater conservation and recharge.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

- Well interference, as reported to the MNDNR, is reduced.
- Groundwater levels, as indicated by the MNDNR Observation Well network, are maintained or increased in the Sauk Lake, Cold Spring, and Grand Pearl Management Districts.

Watershed Partners in Action!

The Rosholt Research Farm is located in Pope County near Westport, Minnesota and is owned by the Pope SWCD. The motivation to purchase the 40-acre property was to conduct soil and water research because the site had uniform soil type, soil depth, level, topography, and adequate water for the irrigation research. The farm's sandy soil and need for supplemental irrigation typifies the challenges that many producers face on the outwash sands of west-central and central Minnesota. The site has a long history of research dating back to 1968. An agricultural weather station was installed at the farm in 2012 as a part of the Central Minnesota Agricultural Weather Network and upgraded in 2019.

The Rosholt Farm is dedicated to agricultural research and education that addresses regional issues and agricultural practices that are typical in the area. Researchers address challenges that producers may face in the Central Sands region of Minnesota. Projects have included trials on nitrogen, cover crops, water quality and quantity research, variable rate irrigation, and exploring alternative perennial

crops as a few recent examples. The farm has been supported in partnership with the Stearns Soil and Water Conservation District, Minnesota Department of Agriculture, University of Minnesota, Forever Green, and Agricultural Utilization Research Institute. Funding has been provided by the Clean Water Fund as part of the Clean, Water, Land, and Legacy Amendment, Agricultural Fertilizer Research and Education Council (AFREC), and Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).

Visit the Pope SWCD website for more detailed research trial information and farm history at https://popeswcd.org/program/rosholt-research-farm/

Strategies

KEY STRATEGIES TO ADDRESS GROUNDWATER AVAILABILITY CONCERNS

Program	Strategy
On-The-Ground Implementation Activities	Keep water on the land through practices such as retrofits to tile outlets, wetland restoration, rain gardens, and buffer strips.
	Reduce groundwater use by expanding the adoption of irrigation management practices such as underground irrigation, irrigation scheduling, low pressure/variable rate technology, and soil-moisture sensors to verify soil conditions.
	Permanently protect and restore wetland areas that offer the greatest opportunity for groundwater recharge, such as the Spring Hill fens and wetlands in the Bonanza Valley area.
	Implement smart irrigation systems in urban areas.
	Incentivize water-reuse systems that reduce the need to withdraw from groundwater.
Land Use and Regulatory	Develop model comprehensive plan language that includes measures protecting groundwater from unsustainable harvesting.
	Develop model comprehensive plan language that guides development decisions to preserve and increase recharge areas.
	Establish additional protections for wetland restoration areas and priority areas that will promote infiltration and recharge via rules and ordinances.
	Consider permitting tile projects in the entire watershed regardless of whether or not public drainage occurs.
	Review infiltration pond specifications for increasing infiltration by reduction reducing compaction.
Monitoring, Studies, and Panning	Continue to make investments in the Rosholt Research Farm. Additional research includes studies on tile drainage and opportunities to design for recharge as well as evaluating improvement efficiencies for below-and above-ground irrigation systems.
	Review lake-gage-monitoring network and potentially expand, particularly in the city of Sauk Centre.
	Develop better BMP targeting programs through the creating creation of maps that identify tiled lands and patterns of tile within fields.
	Increase groundwater monitoring with more observation wells or a better network to inventory aquifer levels within the watershed; may be done in conjunction with additional weather stations as deemed necessary.
	Assess water use and future needs for municipalities, feedlots, and irrigators.
	Obtain a better understanding of the resiliency of the aquifers in the watershed; can be measured with an existing or expanded observation well network.

Program	Strategy
Outreach and Education	Conduct a uniformity test for irrigators.
	Complete storm-pond inventory, complete priority zones, create maps to focus implementation efforts, and devise/execute implementation plans.
	Conduct field days and maintain or expand demonstration plots at the Rosholt Research Farm.
	Continue outreach through existing channels such as the Farmers Fair, the University of Minnesota Extension Service, and the Irrigators' Association of Minnesota annual meeting.
	Promote awareness of wetland banking opportunities.

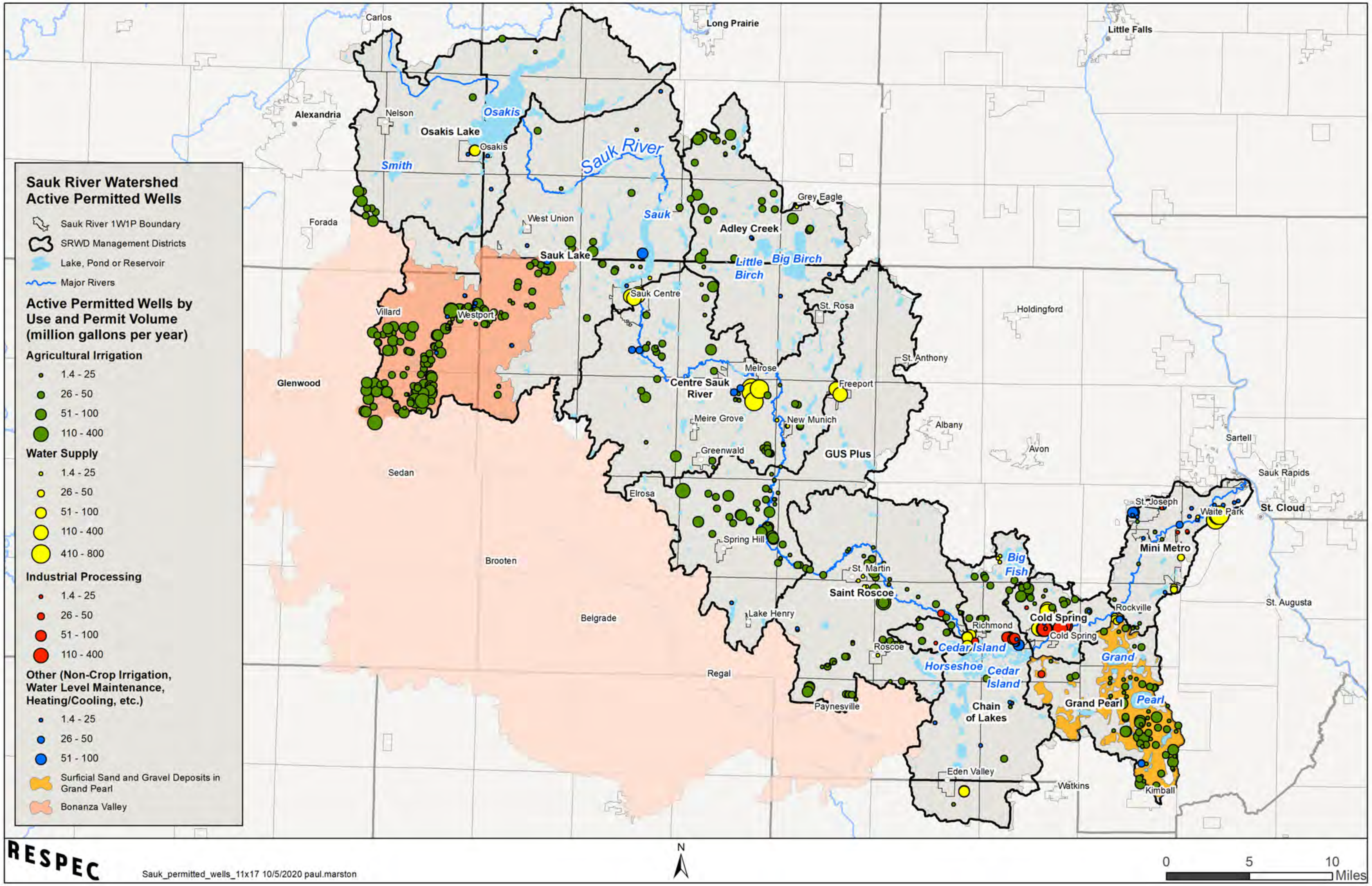
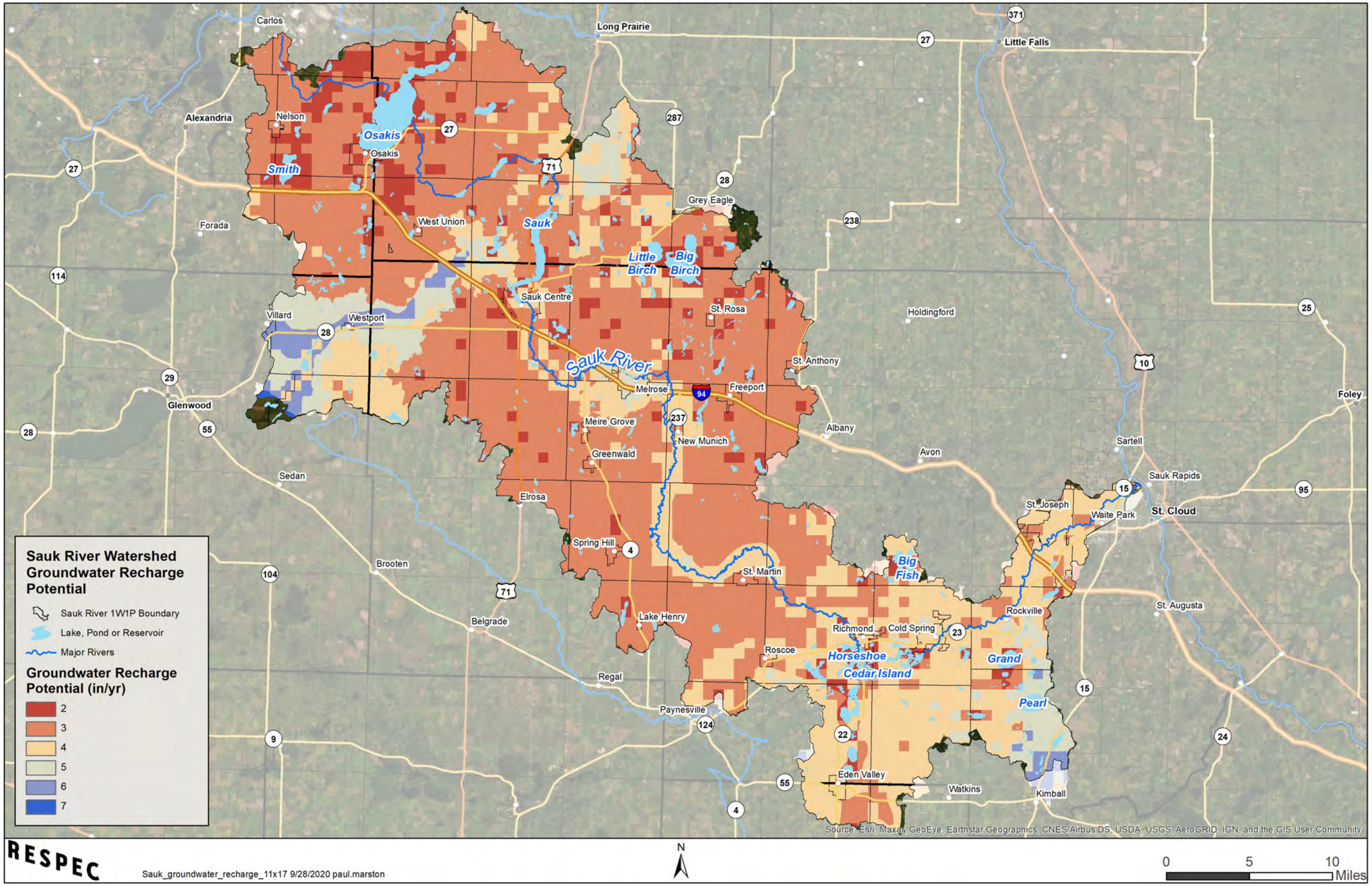


Figure 4-10. Active Permitted Wells in the Sauk River Watershed



. Figure 4-11. Groundwater Recharge Potential in the Sauk River Watershed

GROUNDWATER QUALITY

Groundwater is the primary source of drinking water for most of the land area in the SRW excluding the city of St. Cloud, which relies on surface water taken from the Mississippi River just downstream of the Sauk River outlet. Of the nearly 60,000 people living in the watershed, approximately 35,526 (60 percent) use community public water and the remaining 40 percent obtain their drinking water from private wells, according to the Minnesota Department of Health (MDH) (MDH, 2018).

Numerous contaminants have been detected in drinking water from private wells, monitoring wells, and in public-water supplies throughout the SRW. Contaminated sites such as leaking storage tanks and landfills also pose a risk to groundwater. More than 25 percent of all registered tanks are leaking chemicals into the environment and have the potential to cause localized groundwater pollution (MDH, 2018). Two closed landfills with known groundwater-contamination plumes are found within the SRW. The SRCWMP partners have a limited role in managing drinking water. However, because land management practices have a strong influence on groundwater, the partners have prioritized on-the-ground implementation actions that will reduce the risk of groundwater contamination.

All of the public- and community-water suppliers are required to develop wellhead and source-water protection plans. These plans identify and assess risks within the drinking water supply management area (DWSMA), which covers approximately 50,011 acres, or 7.5 percent, of the watershed. Thirteen of the seventeen approved community wellhead-protection plans exhibit a high vulnerability in all or part of their DWSMAs and are considered vulnerable to contamination from the land surface (Figure 4-12 and Figure 4-13) (MDH, 2018). Public-water suppliers are required to treat water to ensure Safe Drinking Water Act (SDWA) standards and Risk Assessment Advice (RAA) are achieved; however, treating to achieve drinking water standards can be expensive. Therefore, protecting groundwater supplies from contamination is the preferred approach for achieving standards.

Under Minnesota Groundwater Protection Rules (1573.0040, Subparts 2 and 3), the MDA assigns mitigation levels to community-water supplies if they are found to have water samples that have exceeded 5.4 parts per million (ppm) in nitrates, unless the source is determined to be from a point-source discharge. Two mitigation levels exist: Level 1) is for wells that have water-testing results at or above 5.4 ppm of nitrates at any time over the previous 10 years, and Level 2) is designated for wells that have nitrate at or above 8.0 ppm at any time in the last 10 years. When mitigation levels are assigned, the MDA will form a local advisory team in each community. The advisory team's purpose is to develop a monitoring, outreach, and implementation plan to address excessive nitrates.

Private wells are not tested on a regular basis and have no requirement to meet standards, so the number of private wells with pollutant concentrations that exceed SDWA standards is unknown. Private well users are only required to have water tested at the time the well is installed. Additional water tests can be obtained, but unless owners are getting their water tested, they may not be aware of the quality of their drinking water. When tests are done, results are private and unavailable for tracking and identifying areas of concern.

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

Drinking water supplies obtained from groundwater may be contaminated or are at risk of contamination.

DESIRED FUTURE CONDITION:

Groundwater as a source of drinking water will be economical for all users, and groundwater sources will meet the SDWA requirements with minimal treatment needed to remove contaminants. Groundwater protection will be achieved in the drinking water supply management areas.

10-YEAR PLAN GOAL:

H) Reduce the risk of groundwater contamination.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

- Increased groundwater protection in areas that are highly vulnerable to contamination or are designated as a nitrogen mitigation area.
- Increased understanding of the impact that surface waters has on groundwater drinking water sources.

Priorities

PRIORITY RESOURCES

Prioritizing groundwater protection efforts is based on contamination risk. Three risk assessments will be used: wellhead protection area vulnerability, MDA designated mitigation level, and groundwater sensitivity (Figures 4-12 and 4-13).

Within the SRW, five drinking water supply management areas include surface water management areas that need protection because the surface water and groundwater are hydrologically connected. Under the Minnesota Groundwater Protection Rule, three public-water supplies have been assigned a mitigation status (Table 4-11) (MDA, 2020a). The SRCWMP partners prioritized DWSMAs that are either high or very highly vulnerable, and are under public jurisdiction due to the limited capacity of the partners to directly address all of the DWSMAs. This is reflected in the implementation tables in Chapter 5. Partners are encouraged to work with private DWSMAs as resources and opportunities present themselves, but funding will not be provided through watershed based implementation funding.

Potential Contaminants

LOW VULNERABILITY

- Wells
- Class V Injection Wells

MODERATE VULNERABILITY

- Storage or prep area
- Spills
- Pipeline facility
- Leaking underground storage tanks

HIGH VULNERABILITY

- Ash disposal site
- Dumps
- Nuclear reactor

Table 4-11. Priority DWSMAs and Potential Contaminant Risk (complete listing of DWSMAs available on MDH website)

Public Water Supply	Wellhead Protection Area Vulnerability	MDA Mitigation Level	Conjunctive Delineation (Groundwater and Surface Water Hydrologically Connected)
Cold Spring	Very High Risk	Level 2	✓
Eden Valley/Watkins	Very High Risk		
Melrose	High Risk	Level 2	✓
New Munich	Very High Risk		✓
Richmond	High Risk		
Rockville	High Risk		
Roscoe	High Risk	Level 1	✓
Sauk Centre	Very High Risk		✓
St. Joseph	Very High Risk		✓
St. Martin	High Risk		
Waite Park	High Risk		

Very High Risk ⚠ *High Risk* ⚠

MDA Mitigation Level:

Level 1 *Level 2*

KEY STRATEGIES TO ADDRESS GROUNDWATER QUALITY CONCERNS

Program	Strategy
On-The-Ground Implementation Activities	Increase the cost-share rate from 50/50 to 100 percent within the DWSMAs that are rated very high-risk vulnerability and assigned an MDA mitigation level. Wells just outside of a DWSMA may warrant prioritization also; evaluate participation rates and adjust the program delivery or cost-share rate as needed to meet goals.
	Increase the number of acres covered by a manure management plan.
	Improve and expand the adoption of nitrogen management conservation practices, such a perennial crops and cover crops, particularly in areas assigned an MDA mitigation level.
	Promote and encourage the adoption of irrigation water management BMPs, such as irrigation scheduling and conversion to low-flow pressure nozzles.
	Convert and permanently protect land deemed high risk from problematic uses to risk-reduction uses.
	Increase the adoption of recharge BMPs, including wetland construction/restoration, perennial establishment, riparian buffers, and conservation easements.
Land Use and Regulatory	Evaluate local ordinances and revise to include manure timing guidelines to protect from nitrate loss.
	Explore establishing ordinances to protect areas that have high-infiltration rates and the highest probability of promoting infiltration and recharge from development.
	Conduct a desktop N/P review on all of the feedlots in high-risk areas regardless of the facility size, as well as an in-field application inspection of manure-applied acres in high-risk areas.
	Review the impact of mining operations and determine if additional requirements should be established for conditional use permits (e.g., groundwater-level monitoring or density analysis over time).
	Review existing ordinances and requirements regarding storage tanks that are not subject to MPCA requirements to develop uniformity across the watershed and ensure that these storage tanks are being inspected regularly.
	Explore adopting ordinances and requirements where developers must prove that there are both adequate quality (per the SDWA via water testing) and quantity (via pump testing) for the proposed development—specific details to be developed.
	Explore adopting ordinances or requirements for portions of wellhead-protection areas outside of municipal boundaries that limit development where high-groundwater infiltration exists.

Program	Strategy
Land Use and Regulatory	Explore adopting additional controls limiting development that will use groundwater sources where groundwater contamination is suspected.
	Explore adopting ordinances or requirements for entities to provide detailed well logs as part of property sales/transfers.
Monitoring, Studies, and Panning	Continue investments in existing research projects to help develop tools and techniques to address groundwater contamination from surficial uses, such as evaluating cropping systems and a groundwater quality research project conducted at the Rosholt Research Farm.
	Conduct surface-water and groundwater connection studies that will result in better information on how to target programming to reduce risk to groundwater.
	Host a well-testing clinic or provide resources to well users to have their water tested according to MDH recommendations.
	Continually build information and knowledge regarding groundwater quantity and quality data, identifying gaps, and addressing those gaps though local and state agency efforts.
Outreach and Education	Host field days for livestock producers that promote emergency-response training, manure crediting, equipment calibration, and the manure-testing process.
	Enhance training tools and outreach opportunities for landowners implementing manure management plans.
	Host an irrigation water-testing clinic to determine nitrate concentrations in raw water to calculate the irrigation water nitrogen crediting formula.
	Educate the public and decision-makers about the hydrologic connectivity of surface water and groundwater and how it influences vulnerable drinking water resources.
	Increase participation by local partners on wellhead teams to assist public-water suppliers with planning and implementing activities to address protecting source waters in highly and moderately vulnerable drinking water supply management areas.
	Develop a drinking water protection page on the SRWD, SWCD, and county websites, or use other communication tools to share information with citizens on what they can do to protect private and public sources of drinking water.
	Promote awareness of wetland banking opportunities.

Watershed Partners in Action!

The Stearns County SWCD was awarded an Environment and Natural Resources Trust Fund grant to determine if Kernza and native prairie seed production are more effective at reducing nitrate leaching than alfalfa and prairie on the sandy soils of Central Minnesota under irrigated and rain-fed conditions. Kernza is a sod-forming grass with very deep roots growing to a depth of more than 10 feet that can capture and use nitrate in the soil that may otherwise leach into groundwater.

Kernza demonstration fields will be established within the city of Cold Spring's DWSMA. These fields will be monitored for nitrate leaching and demonstrate field-scale production. Kernza will also be tested as a food ingredient (e.g., bread, cereal, pasta, beer) and as non-food (e.g., straw) with Minnesota companies. Local processor capabilities, opportunities, and barriers will be identified. Technical information on the handling (clean and de-hull), storage, formulation, and shelf life of selected Kernza product development concepts will be developed, and nutritional profiles will be supplied for foods and beverages that contain Kernza. This project will be informed by the work of experts and enhance the partnership of the University of Minnesota, Pope and Stearns County SWCDs, and Agricultural Utilization Research Institute (AURI).

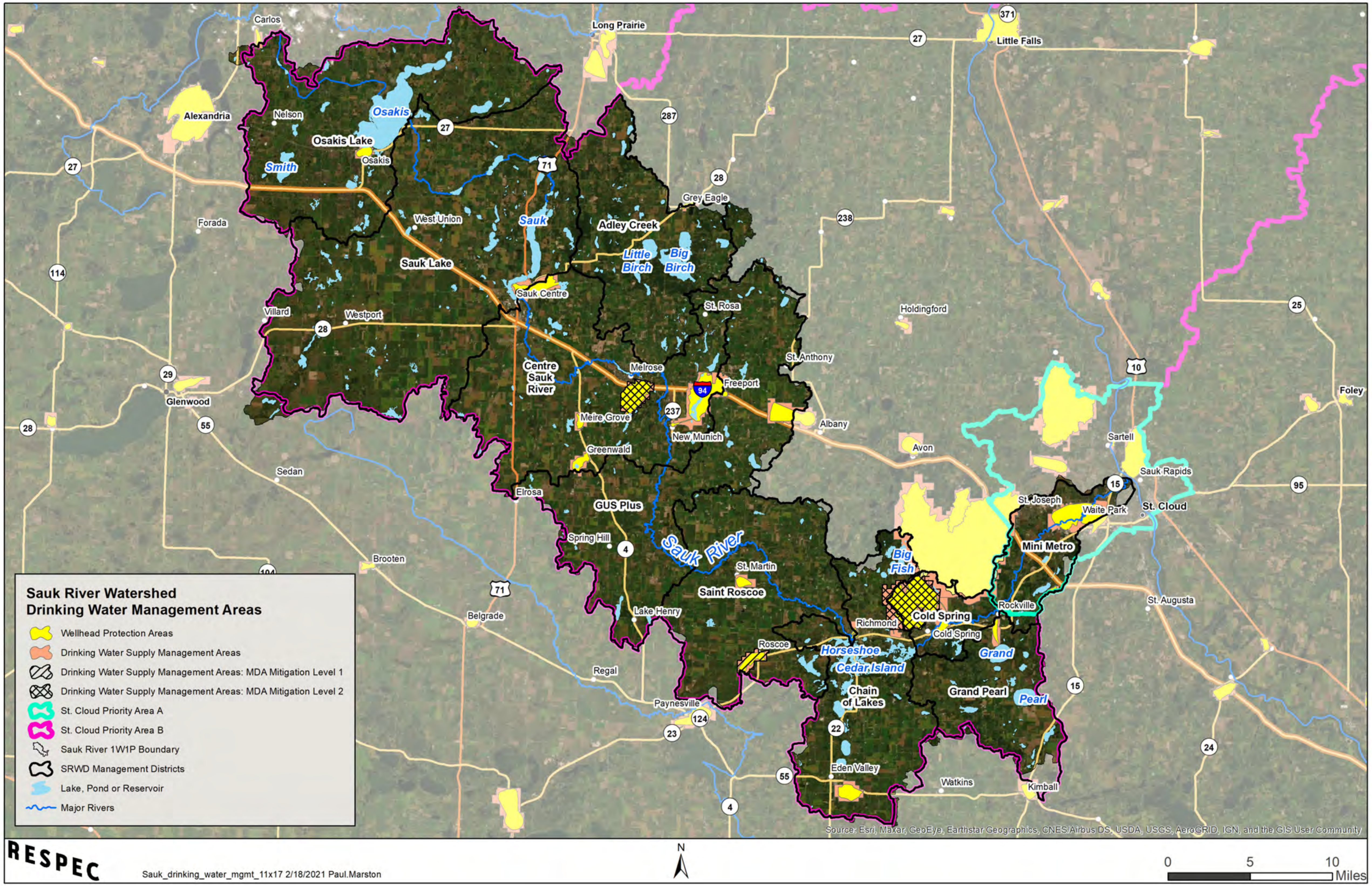


Figure 4-12. Prioritized Drinking Water Supply Management Areas and Mitigation Levels.

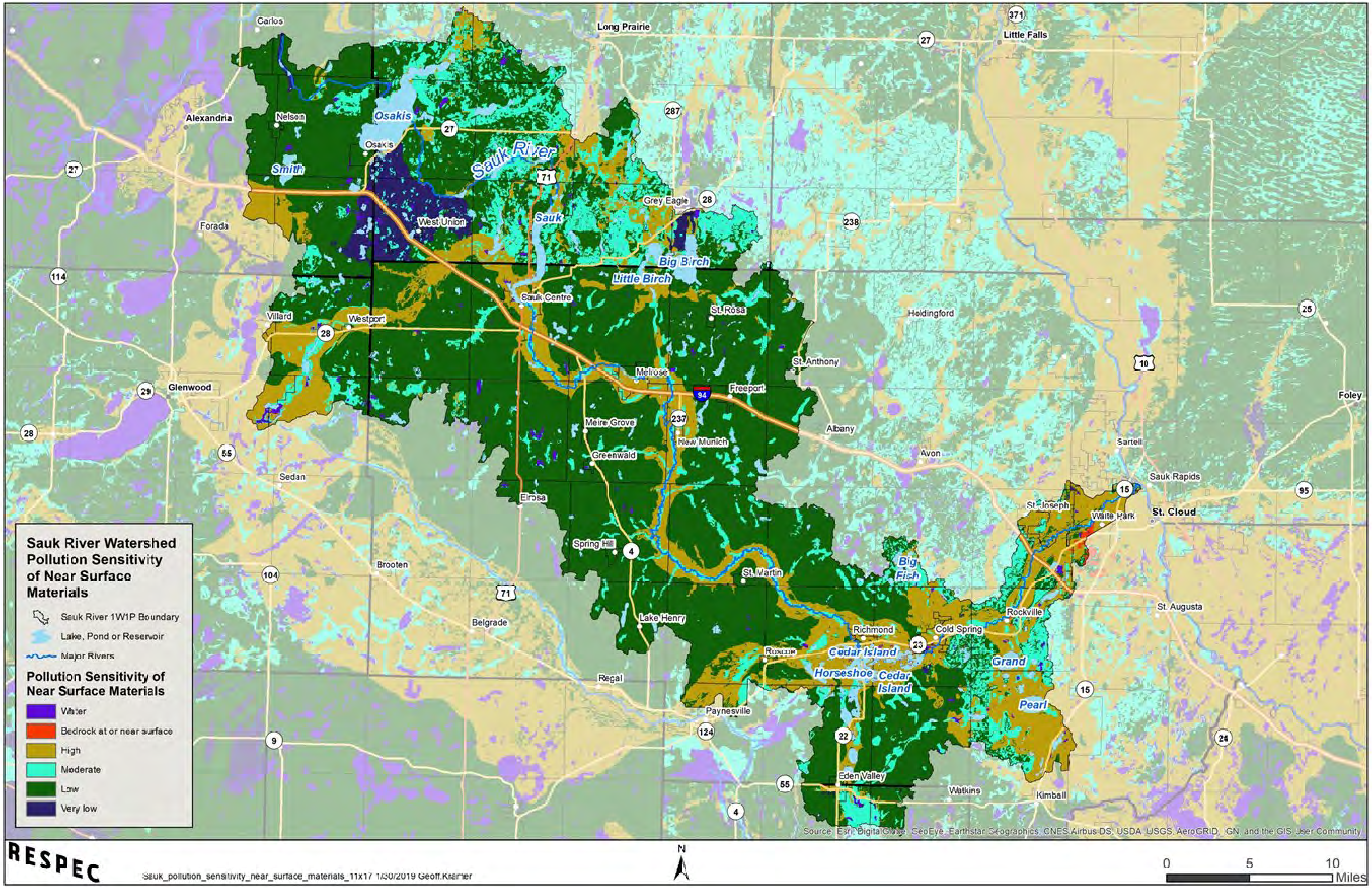


Figure 4-13. Sauk River Watershed Pollution Sensitivity of Near-Surface Materials.

ST. CLOUD SURFACE WATER SOURCED DRINKING WATER

The city of St. Cloud (the City) provides safe, clean drinking water to 70,000 people each day from the Mississippi River downstream of the confluence of the Sauk River. While the entire SRW contributes to the City's drinking water quality as the Sauk River enters the Mississippi River, the focus is on Priority Area A (Figure 4-12), which represents an area where contaminant releases and spills pose an immediate threat to drinking water. The Priority Area A covers the entire Mini-Metro Management District. In addition to the acute threat of contaminant spills, this portion of the Sauk River is impaired because of excess nutrients and occasionally is reported to have high concentrations of suspended solids and bacteria. The City drinking water facility experiences elevated concentrations of ammonia and TSS in spring during snowmelt, as well as in fall. Traveling algae blooms have also required close monitoring for the presence of Microcystis. Sauk River flooding can make issues worse.

All of these impacts require additional resources to ensure high-quality drinking water paid for by the citizens of St. Cloud and St. Augusta. The City is making a large investment in upgrading the drinking water facility to address current issues as well as CECs (e.g., pharmaceuticals, endocrine disruptors, and organic carbons) and provide future capacity. The City owns and maintains two monitoring stations along the Mississippi River to monitor changes in

raw-water quality to anticipate additional treatment needs caused by high-organic loading. The City is in the design phase of a $36 million Advanced Process Improvements and Upgrades project that will introduce ozone and ultraviolet (UV) treatment for removing taste and odor compounds, as well as improve disinfection effectiveness.

The City has developed a source water protection plan (SWPP) to address and reduce the threat of known contaminants. The focus of the SWPP is on Priority Area A (less than 8 hour time of travel to intake). The overall goal of the SWPP is to: "Promote public health, protect the environment, encourage economic development, manage community infrastructure and reduce current drinking water treatment costs by improving the quality of source waters and maintaining a potable drinking water supply at a reasonable cost for all residents of the community, now and in the future." (City of St. Cloud Public Utilities, 2007)

Known Contaminants

- Improper Manure Management and Storage Sites
- Known Stormwater Discharge Sites
- Cropland Sediment Runoff
- Stream Bank Erosion
- Transportation Corridors
- Hazardous Waste Clean-Up Sites
- Failing Septic Systems
- Leaking Underground Storage Tanks

Watershed Partners in Action!

The city of St. Cloud completed a large streambank restoration project along the Sauk River within Whitney Park in 2017. The streambank had severe erosion and bank-failure concerns. As part of the project, an upstream dam was removed and two stream barbs were constructed to help channel river flow to the center and take pressure off the restored stream bank. The City used professional expertise from the Stearns SWCD, Short Elliott Hendrickson Inc. (SEH), Barr Engineering, the SRWD, and the MNDNR to design and manage the project. The project took more than 3½ years to plan and complete because of several delays related to weather, permitting, and obtaining funding for the dam removal. The project was funded by a Clean Water Legacy grant from BWSR through the SRWD and an MNDNR Conservation Partners Legacy Grant. The project added more than 0.6 acres of native plantings and restored and stabilized over 150 feet of shoreline.

Whitney Park Stream Bank Before Restoration

Whitney Park Stream Bank After Restoration

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

The drinking water for the city of St. Cloud is impacted by the Sauk River's water quality.

DESIRED FUTURE CONDITION:

The Sauk River will see improvements in terms of habitat and reductions to nutrient and sediment loading, which will lead to ecological and economic benefits.

10-YEAR PLAN GOAL:

I) Reduce the severity and duration of pollutant loads in the lower Sauk River.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

- Reestablish water quality monitoring program in the Lower Sauk River.
- Prioritize and implement projects that will reduce nutrient, sediment, and *E. coli* loading to the Sauk River.

Priorities

PRIORITY RESOURCES

Priority resources will be determined by completing the inventory and assessment tasks listed in the strategies table in Chapter 5. Meanwhile, sources of known contaminants will be addressed on a case-by-case basis upon completing a risk assessment to identify priority areas within Priority Area A. As such, a watershed-wide map identifying targeted areas is not applicable for this resource concern.

Strategies

KEY STRATEGIES TO ADDRESS ST. CLOUD DRINKING WATER CONCERNS

Program	Strategy
On-The-Ground Implementation Activities	Implementing feedlot and manure storage facility upgrades as well as pasture management improvements that may include livestock exclusion.
	Providing composting facilities for areas with too much manure compared to available land.
	Upgrading failing SSTS that are likely to impact surface water.
	Implementing stormwater projects that treat pollutants and reduce the rate, flow, and volume of runoff.
	Protecting forested areas that filter runoff and increase groundwater recharge.
	Installing high-value pilot stormwater reuse projects to demonstrate value and provide outreach to appropriate audiences on the value of stormwater reuse.
	Ensuring high-risk infrastructure maintenance is included in municipalities' capital improvement plans.
Land Use and Regulatory	Strengthen existing rules/ordinances to ensure new SSTS are being built in appropriate areas and existing SSTS are being checked and monitored and addressed once they begin failing.
	Review ordinances regarding land use management that pose the greatest risk to resources to ensure that priorities identified in the Sauk River CWMP have adequate protection.
	Review the impact of mining operations and determine if additional requirements should be established for conditional use permits (e.g., groundwater-level monitoring or density analysis over time).
	Explore establishing a consistent excessive soil-loss ordinance or requirement—specific details to be developed.
	Evaluate opportunities to convert urbanized public drainage systems, such as CD 17, to stormwater utilities.
Monitoring, Studies, and Panning	Identify feedlots in need of additional upgrades and protections, including pastures in need of riparian exclusions for funding purposes.
	Inventory municipalities' systems to determine where high-risk infrastructure is located (e.g., old sewer lines within the floodplain).
	Inventory of high-risk SSTS in key locations to determine the status of the risk (e.g., main-stem shoreland SSTS).

Program	Strategy
Monitoring, Studies, and Panning	Inventory existing outfalls in the watershed, including storm sewer outfalls and agricultural tile drainage in key locations.
	Develop a list of high-priority volume-reduction project locations in the watershed (e.g., wetland restorations/enhancements, stormwater infiltration and rate control, improving soil health).
	Inventory the existing stormwater treatment infrastructure at key sites in the watershed (i.e., main-stem municipalities).
	Develop a list of existing stormwater reuse systems and identify potential reuse sites.
	Evaluate and potentially update the time-of-travel study with a focus on key sites in the watershed that are particularly concerning.
	Inventory sites where SSTS pumping (i.e., contract septic-tank pumping services) is discharged in the watershed.
Outreach and Education	Provide educational programming for municipalities in the watershed on how their stormwater affects the city of St. Cloud (focus on why they should care).
	Conduct water educational programming for adults on the basics: what a watershed is, where their water goes; why they should care what they do on the land.
	Evaluate existing youth educational programming in the watershed to determine best investments and new initiatives.
	Continue and expand promoting pharmaceutical drop-offs.
	Continue ramping up promoting household hazardous waste collections, including mobile operations.
	Conduct spill-response drills in collaboration with multiple partners in the watershed.

LAND USE

Along with addressing altered-hydrology issues, the planning partnership considers the future impact of current land use decisions of paramount importance in addressing climate change and building a resilient landscape. The key drivers of land use changes in the SRW are population growth, the migration of urban dwellers to rural or lake regions, and agricultural economic conditions. Using the development risk analysis discussed in the emerging issue chapter (Chapter 3), Figure 4-14 indicates that the areas most likely to be converted from agricultural use to development are along the Interstate 94 (I-94) corridor from Melrose to Sauk Centre, the SH 23 corridor from Cold Spring to Richmond, and the northwestern portion of the Mini-Metro Management District. The areas indicated represent a 75 percent likelihood of being converted from agricultural areas to developed areas as well as from undeveloped, natural areas to agricultural uses. The Advisory Committee chose the 75 percent land conversion scenario because it was deemed to be the most likely scenario. Current land use practices may also have detrimental impacts now and into the future; for example, intensive row-crop agriculture without conservation practices is likely to be losing valuable soil to wind-and-water erosion, which causes damage to resources while reducing the long-term health and productivity of the soil. Riparian areas are the last line of defense in protecting surface water from watershed impacts and should be required to have a high-quality vegetated cover and adequate setbacks. Most of the highly productive soils are already in production, and the risk of additional areas being converted to cropland is low (Figure 4-15); however, few wetland, forest, and grassland areas remain. These areas should be protected from conversion to unsuitable land uses. Further details and key strategies to address land use concerns for remaining habitat areas are provided in the Habitat Priority Concern section of this chapter.

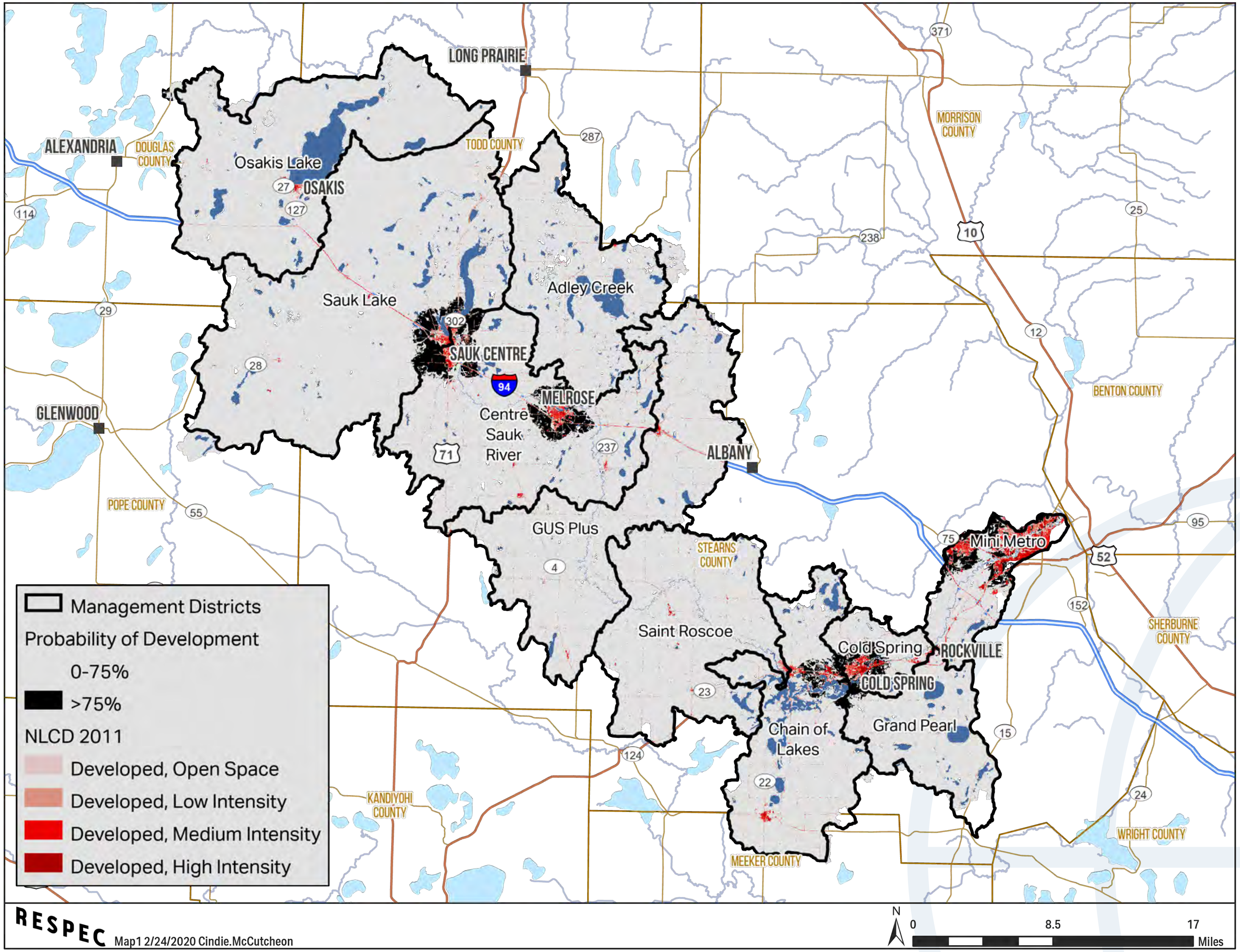


Figure 4-14. Areas Currently in Cropland That Have a 75 Percent Probability of Being Converted To Developed Land Use Because of Growth.

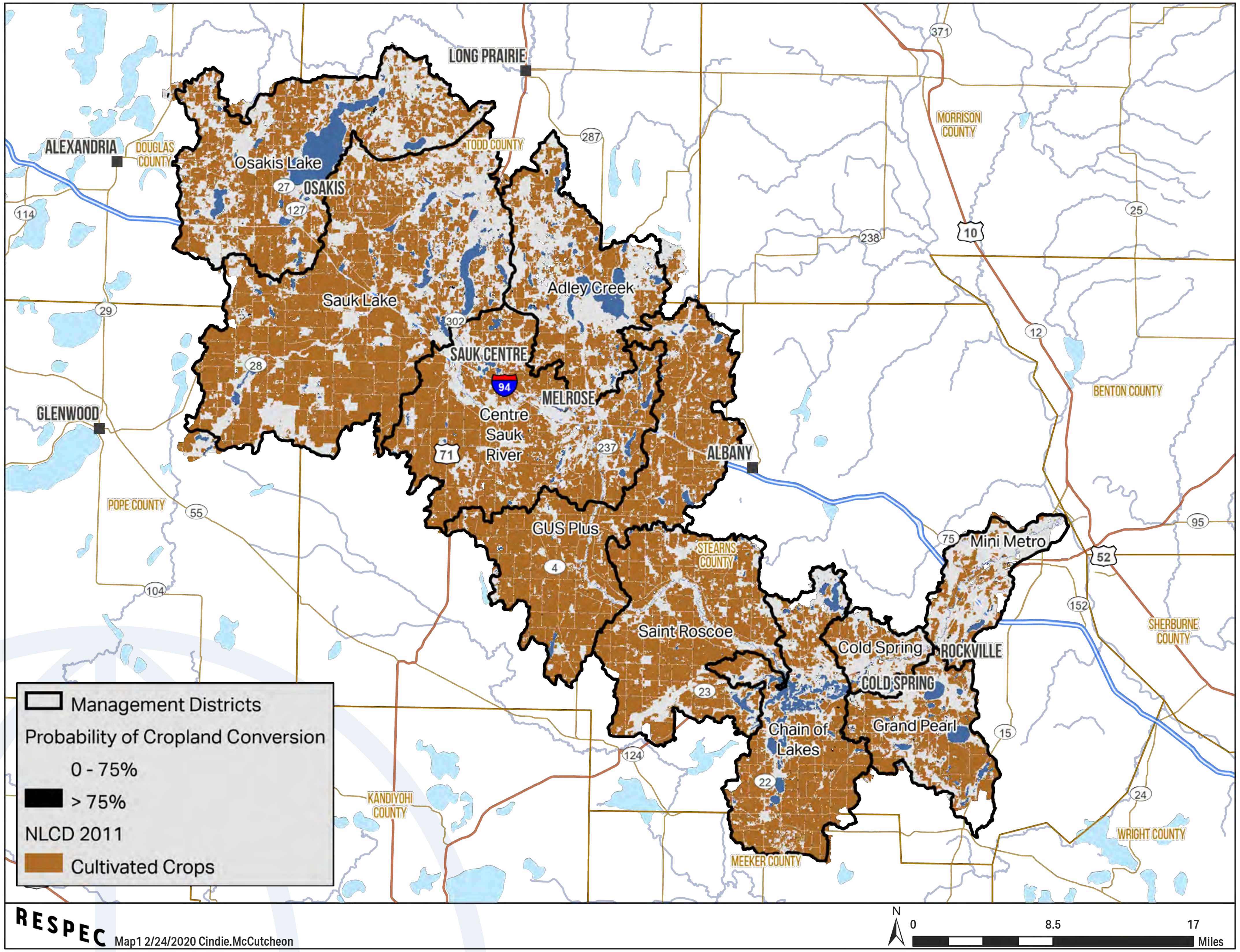


Figure 4-15. Areas That Have a 75 Percent Probability of Being Converted To Cropland.

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

- Land use management decisions can impact long-term sustainability of resource goals.
- Land use activities in riparian and adjacent areas have impacts on surface waters.

DESIRED FUTURE CONDITION:

- Land use provides resiliency for natural ecosystems.

10-YEAR PLAN GOAL:

E) Increase the understanding of land use management opportunities to reduce harmful impacts to natural resources.

F) Improve stewardship of riparian areas.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

(Goal E):

- Land use management decisions incorporate sustainable practices.
- No net decrease in the 120,671 acres of natural areas including CRP, RIM, protected wetlands, and state and county lands.
- Identify priority farmland protection areas to encourage working land easements and other farmland protection tools.
- Obtain no less than tolerable soil loss (T) on priority highly erodible lands within prioritized subwatersheds.

"T": Tolerable Soil Loss

The maximum rate of annual soil loss that will permit crop productivity to be sustained economically and indefinitely on a given soil.

(Goal F):

- Achieve 100 percent buffer compliance.

PRIORITY RESOURCES

Targeting land use management programs to priority areas will depend on the resource of concern that is being protected. In most cases, site-specific targeting will be determined using GIS analysis at the time of project implementation or policy evaluation. Therefore, because strategies are watershed-wide, a map identifying priority targeted areas is not applicable for this resource concern. Key analyses that should be undertaken to meet these the land use goals are as follows:

- Highly productive soils should be targeted for implementing enhanced soil-loss programming efforts. Site-specific targeting may include using the Wind Erosion Prediction System (WEPS) and evaluating the highly erodible soils GIS data layer.
- Riparian land use compatibility will be initially targeted through the pasture management and livestock exclusion measures identified in the *E. coli* impairment priority issue programming.
- Many land use protection measures are already in place to reduce the risk of converting prime agricultural areas to development. These measures should be evaluated to ensure consistency across the watershed.
- Remaining high-quality forest and wetland areas that are at a risk of conversion for development and agricultural purposes have been identified using The Nature Conservancy's (TNC's) multiple benefits analysis (The Nature Conservancy, 2018).

Strategies

KEY STRATEGIES TO ADDRESS LAND USE CHANGES

Program	Strategy
On-The-Ground Implementation Activities	Provide additional incentives for agricultural producers to implement measures to reduce erosion.
	Expand and enhance buffers, install fencing to exclude livestock from direct access to riparian areas, and provide alternative watering solutions.
	Permanently protect valuable farmland, wetlands, uplands, and forests through conservation easements.
	Incentivize conservation planning for new developments by reducing fees or offering other financial benefits.
Land Use and Regulatory	Implement a variance-review process that evaluates the variance request alignment with the priority resource areas identified in the SRCWMP.
	Review ordinances regarding land use management that pose the greatest risk to resources to ensure that priorities identified in the SRCWMP have adequate protection.
	Explore the adoption of additional ordinances and requirements to protect identified calcareous fens, including setbacks.
	Review the impact of mining operations and determine if additional requirements should be established for conditional use permits (e.g., groundwater-level monitoring or density analysis over time).
	Explore ordinances and requirements to increase restrictions on impervious coverage.
	Jointly review existing shoreland ordinances throughout the watershed to determine differences; work together to achieve uniformity and potential improvements.
	Explore establishing a greenbelt protection corridor.
	Explore the adoption of ordinances and requirements that restrict the connection of non-contributing areas.
	Explore ordinances and requirements to restrict certain exemptions under WCA rules.
Monitoring, Studies, and Panning	Establish a risk-assessment program for shoreland, urban development, and some upland areas.
	Conduct a study to identify other calcareous fens in the watershed.

Program	Strategy
Outreach and Education	Host, or partner with existing, on-the-farm breakfasts to build a sense of community and increase awareness of the importance of agriculture to the watershed.
	Develop and conduct outreach and education programs on soil health, BMPs, and conservation practices for new and nontraditional farmers.
	Develop outreach to decision-making bodies such as county boards, boards of adjustment, planning commissions, city councils, and township boards on their roles in protecting water resources.
	Provide forest management programming to private forest landowners.

HABITAT

Most of the landscape in the SRW has been converted from its original land use of native prairies, grasslands, wetlands, and deciduous forests to agriculture and developed land uses; however, portions of the watershed remain as high-quality habitat, including calcareous fens, cold-water streams, upland forests and grasslands, and forested floodplains. Seventy-two sites are rated as outstanding, high, or moderate biodiversity significance covering more than 30,000 acres (Table 4-12) that are either completely or partially within the SRW (MDNR, 2020c), and 17 lakes are rated as biologically significant (Table 4-13) (MDNR, 2020b). Groundwater supply is critically important for the 28 native plant communities in the SRW that are associated with or dependent on groundwater, seven of which are considered critically imperiled or imperiled and four of which are in a vulnerable status (MDH, 2018). Two areas of the SRW have been designated as an Important Bird Area (IBA) by Audubon, Minnesota.

Approximately 3 percent of land (20,384 acres) is owned and managed by federal, state, or local governmental entities for conservation and recreational uses. Of the 97 percent of the land that is held in private ownership, nearly 15 percent (100,937 acres) is enrolled in a conservation program; however, approximately 15,000 of those acres currently enrolled in the Conservation Reserve Program (CRP) could expire. This issue will be addressed as it occurs to maintain the existing level of protection. The number of acres and percentage of land in conservation by ownership type in each management district are provided in Figures 4-16 and 4-17, respectively.

Table 4-12. Sites and Acres of Biological Significance According to Category

Biological Significance Category	Count	Total Area (ac)
Outstanding	2	1,371
High	15	8,874
Moderate	55	22,259
Total	**72**	**32,504**

Table 4-13. Lakes of Biological Significance in the SRW

Waterbody	County	Area (ac)	Shoreline (mi)	Biological Significance
Lake Osakis	Todd	6,389	26.8	Birds
Sauk Lake	Todd	2,126	22.3	Plants
Big Birch Lake	Todd	2,112	15.3	Birds, Fish, Plants
Little Birch Lake	Todd	839	8.6	Fish, Plants
Pearl Lake	Stearns	753	4.0	Fish
Grand Lake	Stearns	651	3.8	Fish, Plants
Big Fish Lake	Stearns	557	5.9	Fish
Big Lake	Stearns	458	7.5	Fish
Fairy Lake	Todd	307	4.1	Fish, Plants
Long Lake	Todd	205	4.7	Fish
Goodners Lake	Stearns	187	3.5	Fish
Long Lake	Stearns	153	2.9	Fish
Cedar Lake	Todd	139	2.0	Fish, Plants
Bass Lake	Todd	94	1.8	Fish
Lake Sylvia	Stearns	85	2.0	Fish
Mud Lake	Stearns	68	1.2	Birds
Unnamed	Stearns	19	0.9	Birds

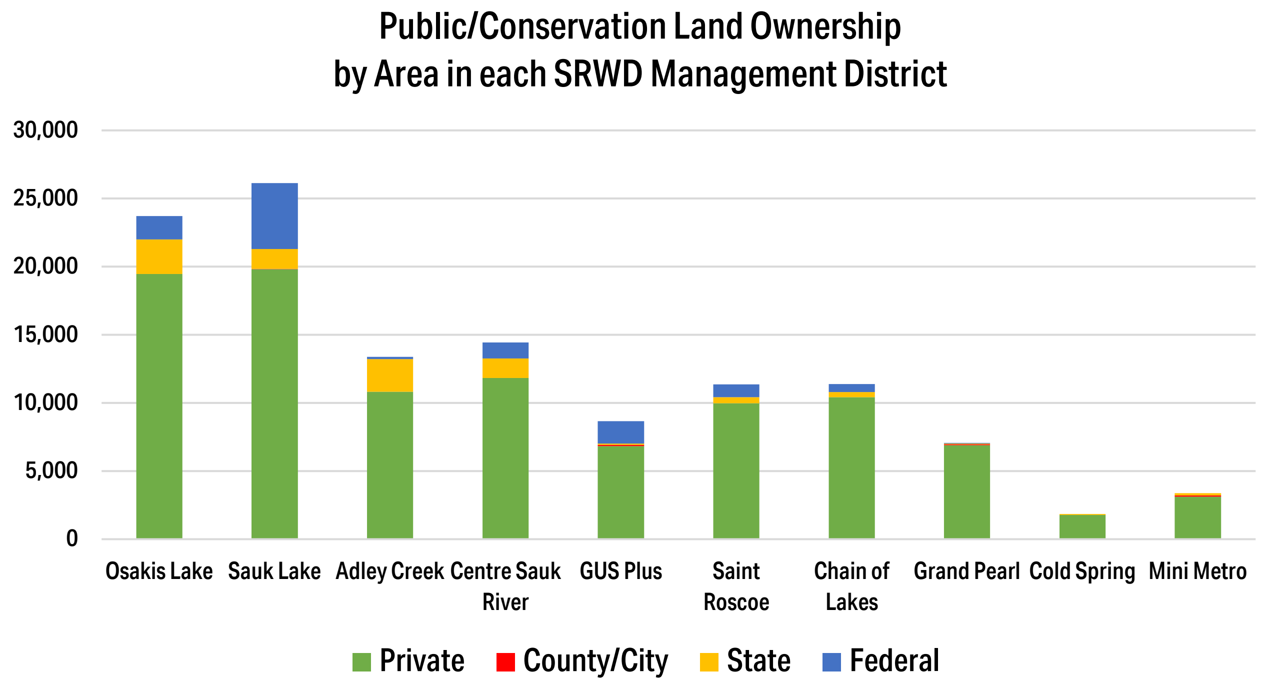


Figure 4-16. Acres of Land in Conservation by Ownership Type in Each Management Unit.

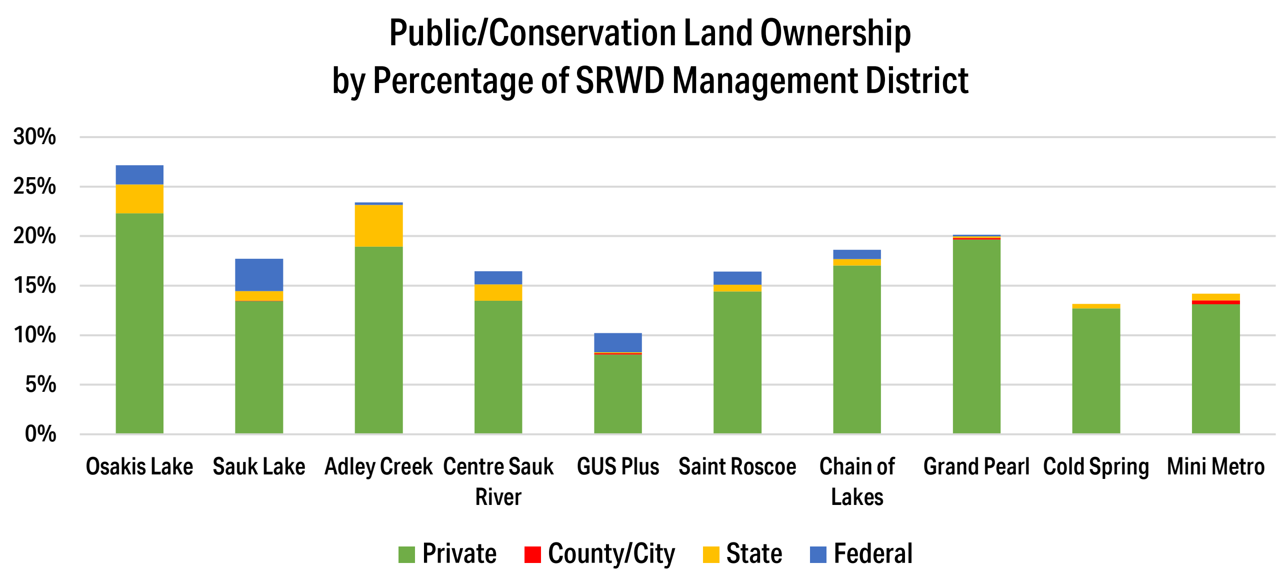


Figure 4-17. Percentage of Land in Conservation by Ownership Type in Each Management Unit.

The Plan

ISSUE, DESIRED FUTURE OUTCOME, GOAL, AND MEASURE:

ISSUE STATEMENT:

Habitat areas have been negatively impacted due to fragmentation, pollution, invasive species, and intensifying land use.

DESIRED FUTURE CONDITION:

Abundant, high quality habitat supports self-sustaining populations of indicator species in aquatic, wetland, and upland environments.

10-YEAR PLAN GOAL:

J) Protect, enhance, and restore habitat.

MEASURE OR INDICATOR OF GOAL ACHIEVEMENT:

» Enhance or restore 10 percent of permanently protected habitat.

» Increase the amount of permanently protected habitat by 2,700 acres.

Priorities

PRIORITY ACTIONS AND GEOGRAPHIC TARGETING

The SRCWMP developed the list of priority actions based on habitat function and restoration or protection activity. Specific project locations are identified in each management district. Additional targeting will be implemented based on TNC's Multiple Benefits Analysis, which has successfully been applied in implementing multiple grant projects in the SRW funded by the Clean Water, Land, and Legacy Amendment as recommended by the Lessard-Sams Outdoor Heritage Council (LSOHC). Figure 4-18 highlights biologically significant resource locations throughout the SRW.

Table 4-14. Enhancing, Restoring, and Protection Actions by Habitat Type

Habitat	Protect (Permanent)	Restore	Enhance
Aquatic	» Trout and cold-water streams » Priority shoreland areas: / Spawning areas / Wild rice beds / Natural environment designation qualities / Threatened and endangered species present / Migration corridors.	» Stream banks and riparian areas with the highest restoration potential » Rough-fish management in impaired lakes with high internal loading. » Connectivity through removing dams and replacing culverts that block fish passage.	» Moderate to outstanding aquatic environments: / Address invasive species / Increase species diversity / Improve habitat quality.
Wetland	» Fens » Sites where threatened and endangered species are present » Migration corridors » Restored wetlands.	» Degraded or drained wetlands that: / Are adjacent to or within ½ mile proximity of existing wetland habitat / Expand habitat for threatened, endangered, or game species currently present.	» Moderate to outstanding wetland environments: / Address invasive species / Increase species diversity / Improve habitat quality.
Upland	» Forested areas in subwatersheds that protect lakes with high water quality » Native or restored prairies and grasslands.	» Degraded forest areas that: / Are adjacent to or within ½ mile proximity of existing forest habitat / Expand habitat for threatened, endangered, or game species currently present.	» Moderate to outstanding upland environments: / Address invasive species / Increase species diversity / Improve habitat quality.

KEY STRATEGIES TO ADDRESS HABITAT CONCERNS

Program	Strategy
On-The-Ground Implementation Activities	Enhancing, restoring, and protecting the resources according to Table 4-14.
Land Use and Regulatory	Explore the adoption of additional ordinances and requirements to protect identified calcareous fens, including setbacks.
	Review the impact of mining operations (aggregate, sand, and gravel) and determine if additional requirements should be established for conditional use permits (e.g., groundwater-level monitoring or density analysis over time).
	Explore the adoption of ordinances and requirements for any changes in land use that will significantly alter hydrology in the watershed to first identify the impacts and then propose solutions to mitigate the impact if the change were to be approved.
	Explore establishing ordinances to protect potential wetland-restoration areas that have the highest probability of promoting infiltration and recharge from development.
	Jointly review existing shoreland ordinances throughout the watershed to determine differences; work together to achieve uniformity and potential improvements.
	Explore establishing a greenbelt protection corridor.
	Explore ordinances and requirements to restrict certain exemptions under WCA rules.
Monitoring, Studies, and Panning	Identify wetland-restoration areas and priority areas that will have a high probability of promoting infiltration and recharge.
	Continually build information and knowledge regarding groundwater quantity and quality data, identifying gaps, and addressing those gaps though local and state agency efforts.
	Assess the Berscheid Pond Dam for opportunities to improve ecological function; evaluate for fish-passage opportunities.
	Complete culvert inventories in prioritized subwatersheds and where street, road, and bridge projects are occurring. Assess for opportunities to improve habitat, store or slow water, and implement sediment- and erosion-reduction enhancements, and recommend actions.
	Investigate the feasibility of reducing rough-fish populations.
	Conduct a study to identify other calcareous fens in the watershed.

Program	Strategy
Outreach and Education	Encourage landowner enrollment in habitat restoration, protection, and set-aside programs.
	Continue to implement terrestrial and AIS awareness, detection, and management programs.

Watershed Partners in Action!

HERBERGER LAKE WILDLIFE MANAGEMENT AREA

The Herberger Lake WMA Addition can be found four miles South of Osakis in Douglas County, Minnesota. Pheasants Forever, in partnership with the Sauk River Watershed Partnership, Kleinfehn Family, Outdoor Heritage Fund, North American Wetland Conservation Act, and the Sauk Centre Conservation Club, purchased this tract in fee-title in 2019. Once native grasslands and drained wetlands are restored, this property will add 212 acres of quality habitat onto the existing 156-acre Herberger Lake WMA. Wildlife populations improvements estimated for the restoration of this tract include a 272 percent increase in breeding duck pair use, an 817 percent increase in monarch butterfly production, and a 50 percent increase in ring-necked pheasant carrying capacity. Additionally, this acquisition will protect more than a mile of shoreline on Herberger Lake. The Herberger Lake WMA Addition will be open to public hunting, fishing, hiking, birding, and many other outdoor recreation activities.

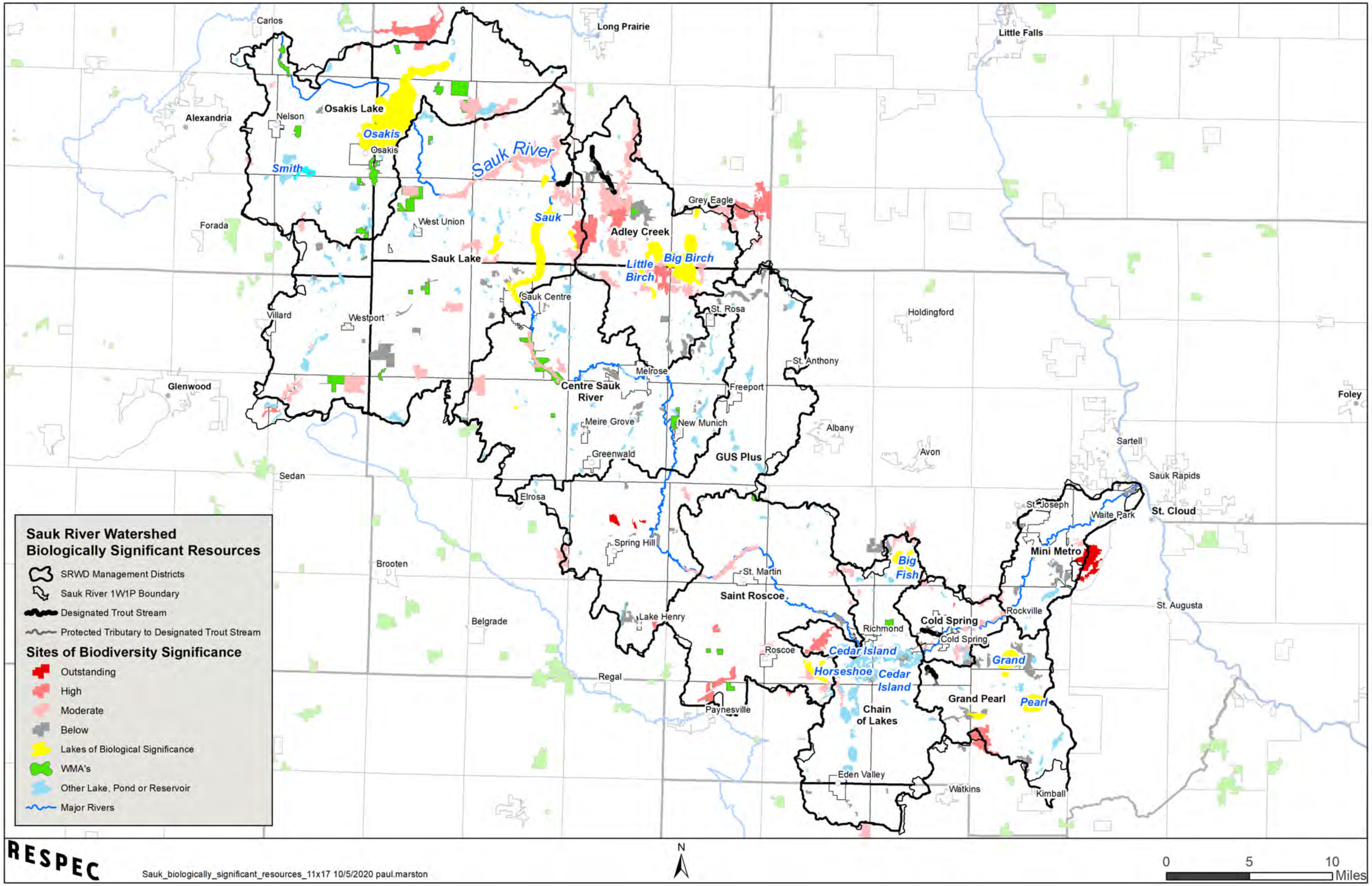


Figure 4-18. Sauk River Watershed Biologically Significant Areas

5 GEOGRAPHIC MANAGEMENT AREAS

The geographic management area organization is based on the management district planning zones that have been adopted and used for nearly 20 years. The management districts are presented in order from the headwaters in Osakis Lake to the St. Cloud area where the Sauk River enters the Mississippi River. A summary of each management district is presented in this chapter with an at-a-glance table of priority resources. More detailed discussion of each resource concern, priority resources, and resource specific goals as applicable, follow. A map of priority resources and targeted subwatersheds are shown for each of the management districts while Figure 5-1 presents the priority resources and subwatersheds with planned implementation actions at the watershed scale.

The SRCWMP strives to take opportunities to achieve multiple benefits for implementation actions. A summary of the benefits achieved from each implementation action is provided in Table 5-1. Specific actions to address the sustainability of land use decisions and riparian area management priority concerns are not included in the table in recognition of multiple benefits and to simplify the tracking of implementation actions. For example, the types of actions that would address the riparian area management resource concern were already detailed in the riparian fencing to address *E. coli* issues and in the watershed-wide regulatory action to achieve 100 percent buffer compliance. Additionally, detailed information on the subwatersheds that have been prioritized to reduce downstream impacts of excessive sediment and nutrients will not be available until additional data and analysis are completed. Therefore, information is provided only where available.

TARGETED IMPLEMENTATION SCHEDULE

The on-the-ground implementation actions for each priority resource and concern are provided in each management district's implementation schedule. The implementation schedule identifies the specific activities, targeted locations, measurable outcomes, estimated costs (where available), and organizational responsibilities for each activity. Implementation actions included in each management district's implementation schedule reflect actions identified by project partners and make up their comprehensive watershed management plan. The prioritization framework described throughout the plan will be used to guide their implementation actions and achieve the identified measurable goals.

The on-the-ground implementation action schedule is found at the end of each respective management district section in Chapter 5. Watershed-wide implementation schedules for monitoring, regulatory, and outreach and education programs are provided in Chapter 6.

The on-the-ground implementation schedule was designed to be easily used in implementing the Sauk River CWMP because the tables are set up to automatically calculate pollutant reductions and costs using the criteria established in HSPF-SAM and professionally accepted estimators, such as the MPCA's Minimal Impact Design Standard (MIDS) calculator. Therefore, the planning partners can adapt the table for specific purposes, such as tracking progress or applying for grants.

The targeted implementation schedule is an idealized presentation of implementation efforts according to ranked priorities and specific, targeted resources; however, oftentimes the targeting of on-the-ground implementation actions is based on other key factors, such as:

- Identifying willing landowners
- Priorities as identified through federal and other funding sources
- Leveraging opportunities that allow for goals to be achieved more efficiently and cost effectively
- Evaluating the ability to achieve multiple benefits.

Targeting at the planning level identifies subwatersheds or priority resources. Site specific targeting will direct the staff and program resources for on-the-ground implementation activities. The site-specific targeting process for some activities, such as feedlot upgrades, is outlined in the discussion of each priority concern. The Nature Conservancy's (TNC's) multiple benefits analysis is a science-based process completed in 2017 for the Upper Mississippi River Basin to inform spatial targeting of protection and restoration. This analysis considers fish and wildlife habitat, drinking water source protection, surface and groundwater quantity and quality, and flooding and erosion control benefits, both in combination and in separate-themed modules (integrating numerous datasets and map layers already discussed in earlier sections of this plan). The analysis can be used to identify areas where protection and restoration activities, including in-field and edge-of-field agricultural conservation practices, are likely to provide multiple benefits. For each priority area, determining what specific activities should be implemented to produce multiple benefits will depend on existing physical characteristics, resource issues, land use, and management considerations at each site. In addition to practitioner knowledge and expertise, additional tools, data, and analyses may be needed or helpful in determining the most appropriate implementation actions on the ground; for example, developing hydroconditioned digital elevation models (DEMs) and completing the Agricultural Conservation Planning Framework (ACPF) or Prioritize, Target, and Measure Application (PTMApp) in priority subwatersheds will be used to determine the most effective and appropriate type and placement of in-field or edge-of-field agricultural BMPs throughout a subwatershed.. Until these analyses are completed, the Implementation Team will use various GIS analyses, data generated from previously completed studies, and practitioner knowledge as well as BMP requirements and siting criteria to target practices. Locations for some drainage practices, for example, can be identified using GIS analysis that selects for annual cropland with slopes of less than 1 percent that are within 500 feet of a drainage system or public water. The Implementation Team will establish consistent protocols for identifying targeted implementation actions to ensure that investments provide the greatest advancement toward goals.

The Sauk River CWMP planning partners have agreed that flexibility in the approach to meet specific goals is more important than implementing each identified action that is identified in the implementation plan.

Potential on-the-ground implementation projects will be selected for funding using a two-tiered system. Tier 1 projects are those that are already identified in the implementation schedule that are consistent with the location, cost, and outcome identified in the plan. Tier 2 projects are those that can achieved the stated goals and outcomes through alternative actions or locations, such as an opportunistic project that is initiated by a municipality or that uses emerging technology. The Implementation Team will develop a process to screen, review, and select projects to receive funding and technical support.

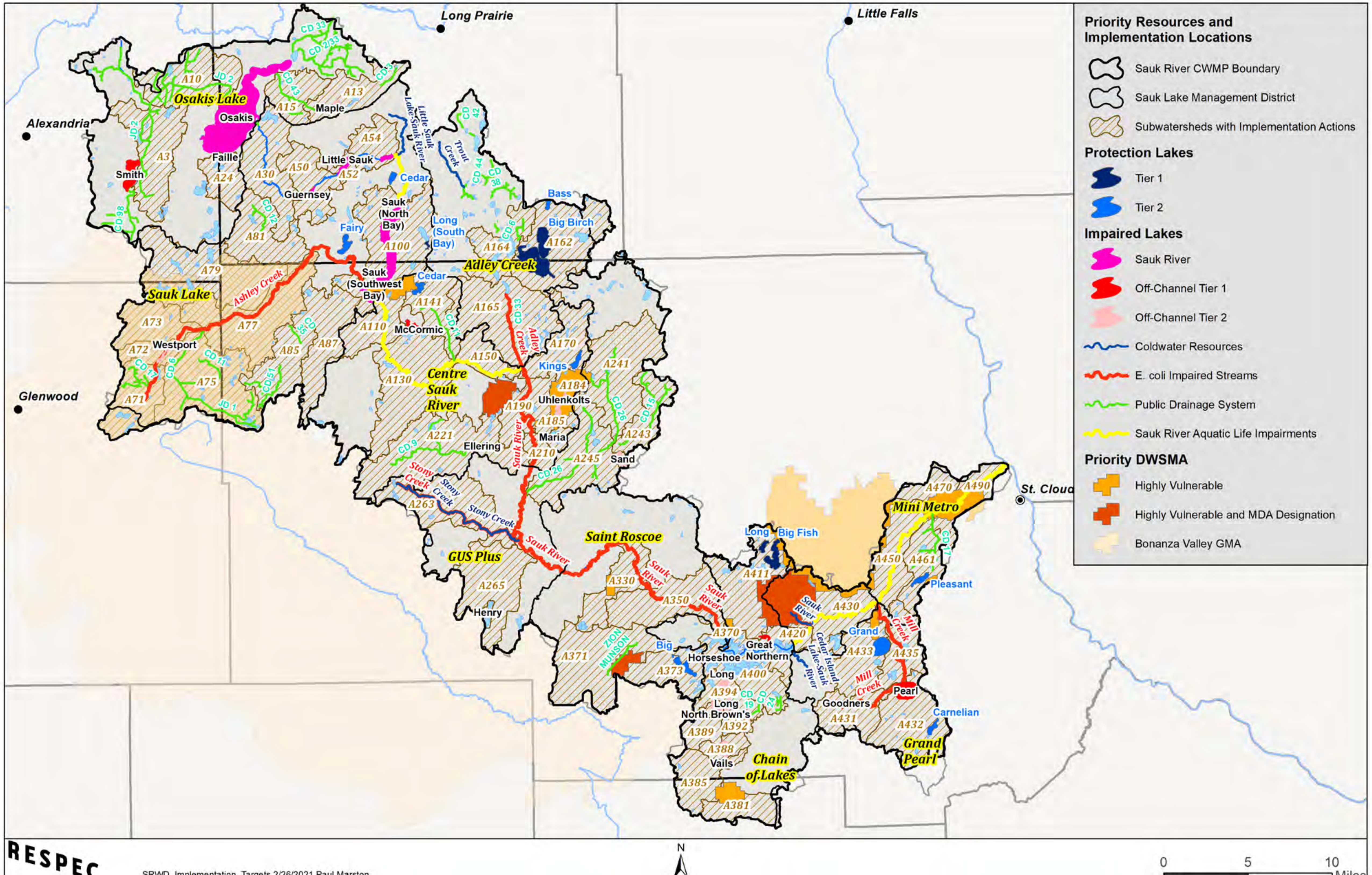


Figure 5-1. Priority Resources and HSPF Subwatersheds with Implementation Actions Identified

Table 5-1. Priority Concerns Addressed by Each Implementation Action and the Relative Impact of the Implementation Action on Each Priority Concern.

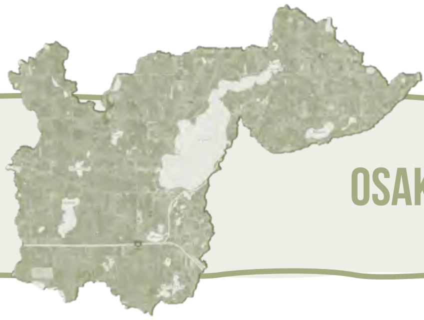
Implementation Action	Altered Hydrology	*E. coli* Impaired Streams	Excess Nutrients and Sediment	Protection of High Quality Resources	Groundwater Availability	Groundwater Quality	Surface Water/ Drinking Water – St. Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
Two-Stage Ditches on Public-Drainage Systems Under the SRWD Drainage Authority	●		●	◑	○		◑		●	◑
Alternative Inlets	◑		●	◑					◑	
Bioretention/Biofiltration	◑		●	○	◑				◑	
Conservation Cover Perennials	○		●	◑	○	○		○	○	
Conservation Crop Rotation	○		●	◑	○	○		○	○	
Conservation Easements	◑		◑	●	○	○	○	●	◑	●
Controlled Tile Drainage	●		●	○					◑	
Cover Crops	◑		●	◑	○	○	○	●	◑	○
Cover Crops in Areas with High Vulnerability	◑		●	◑	○	●	○	●	◑	○
Feedlot Improvements and Manure Storage		●	●	●		●		●	◑	◑
Filter Strips	○	●	●	○		◑			◑	
Grassed Waterway	○	●	●	○		◑			◑	
Infiltration Basin	◑		●	○	◑				◑	
Irrigation Management – Soil Moisture Sensors			◑		●					
Irrigation Water Management			◑		●					
Livestock Exclusion and Alternative Watering		●	●	●		●		●	◑	◑
No Tillage	◑	●	●	◑		○			◑	
Nutrient Management (Implementation)		●	●	●		●			◑	
Nutrient Management Plans		●	●	●		●			◑	

Implementation Action	Altered Hydrology	*E. coli* Impaired Streams	Excess Nutrients and Sediment	Protection of High Quality Resources	Groundwater Availability	Groundwater Quality	Surface Water/ Drinking Water – St. Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
Prescribed Grazing Plans		●	◐	◐		●			◐	
Reduced Tillage	◐	●	●	◐		○			◐	
Septic System Upgrades		●	◐	◐		●				
Shoreline Buffers	●	●	●	●					●	◐
Stormwater Pond	◐	●	●			○			◐	
Stream Bank Stabilization	◐		●						◐	●
WASCOBs	◐		●							
Well Sealing						●				
Wetland Restoration	●		●	◐	◐	◐		●	◐	●

● Primary Benefit

◐ Secondary Benefit

○ Minor Benefit



OSAKIS MANAGEMENT DISTRICT

Osakis Lake is the headwaters of the Sauk River and a fishing and recreation destination (Figure 5-2). The 138-square-mile management district offers some of the greatest habitat opportunity in the SRW but also has significant water quality challenges. The area is relatively flat and mostly agricultural with poorly drained soils. Public-drainage systems are prevalent throughout the management district, which has the most miles of public-drainage systems in the SRW. Many wetlands have been eliminated, and the number of acres and quality of wetlands in those that remain have been impacted because of the drainage systems. Most of the watercourses have been altered, which resulted in streams that have poor habitat.

Osakis Lake is the priority resource in this management district and because it is the headwaters of the Sauk River, the restoration of this lake is important in improving downstream resources. Efforts to restore Osakis Lake focus on reducing phosphorus, particularly dissolved phosphorus, from the Judicial Ditch 2 (JD2) and Faille Lake drainage areas as well as runoff from the city of Osakis and the immediate drainage area surrounding Osakis Lake. Numerous potentially viable projects in the JD2 Watershed can provide multiple benefits for habitat, water quality, and restoring natural hydrology.

The Osakis Management District has the highest percentage of acres in conservation (27 percent) of all of the management districts at a total of 23,705 acres, which is the second highest number of acres. All but 5 percent of these acres are in private conservation. More than 20,000 acres in the Osakis area have been designated by Audubon Minnesota as an IBA.

fact:

Osakis Lake is the headwaters of the Sauk River and has the highest percentage of acres in conservation of all of the management districts.

Osakis

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY

175
More than 175 miles of watercourses have been altered.

55
Miles of public-drainage systems (the most in the SRW)

NUTRIENT AND SEDIMENT IMPAIRMENTS

IMPAIRED LAKES ON THE SAUK RIVER
Osakis-Headwaters of the Sauk River

IMPAIRED LAKES IN THE SAUK RIVER WATERSHED
Smith (Tier 1; see "Priority Impaired Lakes" in Ch. 4)
Maple (Tier 2)

PRIORITY SUBWATERSHEDS (REACHES) TO REDUCE DOWNSTREAM IMPACTS
JD2, also known as Crooked Lake Creek and Fairfield Creek (Reaches 3 and 10)

HABITAT

- Lake Osakis is noted as important habitat for grebes and fish.
- Highest percentage (27 percent) of land in conservation, including CRP as well as several MNDNR wildlife management areas (WMAs) and USFWS waterfowl production areas (WPAs).
- The creeks and rivers lack suitable habitat, which has resulted in biological impairments.

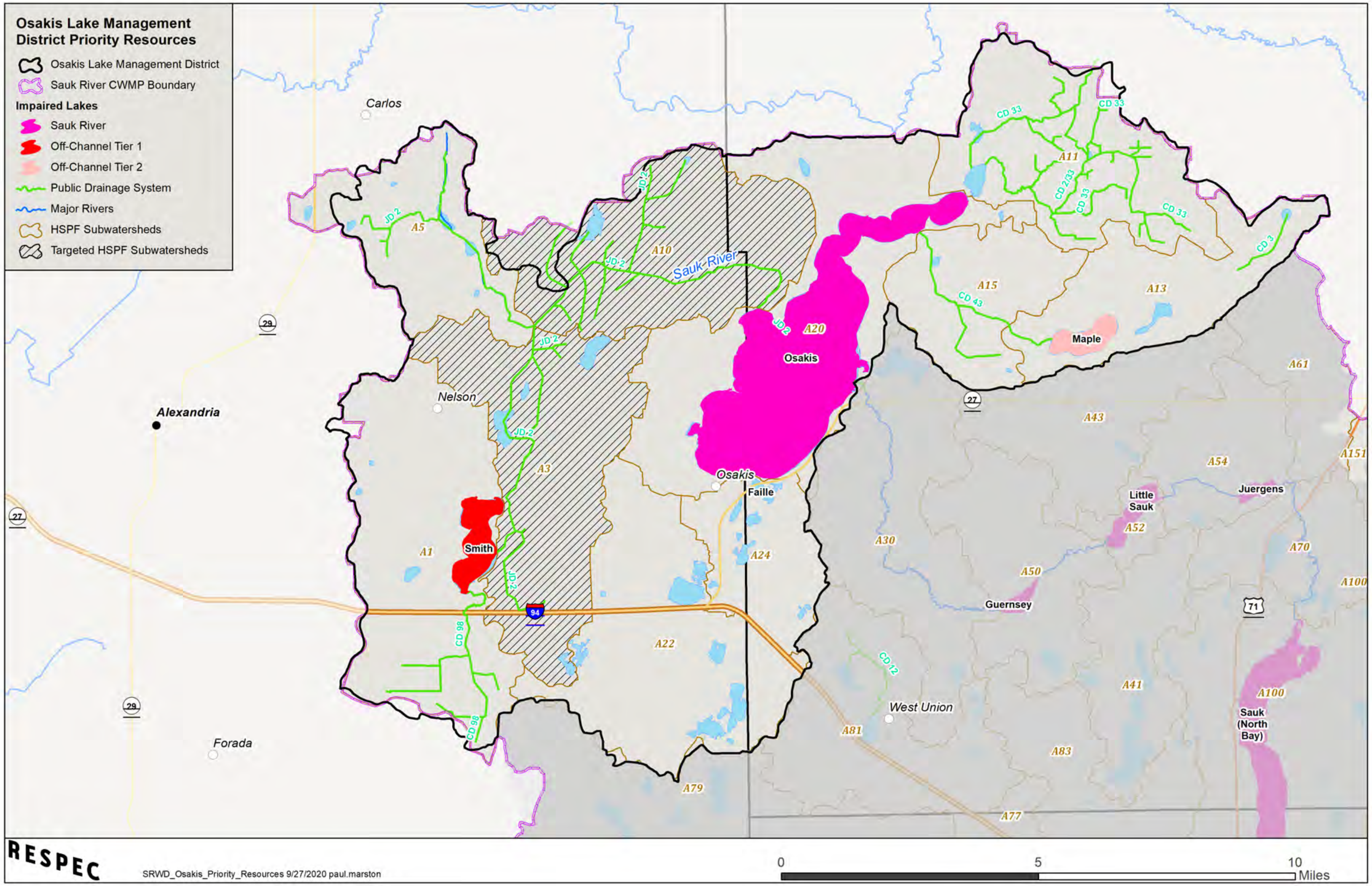


Figure 5-2. Osakis Lake Management District Priority Resources.

Osakis

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

The priority area to target for restoring hydrology is the JD2 drainage area downstream from Smith Lake. Nearly all of the water storage in this area has been eliminated. Table 5-2 summarizes the ditch system length and authority in the Osakis Management District. Restoring wetlands and implementing practices that hold water on the land are key strategies to alleviate flooding, improve water quality, and restore habitat. Priority actions include large-scale capital improvement projects such as restoring Crooked Lake, a shallow lake bed that was drained in the early 1900s. Before Crooked Lake was drained, it provided thousands of acres of critical habitat. The Crooked Lake shallow lake restoration project was deemed a federal priority in 2011 by the USDA under the Mississippi River Basin Initiative (MRBI). This project, that will provide habitat and water quality benefits, is being led by the Douglas SWCD and the SRWD and supported by cooperating partners such as the NRCS, BWSR, Ducks Unlimited, and many other local, state, and federal partners (Tyma, 2011). To date, more than 1,230 acres of easements have been acquired; however, additional easements are necessary to bring this project to full implementation. Other priority capital improvement projects include implementing two-stage ditches, restoring natural channels where possible, and large-scale projects to retrofit tile lines with controlled tile-drainage systems in the JD2 Watershed.

10-Year Measurable Goal

The 10-year water storage goal for the Osakis Lake Management District is to create 1,561 acre-feet of storage to maintain current average discharge volume relative to expected changes in precipitation.

Table 5-2. Osakis Management District Ditch Systems

Ditch Name	Authority	Total System Length (mi)
Douglas CD 98	Douglas County	9.78
Douglas/Todd JD2 (Crooked Lake Creek)	Douglas County	37.29
Todd CD 2/33	Todd County	1.6
Todd CD 3	Todd County	2.1
Todd CD 33	Todd County	2.5
Todd CD 43 (Boss Creek)	Todd County	2

CD = County Ditch; JD = Judicial Ditch.

IMPAIRED LAKES (10-YEAR PLAN GOAL C)

On the Sauk River: Lake Osakis

A fishing and recreation destination lake with more than 6,300 acres of surface area, Osakis Lake is the headwaters of the Sauk River. Slightly more than 45 percent of the lake is shallow enough for aquatic plants that provide habitat to important fisheries as well as important water fowl, such as grebes, allowing them to thrive. This lake has a long residence time, which means that it takes a long time for any pollution to be washed out of the lake. Therefore, the focus should be on reducing pollution coming from the area draining to the lake, particularly from the JD2 subwatershed. The JD2 subwatershed contributes 30 percent of the TP load; the areas that drain directly to the lake, which contribute 23 percent; and the Faille Lake subwatershed, which contributes 17 percent. Restoration modeling completed on the JD2 drainage area indicated that meeting restoration goals with BMPs alone will not result in the reductions necessary. Therefore, larger capital improvement projects, particularly those that reduce orthophosphate loading, must be considered if water quality is to be adequately addressed. Orthophosphate is the type of phosphorous that is most readily available for algae and plants to use for growth. Management strategies and capital improvement projects that should be pursued include Crooked Lake wetland restoration and water-level management, sediment-pond alum treatment or alternative measures to sequester dissolved organic phosphorus, and stormwater treatment practices in the city of Osakis.

In the Watershed: Smith and Maple Lakes

Smith and Maple Lakes are Tier 1 and Tier 2 priority lakes, respectively, that are located in the watershed (i.e., not on the mainstem Sauk River). Key implementation actions for these lakes include reducing sediment and nutrient runoff in the watershed through conservation tillage, cover crops, high-quality buffers, and upgrading septic systems. Runoff from roads and other impervious surfaces should be treated and culverts should be sized and replaced as appropriate. Priority lakes and water quality goals are provided in Table 5-3.

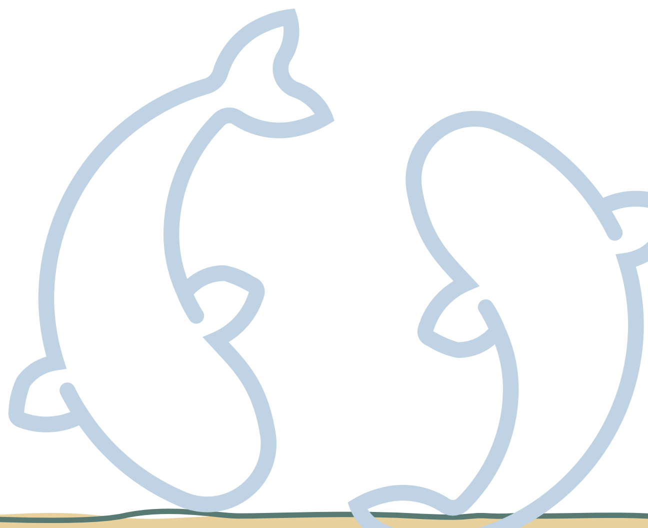
Table 5-3. Priority Lakes and Water Quality Goals

Lake	Lake I.D.	Current TP (µg/l)	TP Standard (µg/l)	10-Year Plan Reduction Goal (lbs/year)	Long Term Load Reduction Goal (lbs/year)	Transparency Trend	Biological Significance Rating
Impaired Lakes							
Osakis	77021500	61	40	429[a]	7,158[a]	No evidence of trend	Outstanding
Smith	21001600	57	40	49[a]	819[a]	Improving trend	NA
Maple	77018100	71	40	76[b]	1,261[b]	Improving trend	NA

µg/l = micrograms per liter.
(a) MPCA and Wenck Associates, Inc. (2013)
(b) MPCA and Wenck Associates, Inc. (2018)

HABITAT (10-YEAR PLAN GOAL J)

The key strategies for addressing habitat in this management district are to expand and enhance current permanent protection areas, restore stream habitat for fish and insects, and restore upland native vegetation. Numerous state WMAs and federal WPAs could be expanded to provide large-habitat complexes, particularly south of the city of Osakis and northeast of Osakis Lake. Expanding the Osakis WMA and managing these wetlands for water quality as well as habitat would provide multiple benefits. Implementing the altered-hydrology and water quality actions mentioned above will improve stream habitat for fish and insects, such as macroinvertebrates. Specific habitat improvement measures will be targeted based on the results of field assessments used to determine the viability for project success.



Osakis Lake Watershed Management District										
On-The-Ground Priority Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
2-Stage Ditch/Ditch Cleaning (10 miles of the Total 37.29-Mile System)	Douglas/Todd Judicial Ditch 2 (Reach A3 and A10 subwatersheds)	Convert 10 miles of existing open ditch to 2-stage ditch			558,624			558,624	Douglas County, Todd County	SRWD, TNC, DNR
Streambank Stabilization	Douglas/Todd Judicial Ditch 2 (Reach A3 and A10 subwatersheds)	Stabilize or restore 1 stream mile of streambank				264,000		264,000	SRWD	TNC, DNR
Alternative Tile Intakes	Douglas/Todd Judicial Ditch 2 (ReachA3 and A10 subwatersheds)	Install alternative tile intakes to treat 200 acres of cropland Reduce TSS load by 801 tons Reduce TP load by 825 lbs	8,000	8,000	8,000	8,000	8,000	40,000	SWCD[1]	Douglas County, Todd County, SRWD
Controlled Tile Drainage	CD 43/Boss Creek (Reach A13 and A15 Subwatersheds)	Install controlled tile drainage to treat 100 acres Reduce TP load by 34 lbs				25,000	25,000	50,000	SWCD[1]	SRWD
Controlled Tile Drainage	Douglas/Todd Judicial Ditch 2 (Reach A3 and A10 subwatersheds)	Install controlled tile drainage to treat 400 acres Reduce TP load by 138 lbs	40,000	40,000	40,000	40,000	40,000	200,000	SWCD[1]	Douglas County, Todd County, SRWD
Wetland Restoration	Crooked Lake Basin Restoration	Create restored wetland(s) to treat 100 acres Reduce TSS load by 354 tons Reduce TP load by 1,701 lbs					500,000	500,000	SRWD	Douglas SWCD, NRCS, DU, MLT, TNC, DNR, USFWS
Conservation Easements	Crooked Lake Basin Restoration	Permanently protect 100 acres of habitat.				250,000		250,000	SRWD	Douglas SWCD, NRCS, DU, MLT, TNC, DNR, USFWS
Wetland Restoration	Faille Lake subwatershed (Reach A24 subwatershed)	Create restored wetland(s) to treat 60 acres Reduce TSS load by 212 tons Reduce TP load by 1,021 lbs				300,000		300,000	SWCD[1]	SRWD, Douglas SWCD, Douglas County, Stearns SWCD, USFWS, TNC
Subtotal			$48,000	$48,000	$606,624	$887,000	$573,000	$2,162,624		
Excess Nutrients and Sediment										
Alternative Side Inlets	CD 43/Boss Creek (Reach A13 and A15 subwatersheds)	Install/replace alternative side inlets to treat 100 acres of cropland Reduce TSS load by 1,001 tons Reduce TP load by 000 lbs				$10,000	$10,000	$20,000	Todd County SWCD	SRWD, TNC
Tile Line Bioreactors	CD 43/Boss Creek (Reach A13 and A15 subwatersheds)	Install tile line bioreactors to treat 100 acres				$8,000	$8,000	$16,000	Douglas SWCD	Douglas County, Drainage Authority
Infiltration Basin	City of Osakis	Construct infiltration basin(s) to treat 40 acres Reduce TSS load by 384 tons Reduce TP load by 1,476 lbs				$368,953		$368,953	SRWD	City of Osakis, SWCD [1]
Stormwater Management Including a New Pond and Enhancing King Street and East Side Stormwater Ponds Performance	City of Osakis	Construct stormwater pond(s) to treat 100 acres Reduce TSS load by 816 tons Reduce TP load by 2,215 lbs			$350,000	$450,000	$450,000	$1,250,000	SRWD	City of Osakis, SWCD [1]

Osakis Lake Watershed Management District										
On-The-Ground Priority Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Riparian Plantings	Priority Lakes (average three 100 ft of shorelines feet per year)	Establish 3,000 linear feet of riparian buffer Reduce TSS load by 8,953 tons Reduce TP load by 3,257 lbs	30,000	30,000	30,000	30,000	30,000	150,000	SWCD(1)	
Alternative Side Inlets	Douglas/Todd Judicial Ditch 2 (Reach A3 and A10 subwatersheds)	Install/replace alternative side inlets to treat 400 acres of cropland Reduce TSS load by 4,006 tons Reduce TP load by 000 lbs	16,000	16,000	16,000	16,000	16,000	80,000	SWCD(1)	TNC, SRWD, NRCS
Tile Line Bioreactors	Douglas/Todd Judicial Ditch 2 (Reach A3 and A10 subwatersheds)	Install tile line bioreactors to treat 200 acres			16,000	16,000		32,000	Douglas SWCD	Douglas County, Drainage Authority
Alum Treatment (or Alternative Method to Sequester Dissolved organic phosphorus)	Douglas/Todd Judicial Ditch 2 (ponds)	Treat the 10-acre sediment pond with alum. Specific nutrient reductions to be determined through feasibility study				1,500,000		1,500,000	SRWD	
Pond Expansion	Douglas/Todd Judicial Ditch 2 (ponds)	Add 6 ac-ft of storage to the JD2 ponds Reductions to be determined			1,600,000			1,600,000	SRWD	
Subtotal			$46,000	$46,000	$2,012,000	$2,398,953	$514,000	$5,016,953		
Habitat										
Native Planting	Along Central Lakes Trail	Plant 100 acres of native vegetation				70,000		70,000	Douglas County	SWCDs
Subtotal						$70,000		$70,000		
Grand Totals			$94,000	$94,000	$2,618,624	$3,335,953	$1,087,000	$7,249,577		

(1) Specific SWCD and County will be determined by implementation location.

SAUK LAKE MANAGEMENT DISTRICT

At nearly 235 square miles, the Sauk Lake Management District is the largest of all of the management districts spanning from the southwestern tip at the headwaters of Ashley Creek in Glenwood Township (Pope County) across portions of Stearns and Douglas Counties in the central region up to the northeast, where the management district captures the run of the Sauk River from the outlet of Lake Osakis to Sauk Lake in Todd County (Figure 5-3). The Ashley Creek drainage area is of primary concern in this management district; where most of the 38 miles of public-drainage systems in the management district are located. The middle portion of the Ashley Creek Watershed is a major source of *E. coli*, nutrients, and sediment that have resulted in poor water quality within the creek as well as impacts to downstream resources, including Sauk Lake-South Bay, which is impaired because of excess nutrients. Hoboken Creek to the south of Sauk Centre is also a major contributor of nutrients and sediment to Sauk Lake-South Bay and downstream resources.

In addition to Sauk Lake, three other lakes along the mainstem of the Sauk River, as well as Westport Lake, which is along Ashley Creek in Pope County, are impaired. Numerous high-water quality lakes, such as Long (77-0149-00), Fairy, and Cedar Lakes (77-0160-00 and 73-0255-00, respectively), also require protection to prevent a decline in lake-water quality.

The Sauk Lake Management District ranks highest of all of the management districts for groundwater availability and quality concerns. The Ashley Creek headwaters area is highly vulnerable to groundwater contamination, has the most irrigation use of anywhere in the SRW, and has been known to experience groundwater-availability issues. This area of concern is referred to as the Bonanza Valley, and the

fact:

The Sauk Lake Management District ranks highest of all of the management districts for groundwater availability and quality concerns.

MNDNR has developed a groundwater management plan to address groundwater availability in this area. The Bonanza Valley area has sandy soils that are heavily irrigated for agricultural productivity. The Bonanza Valley geology allows for high-infiltration rates that can restore groundwater that is used for irrigation; however, care must be taken to prevent groundwater contamination from upland practices. The water quality for private drinking water wells in the Bonanza Valley area is of concern, as is the city of Sauk Centre, because of the interaction between surface water and groundwater.

The Sauk Lake Management District has a relatively well-developed network of federal, state, and private conservation lands in the headwaters region of Ashley Creek as well as in the West Union area. Habitat initiatives should focus on building connections between and expanding core habitat complexes. Other biologically significant resources include Fairy Lake, which has documented significant fish and plants, and Sauk Lake, which has documented significant plants.

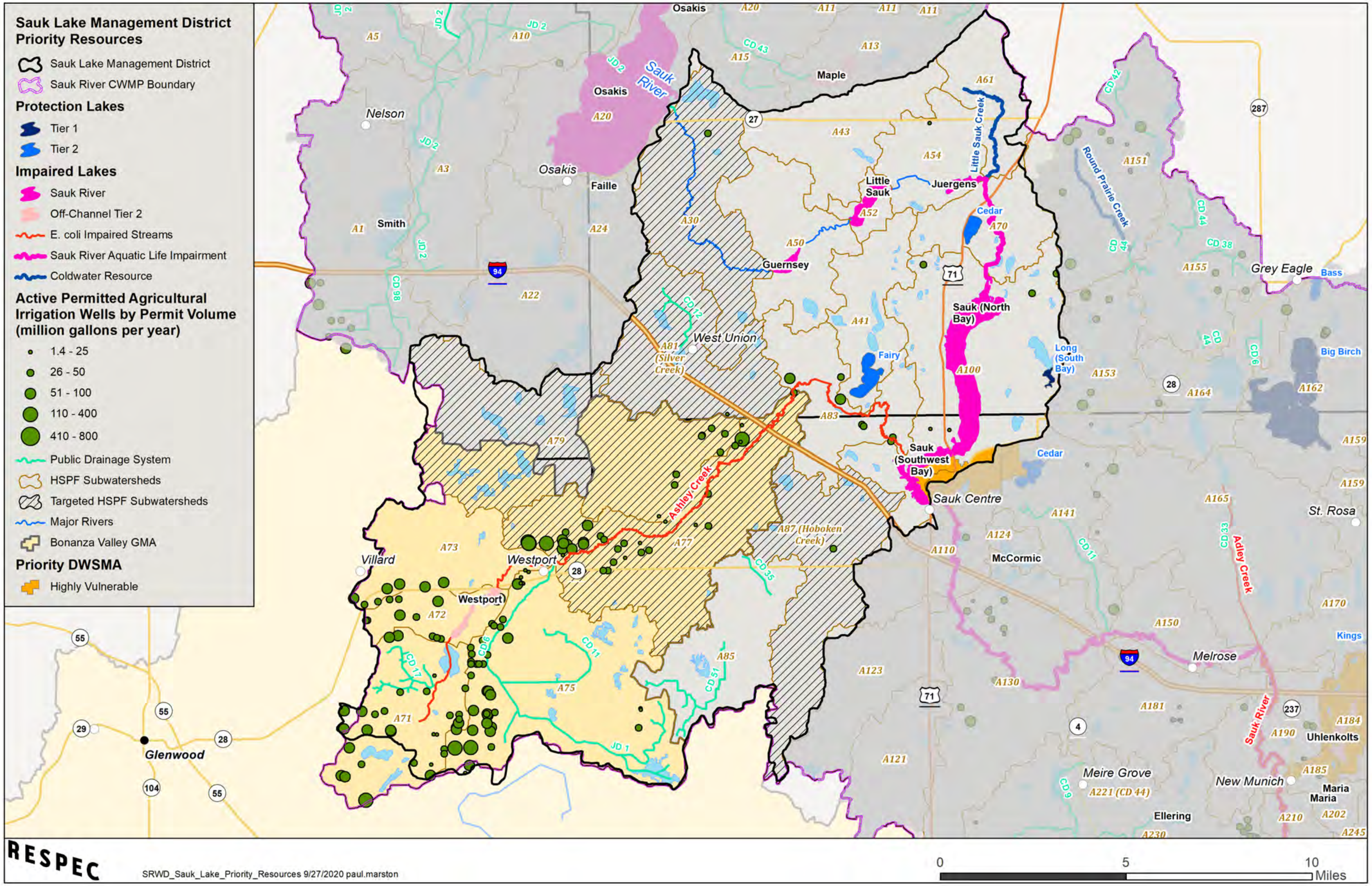


Figure 5-3. Sauk Lake Management District Priority Resources.

at a glance

Sauk Lake

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY

314
Most miles of altered-water courses in the SRW (314 miles).

38
More than 38 miles of public-drainage systems (Second highest in the watershed).

7
Approximately 7 percent of the previously drained wetlands are restorable.

E. COLI IMPAIRED STREAMS

Ashley Creek

NUTRIENT AND SEDIMENT IMPAIRMENTS

IMPAIRED LAKES ON THE SAUK RIVER
Guernsey, Little Sauk, Juergens, Sauk Lake

IMPAIRED LAKES IN THE SAUK RIVER WATERSHED
WestPort (Tier 2; see "Priority Impaired Lakes" in Ch. 4)

PRIORITY SUBWATERSHEDS (REACHES) TO REDUCE DOWNSTREAM IMPACTS
Ashley Creek (Reaches 73, 77 and 79), Silver Creek (part of Ashley Creek Watershed, Reach 81), Hoboken Creek (Reach 87), Sauk River (Reach 30).

PROTECTION LAKES

Long (Tier 1; see "High Water Quality Lakes" in Ch. 4), Fairy (Tier 2), Cedar Lake (Tier 2)

GROUNDWATER AVAILABILITY

- Area of highest concern within the SRW
- Bonanza Valley groundwater management area
- Most agricultural irrigation wells (162) in the SRW

DRINKING WATER QUALITY

- High-groundwater vulnerability in the headwaters of Ashley Creek and areas north of Sauk Lake
- Sauk Centre has very high-groundwater vulnerability because of surface water/groundwater interaction

HABITAT

- Most acres in conservation (26,125 acres) and second most on a percentage basis (23 percent).
- Biologically significant resources include Fairy Lake for fish and plants and Sauk Lake for plants.

Sauk Lake

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

This management district has 314 miles of altered streams and a total of seven CDs and JDs in Pope, Stearns, and Todd Counties. Priority actions are restoring wetlands in the headwaters reaches, particularly in those that have the greatest potential for groundwater recharge and working with drainage authorities to implement drainage-water management projects. Projects that slow the flow rate through the streams, such as controlled tile drainage, and increase storage capacity, such as implementing two-stage ditches, will reduce channel and stream bank erosion.

10-year Measurable Goal

The 10-year water storage goal for the Sauk Lake Management District is to create 4,559 (including upstream storage) acre-feet of storage in order to maintain current average discharge. This includes 2,999 acre-feet storage within this management district.

Ditch Name	Authority	Total System Length (mi)
Pope CD 6	SRWD	8.7
Pope CD 11	SRWD	3
Pope CD 17	Pope County	6.1
Pope/Stearns JD1	SRWD	7.5
Stearns CD 35	Stearns County	1.4
Stearns CD 51	SRWD	7
Todd CD 12	Todd County	6.4

E. coli Impaired Streams (10-Year Plan Goal B)

The Ashley Creek Watershed has 116 feedlots totaling 31,450 AU. The numbers reflect what is registered or allowed as a maximum but does not reflect what is actually stocked. The creek's water quality standard is exceeded during low-flow conditions, which indicates that riparian pastures, particularly those that allow for livestock access to streams, are the main source of *E. coli*.

Restricting livestock access to surface waters and providing an alternative water source for cattle as well as improving pasture management are the most important implementation strategies. Trapping and treating runoff from feedlots and increasing the number of acres using manure management plans will reduce *E. coli* loading, particularly during wet-weather periods.

Waterbody Name	Waterbody Description	Very High-Flow Reduction (%)	High-Flow Reduction (%)	Mid-Flow Reduction (%)	Low-Flow Reduction (%)	Very Low-Flow Reduction (%)	Top Three Sources Causing Impairments
Ashley Creek	Headwaters to Sauk Lake	NA	NA	NA	31	37	1. High use livestock access to streams and riparian areas. 2. Upland pastures with a poor-quality rating (NRCS pasture ranking). 3. Cropland with non-incorporated surface manure or poorly timed manure application.

NA = Not Applicable.

Impaired Lakes (10-Year Plan Goal C)

On the Sauk River: Sauk Lake

Sauk Lake has two major basins, the north and the south, along the mainstem of the Sauk River. The north basin is deep, long, and narrow with the Sauk River as the main tributary. The south basin is shallower with Ashley Creek, Hoboken Creek, and Sauk Lake-North as its main water sources and has poorer-quality water than the north basin. Sauk Lake-North is greatly influenced by the quality of the water coming into the lake from the Sauk River, which accounts for approximately 65 percent of the phosphorus loading to the lake (MPCA, 2013). Therefore, it will be important to address areas that have high erosion rates, exposed soils, and streambank failures by establishing permanent vegetation. Sauk Lake-South receives more than half of its phosphorus load from Ashley Creek (including Silver Creek) and Hoboken Creek, while Sauk Lake-North contributes smaller but still significant loads (MPCA, 2016). Major challenges in this subwatershed are field and gully erosion, runoff from agricultural fields, and riparian pastures that are degraded. The

BMPs listed for altered hydrology and *E. coli* provide the additional benefit of reducing sediment and nutrient loads to the lake. Nearshore reductions are more important for the north basin than the south basin. Nearshore BMPs include shoreline restoration, gully and ravine stabilization, and septic-system upgrades.

Sauk River Channel Lakes: From Osakis Lake to Sauk Lake

The chain of lakes from Osakis Lake to Sauk Lake includes Guernsey, Little Sauk, and Juergens Lakes. As the Sauk River flows from the outlet of Lake Osakis to the inlet at Sauk Lake, TP increases (MPCA, 2012). Indications show that stream bank erosion and field and gully erosion are increasing sediment runoff to the river and causing elevated TP levels. Guernsey and Little Sauk Lakes have curly-leaf pondweed and a large carp biomass, which contribute to internal loading. Addressing these issues will improve water quality along the Sauk River and the stretch of smaller lakes. This chain of lakes is highly influenced by the poor-quality water leaving Lake Osakis and would likely meet state water quality standards if Lake Osakis did as well (Wenck Associates, Inc., 2018).

In the Watershed: Westport Lake

Westport Lake is a Tier 2, shallow lake that has a history of fish kills and a large carp population. Most of the phosphorus loading to this lake is from agricultural sources of watershed runoff. The 2018 TMDL report (Wenck Associates, Inc., 2018) calls for a 40 percent phosphorus reduction (approximately 650 lbs/per year) from the watershed.

PROTECTION LAKES (10-YEAR PLAN GOAL D)

Long, Fairy, and Cedar Lakes are high water quality lakes with Long Lake ranking as one of the top four protection priority lakes. Fairy and Cedar Lakes ranked in the second tier for protection. The key to protecting lakes from degradation is to reduce land use disturbance or land use changes that increase runoff to the lake. Upland conservation easements, forest management plans, and perennial cover are crucial to preventing degradation. Monitoring for shoreline erosion, gullies, or excessive erosion should occur on a regular, multiyear basis. When such issues arise, they should be addressed as quickly as possible to prevent water quality decline.

Lake Name	Lake I.D. Number	Current TP (µg/l)	Standard	10-Year Plan Reduction Goal (lbs/year)	Long Term Load Reduction Goal (lbs/year)	Transparency Trend	Biological Significance Rating
Impaired Lakes							
Guernsey	77018200	68	40	128[a]	2,126[a]	NA	—
Little Sauk	77016400	60	40	167[a]	2,778[a]	NA	—
Juergens	77016300	69	40	178[a]	2,962[a]	NA	—
Sauk	77015002	64	40	1,836[a]	30,599[a]	No evidence of trend	High
Westport	61002900	76	60	39[a]	649[a]	Increasing	—
Protection Lakes							
Long	77014901	20	40	4[b]	81[b]	Increasing	High
Fairy	77015400	21	40	19[b]	377[b]	Increasing	High
Cedar	77016000	13	40	3[b]	60[b]	NA	Moderate

(a) MPCA and Wenck Associates, Inc., (2018)

(b) From 2019 MPCA/MNDNR LPSS Spreadsheet (MNDNR, 2019b) (data through 2018).

GROUNDWATER AVAILABILITY (10-YEAR PLAN GOAL G)

In the Ashley Creek Watershed, 162 high-capacity agricultural irrigation wells have a permitted capacity to irrigate more than 7 billion gallons per year. Most of the irrigation is within the Bonanza Valley groundwater management area. Because groundwater use in the Bonanza Valley area may not be sustainable, the MNDNR developed a groundwater management plan for the area (https://www.dnr.state.mn.us/gwmp/area-bv.html). This plan specifically outlines the measures that the MNDNR will accomplish to assess and maintain adequate groundwater supply for the area. The Sauk River CWMP partners will continue to support the MNDNR in its plan and compliment those efforts by implementing on-the-ground conservation measures to reduce the demand for groundwater consumption and improve groundwater recharge. When necessary, the CWMP partners may provide funding for data collection or monitoring equipment to support the Bonanza Valley groundwater management plan and achieve the CWMP goals (e.g., when additional weather stations are needed to provide more accurate irrigation management scheduling support to local irrigators).

GROUNDWATER QUALITY (10-YEAR PLAN GOAL H)

City of Sauk Centre

The city of Sauk Centre's (the City) groundwater source is highly vulnerable to contamination because of the strong interaction between surface water and groundwater. All available tools will be used to protect the groundwater source, but the primary focus for reducing the contamination risk is to prevent unsuitable land management practices and remove existing threats. Preventative measures include proper siting of suitable land management activities through local land use controls and review of development proposals. Existing threats can be addressed by removing or containing petroleum and chemical storage tanks, converting agricultural land to conservation lands, and implementing emergency preparedness exercises to contain threats in the event of an emergency spill. Because groundwater does not follow the same hydrologic boundaries as surface water, the City's groundwater management area includes portions of Sauk Lake as well as the Centre Sauk Management District. Therefore, these actions should be considered within the entire DWSMA, not just within the City limits or the Sauk Lake Management District.

HABITAT (10-YEAR PLAN GOAL J)

This management district has a relatively well-developed network of federal, state, and private conservation lands in the headwaters region of Ashley Creek, as well as in the West Union area. Habitat initiatives should focus on building connections between and expanding core habitat complexes in Westport and Grove Lake Townships in Pope County; Ashley, Raymond, and Getty Townships in Stearns County; and West Union Township in Todd County.

Relatively few acres of land are in conservation in the riparian and immediately upland areas along the Sauk River from the outlet at Osakis Lake to Sauk Lake. This area may be a new target for conservation easements and stream bank restoration based on the results from the 2008 MPCA biological monitoring (MPCA, 2012), which indicated that stream bank failure is a potential source of sediment that is harming aquatic life.

Other biologically significant resources include Fairy Lake which has documented significant fish and plants, and Sauk Lake, which has documented significant plants. Two low-head dams are on Ashley Creek (MPCA, 2012) that may be barriers to fish movement; however, habitat quality as well as *E. coli* contamination and excess nutrients are most likely more critical stressors to the fish and macroinvertebrates.

Sauk Lake										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
2-Stage Ditches on Public Drainage Systems Under the SRWD Drainage Authority	CD6, CD11, JD1, CD51	Convert 5 miles of existing open ditch to 2-stage ditch			279,312			279,312	SRWD	DNR, Counties, TNC
Controlled Tile Drainage	Ashley Creek (Reach A77 subwatershed)	Install controlled tile drainage to treat 80 acres	8,000	8,000	8,000	8,000	8,000	40,000	SWCD[1]	SRWD
Controlled Tile Drainage	Ashley Creek (Reach A79 subwatershed)	Install controlled tile drainage to treat 80 acres	20,000	20,000				40,000	SWCD[1]	SRWD
Controlled Tile Drainage	Hoboken Creek (Reach A87 subwatershed)	Install controlled tile drainage to treat 80 acres	20,000	20,000				40,000	Stearns SWCD	SRWD
Controlled Tile Drainage	All County and Judicial Drainage Systems within the jurisdiction of the SRWD Drainage Authority	Install controlled tile drainage to treat 80 acres	10,000	10,000	10,000	10,000		40,000	SRWD	County[1], SWCD [1]
Streambank Stabilization	Ashley Creek, Hoboken Creek, Sauk River, and other water courses	Stabilize or restore 0.5 stream mile of streambank	66,000	66,000				132,000	SRWD	TNC, DNR
Streambank Stabilization	Ashley Creek (Reach A77 subwatershed)	Stabilize or restore 0.1 stream mile of streambank	26,400					26,400	SRWD	SWCD, TNC, DNR
Streambank Stabilization	Ashley Creek (Reach A79 subwatershed)	Stabilize or restore 0.1 stream mile of streambank		26,400				26,400	SRWD	SWCD, TNC, DNR
Streambank Stabilization	Hoboken Creek (Reach A87 subwatershed)	Stabilize or restore 0.1 stream mile of streambank		26,400				26,400	SRWD	SWCD, TNC, DNR
Streambank Stabilization	Sauk River - just below Osakis (Reach A30 subwatershed)	Stabilize or restore 0.5 stream mile of streambank	132,000					132,000	SRWD	SWCD, TNC, DNR
Wetland Restoration	Ashley Creek (Reach A77 subwatershed)	Create restored wetland(s) to treat 80 acres Reduce TSS load by 283 tons Reduce TP load by 1,361 lbs	80,000	80,000	80,000	80,000	80,000	400,000	SWCD[1], SRWD	TNC
Wetland Restoration	Ashley Creek (Reach A79 subwatershed)	Create restored wetland(s) to treat 80 acres Reduce TSS load by 283 tons Reduce TP load by 1,361 lbs	80,000	80,000	80,000	80,000	80,000	400,000	SWCD[1], SRWD	TNC
Wetland Restoration	Hoboken Creek (Reach A87 subwatershed)	Create restored wetland(s) to treat 80 acres Reduce TSS load by 283 tons Reduce TP load by 1,361 lbs	80,000	80,000	80,000	80,000	80,000	400,000	Stearns SWCD, SRWD	TNC
Subtotal			$522,400	$416,800	$537,312	$258,000	$248,000	$1,982,512		
E. Coli										
Livestock Exclusion and Alternative Watering	Ashley Creek (Reach A73 subwatershed[2])	Install fencing, provide water, and restrict livestock access along 120 acres of riparian areas	544	544	544	544	544	2,720	Pope SWCD	SRWD
Nutrient Management	Ashley Creek (Reach A73 subwatershed[2])	Implement nutrient management plan w/manure incorporation on 1,200 acres Reduce TP load by 578 lbs	2,640	2,640	2,640	2,640	2,640	13,200	Pope SWCD	SRWD
Nutrient Management Plans	Ashley Creek (Reach A73 subwatershed[2])	Complete four plans	3,400	3,400	3,400	3,400		13,600	Pope SWCD	SRWD

Sauk Lake										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
E. Coli (cont.)										
Feedlot Improvements/Manure Storage	Ashley Creek (Reach A77 subwatershed)	Improve feedlots and manure storage for 1,200 animal units	120,000	120,000	120,000			360,000	SWCD[1]	SRWD, Stearns County, MPCA
Livestock Exclusion and Alternative Watering	Ashley Creek (Reach A77 subwatershed)	Install fencing, provide water, and restrict livestock access along 120 acres of riparian areas	15,000	15,000				30,000	SWCD[1]	SRWD
Nutrient Management	Ashley Creek (Reach A77 subwatershed)	Implement nutrient management plan w/manure incorporation on 1,200 acres Reduce TP load by 98 lbs	36,000	36,000	36,000	36,000	36,000	180,000	SWCD[1]	SRWD, Stearns County
Nutrient Management Plans	Ashley Creek (Reach A77 subwatershed)	Complete four plans	3,400	3,400	3,400	3,400		13,600	SWCD[1]	SRWD
Prescribed Grazing Plans	Ashley Creek (Reach A77 subwatershed)	Complete three prescribed grazing plans	3,500	3,500	3,500			10,500	SWCD[1]	SRWD
Feedlot Improvements/Manure Storage	Ashley Creek (Reach A79 subwatershed)	Improve feedlots and manure storage for 300 animal units	120,000					120,000	SWCD[1]	SRWD, Stearns County
Nutrient Management	Ashley Creek (Reach A79 subwatershed)	Implement nutrient management plan w/manure incorporation on 300 acres Reduce TP load by 24 lbs	9,000	9,000	9,000	9,000	9,000	45,000	SWCD[1]	SRWD
Nutrient Management Plans	Ashley Creek (Reach A79 subwatershed)	Complete one plan	3,400					3,400	SWCD[1]	SRWD, Stearns County
Nutrient Management	Silver Creek (Reach A81 subwatershed)	Implement nutrient management plan w/manure incorporation on 200 acres Reduce TP load by 16 lbs	6,000	6,000	6,000	6,000	6,000	30,000	Todd SWCD	SRWD
Nutrient Management Plans	Silver Creek (Reach A81 subwatershed)	Complete two plans	3,400	3,400				6,800	Todd SWCD	SRWD
Livestock Exclusion and Alternative Watering	Guernsey, Little Sauk, Juergens, Sauk, Wesport; as needed to protect Long, Fairy and Cedar	Provide alternative livestock watering for 300 acres	6,000	6,000				12,000	SWCD[1]	SRWD
Feedlot Improvements/Manure Storage	Hoboken Creek (Reach A87 subwatershed)	Improve feedlots and manure storage for 600 animal units	120,000	120,000				240,000	Stearns SWCD	SRWD, Stearns County
Nutrient Management	Hoboken Creek (Reach A87 subwatershed)	Implement nutrient management plan w/manure incorporation on 600 acres Reduce TP load by 49 lbs	18,000	18,000	18,000	18,000	18,000	90,000	Stearns SWCD	SRWD
Nutrient Management Plans	Hoboken Creek (Reach A87 subwatershed)	Complete 2 plan(s)	3,400		3,400			6,800	SWCD[1]	SRWD
Feedlot Improvements/Manure Storage	Silver Creek (Reach A81 subwatershed)	Improve feedlots and manure storage for 300 animal units		120,000				120,000	Todd SWCD	SRWD
Subtotal			$473,684	$466,884	$205,884	$78,984	$72,184	$1,297,620		
Excess Nutrients and Sediment										
Alternative Inlets	Ashley Creek (Reach A73 subwatershed[2])	Install alternative tile intakes to treat 100 acres of cropland over 10 years Reduce TSS load by 1,763 tons Reduce TP load by 7,604 lbs			682			682	Pope SWCD	SRWD

Sauk Lake											
Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Conservation Crop Rotation	Ashley Creek (Reach A73 subwatershed[2])	Implement conservation crop rotation on 1,000 acres of cropland over 10 years Reduce TSS load by 223 tons Reduce TP load by 990 lbs	77,900	77,900	77,900	77,900	77,900	389,500	Pope SWCD	SRWD
Cover Crops	Ashley Creek (Reach A73 subwatershed[2])	Implement cover crops on 750 acres over 10 years Reduce TSS load by 247 tons Reduce TP load by 709 lbs	20,625	20,625	20,625	20,625	20,625	103,125	Pope SWCD	SRWD
No Tillage	Ashley Creek (Reach A73 subwatershed[2])	Implement no till on 50 acres over 10 years Reduce TSS load by 18 tons Reduce TP load by 112 lbs	4,412	4,412	4,412	4,412	4,412	22,060	Pope SWCD	SRWD
Reduced Tillage	Ashley Creek (Reach A73 subwatershed[2])	Implement reduced tillage on 50 acres over 10 years Reduce TSS load by 11 tons Reduce TP load by 55 lbs	9,004	9,004	9,004	9,004	9,004	45,020	Pope SWCD	SRWD
Alternative Inlets	Ashley Creek (Reach A77 subwatershed)	Install alternative tile intakes to treat 100 acres of cropland Reduce TSS load by 401 tons	10,000	10,000				20,000	SWCD[1]	SRWD
Conservation Cover Perennials	Ashley Creek (Reach A77 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	25,000	50,000	25,000			100,000	SWCD[1]	SRWD
Conservation Crop Rotation	Ashley Creek (Reach A77 subwatershed)	Implement conservation crop rotation on 700 acres of cropland Reduce TSS load by 156 tons Reduce TP load by 131 lbs	25,000	30,000	60,000	70,000	87,650	272,650	SWCD[1]	SRWD
Cover Crops	Ashley Creek (Reach A77 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	SWCD[1]	SRWD, TNC
Filter Strips	Ashley Creek (Reach A77 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	1,400					1,400	SWCD[1]	SRWD
Grassed Waterway	Ashley Creek (Reach A77 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs		3,000				3,000	SWCD[1]	SRWD
No Tillage	Ashley Creek (Reach A77 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	SWCD[1]	SRWD
Reduced Tillage	Ashley Creek (Reach A77 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	SWCD[1]	SRWD
Shoreline Buffers	Ashley Creek (Reach A77 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs	12,500	12,500				25,000	SWCD[1]	SRWD, TNC
WASCOBs	Ashley Creek (Reach A77 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs	40,000	40,000				80,000	SWCD[1]	SRWD

Sauk Lake										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Alternative Inlets	Ashley Creek (Reach A79 subwatershed)	Install alternative tile intakes to treat 100 acres of cropland Reduce TSS load by 401 tons	10,000	10,000				20,000	SWCD[1]	SRWD
Conservation Cover Perennials	Ashley Creek (Reach A79 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	25,000	50,000	25,000			100,000	SWCD[1]	SRWD
Conservation Crop Rotation	Ashley Creek (Reach A79 subwatershed)	Implement conservation crop rotation on 700 acres of cropland Reduce TSS load by 156 tons Reduce TP load by 131 lbs	25,000	30,000	60,000	70,000	87,650	272,650	SWCD[1]	SRWD
Cover Crops	Ashley Creek (Reach A79 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	SWCD[1]	SRWD, TNC
Filter Strips	Ashley Creek (Reach A79 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	1,400					1,400	SWCD[1]	SRWD
Grassed Waterway	Ashley Creek (Reach A79 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs		3,000				3,000	SWCD[1]	SRWD
No Tillage	Ashley Creek (Reach A79 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	SWCD[1]	SRWD
Reduced Tillage	Ashley Creek (Reach A79 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	SWCD[1]	SRWD
Shoreline Buffers	Ashley Creek (Reach A79 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs	12,500	12,500				25,000	SWCD[1]	SRWD, TNC
WASCOBs	Ashley Creek (Reach A79 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs		40,000	40,000			80,000	SWCD[1]	SRWD
WASCOBs	Ashley Creek (Reach A77 and A79 subwatersheds) Hoboken Creek (Reach A87 subwatershed) Sauk River (Reach A30 subwatershed)	Construct WASCOB(s) to treat 70 acres Reduce TSS load by 28 tons Reduce TP load by 37 lbs	9,004	180,123	71,504			260,631	SWCD[1]	SRWD
Reduced Tillage	Ashley Creek (Reach A73 subwatershed)	Create restored wetland(s) to treat 50 acres Reduce TSS load by 011 tons Reduce TP load by 010 lbs	9,004	9,004	9,004	9,004	9,004	45,020	SWCD[1]	SRWD
Infiltration Basin	City of Sauk Centre	Construct infiltration basin(s) to treat 5 acres Reduce TSS load by 48 tons Reduce TP load by 185 lbs		46,119				46,119	SRWD	City of Sauk Centre
Stormwater Pond	City of Sauk Centre	Construct stormwater pond(s) to treat 15 acres Reduce TSS load by 123 tons Reduce TP load by 332 lbs		125,000	62,500			187,500	SRWD	City of Sauk Centre

Sauk Lake										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Alternative Inlets	Hoboken Creek (Reach A87 subwatershed)	Install alternative tile intakes to treat 100 acres of cropland Reduce TSS load by 401 tons	10,000	10,000				20,000	Stearns SWCD	SRWD
Conservation Cover Perennials	Hoboken Creek (Reach A87 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	25,000	50,000	25,000			100,000	Stearns SWCD	SRWD
Conservation Crop Rotation	Hoboken Creek (Reach A87 subwatershed)	Implement conservation crop rotation on 700 acres of cropland Reduce TSS load by 156 tons Reduce TP load by 131 lbs	25,000	30,000	50,000	50,000	50,000	205,000	Stearns SWCD	SRWD
Cover Crops	Hoboken Creek (Reach A87 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	SWCD(1)	SRWD, TNC
Filter Strips	Hoboken Creek (Reach A87 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	1,400					1,400	SWCD(1)	SRWD
Grassed Waterway	Hoboken Creek (Reach A87 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs	3,000					3,000	SWCD(1)	SRWD
No Tillage	Hoboken Creek (Reach A87 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs		15,000	15,000	10,000	10,000	50,000	SWCD(1)	SRWD
Reduced Tillage	Hoboken Creek (Reach A87 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	SWCD(1)	SRWD
Shoreline Buffers	Hoboken Creek (Reach A87 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs	12,500	12,500				25,000	SWCD(1)	SRWD, TNC
WASCOBs	Hoboken Creek (Reach A87 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs	40,000	40,000				80,000	Stearns SWCD	SRWD
Conservation Cover Perennials	Sauk River - just below Osakis (Reach A30 subwatershed)	Implement conservation cover perennials on 50 acres of cropland Reduce TSS load by 21 tons Reduce TP load by 26 lbs	25,000	50,000	25,000			100,000	Todd SWCD	SRWD
Conservation Crop Rotation	Sauk River - just below Osakis (Reach A30 subwatershed)	Implement conservation crop rotation on 300 acres of cropland Reduce TSS load by 67 tons Reduce TP load by 56 lbs	10,000	25,000	25,000	26,850	30,000	116,850	Todd SWCD	SRWD
Cover Crops	Sauk River - just below Osakis (Reach A30 subwatershed)	Implement cover crops on 350 acres Reduce TSS load by 115 tons Reduce TP load by 63 lbs	35,000	35,000	35,000	35,000	35,000	175,000	SWCD(1)	SRWD, TNC
Filter Strips	Sauk River - just below Osakis (Reach A30 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	1,400					1,400	SWCD(1)	SRWD

Sauk Lake											
Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Grassed Waterway	Sauk River - just below Osakis (Reach A30 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs	3,000					3,000	SWCD[1]	SRWD
No Tillage	Sauk River - just below Osakis (Reach A30 subwatershed)	Implement no till on 50 acres Reduce TSS load by 18 tons Reduce TP load by 21 lbs		2,500	5,000	2,500	2,500	12,500	SWCD[1]	SRWD
Reduced Tillage	Sauk River - just below Osakis (Reach A30 subwatershed)	Implement reduced tillage on 50 acres Reduce TSS load by 11 tons Reduce TP load by 10 lbs	1,700	1,700	1,700	1,700	1,700	8,500	SWCD[1]	SRWD
WASCOBs	Sauk River - just below Osakis (Reach A30 subwatershed)	Construct WASCOB(s) to treat 60 acres Reduce TSS load by 24 tons Reduce TP load by 32 lbs	30,000	30,000				60,000	Todd SWCD	SRWD
Shoreline Buffers	Targeted locations on priority lakes Impaired: Guernsey Lake, Little Sauk Lake, Juergens Lake, and Big Sauk Lake Protection: Long, Fairy, and Cedar	Establish 500 linear feet of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs		10,000	15,000			25,000	SWCD[1]	SRWD, Stearns County, TNC
Subtotal			$731,149	$1,265,287	$852,731	$577,395	$615,845	$4,042,407		
Groundwater Availability										
Irrigation Management Soil Moisture Sensors	Bonanza Valley Groundwater Management Area	Install soil moisture sensors on 600 acres of irrigated cropland	2,400	2,400	2,400	2,400	2,400	12,000	Stearns SWCD	Pope SWCD
Irrigation Water Management	Bonanza Valley Groundwater Management Area	Implement irrigation water management on 600 acres of irrigated cropland	24,000	24,000	24,000	24,000	24,000	120,000	Stearns SWCD	Pope SWCD
Subtotal			$26,400	$26,400	$26,400	$26,400	$26,400	$132,000		
Groundwater Quality										
Cover Crops in Areas With High Vulnerability	DWSMA (Sauk Ctr), HEL, Riparian, sensitive soils	Implement cover crops on 100 acres of cropland Reduce TSS load by 33 tons Reduce TP load by 18 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	City of Sauk Centre, SRWD, TNC
Septic System Upgrades	DWSMA (Sauk Ctr), and identified priority lakes and streams	Upgrade 10 septic systems	20,000	20,000	20,000	20,000	20,000	100,000	County[1]	SWCD[1], MPCA
Well Sealing Within DWSMA Boundaries; Wells Just Outside a DWSMA Boundary as Justified	City of Sauk Centre	Seal 10 wells in or near DWSMAs	2,000	2,000	2,000	2,000	2,000	10,000	Stearns SWCD	City of Sauk Centre
Well Sealing-Outside DWSMAs	Identified priority lakes and streams	Seal 10 wells outside DWSMAs	2,000	2,000	2,000	2,000	2,000	10,000	Pope SWCD	Pope County
Subtotal			$34,000	$34,000	$34,000	$34,000	$34,000	$170,000		
Habitat										
Conservation Easements	Ashley Creek (Reach A77 subwatershed)	Permanently protect 100 acres of habitat	125,000			125,000		250,000	SRWD	SWCD[1], TNC
Conservation Easements	Ashley Creek (Reach A79 subwatershed)	Permanently protect 100 acres of habitat		125,000	125,000			250,000	SRWD	SWCD[1], TNC

Sauk Lake										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Time Frame					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Habitat (cont.)										
Conservation Easements	Hoboken Creek (Reach A87 subwatershed)	Permanently protect 100 acres of habitat				125,000	125,000	250,000	SRWD	SRWD, Stearns SWCD, TNC
Subtotal			$125,000	$125,000	$125,000	$250,000	$125,000	$750,000		
Grand Totals:			$1,912,633	$2,334,371	$1,781,327	$1,224,779	$1,121,429	$8,374,539		

(1) Specific SWCD and County will be determined by implementation location.

(2) Reach A73 was added as a priority based on local priority issues.

CENTRE SAUK MANAGEMENT DISTRICT

The 136-square-mile area of the Centre Sauk Management District starts as the Sauk River returns to flow as a river downstream from the Sauk Lake Dam in Sauk Centre (Figure 5-4). The Sauk River flows to the east through another impoundment in Melrose before turning southward through the city of New Munich as it makes its way unimpeded crossing to more management districts before entering the Sauk River Chain of Lakes (SRCOL). The lower portion of this management district includes a creek referred to as CD 44, although portions of the creek are, in fact, CD 9; no CD 44 exists in the Stearns County portion of the SRW. The natural hydrology in this management district has been highly altered with less than 200 miles of altered-water courses and approximately 16 miles of public-drainage systems, as well as the Melrose Dam. The Melrose Dam results in an immediate transition from riverine habitat to lake habitat, has reduced aquatic habitat connectivity, and limits the migration of aquatic species throughout this river stretch.

The Sauk River is impaired for *E. coli* at the point at which Adley Creek enters the Sauk River all the way down to the SRCOL. This management district is the second-highest priority area for addressing the nutrients and sediment in the mainstem of the Sauk River and downstream to the SRCOL. Land use in this management district is highly agricultural and includes developed land use in portions of the city of Sauk Centre, the city of Melrose, and several smaller towns such as New Munich, Greenwald, Saint Rosa, and Meire Grove. Eight lakes are in this management district and most are fairly small (less than 250 acres). Four of the lakes do not meet water quality standards.

Groundwater quality is a major concern for the cities of Sauk Centre, New Munich, and Melrose. The concern for the cities of Sauk Centre and New Munich is because surface water interfaces with groundwater. The city of Melrose groundwater supply is also highly vulnerable and has been designated by the MDA as Nitrate Mitigation Level 2 (refer to Section 8.2.5, *Groundwater Quality,* for more details on this mitigation level).

The acres that are in habitat or conservation in the Centre Sauk Management District are slightly below the average for the SRW on a percentage basis. One habitat feature is the Sauk River WMA, which runs for 4 miles along the Sauk River. This WMA includes more than 700 acres of floodplain and upland habitat and provides multiple benefits, including improving water quality and preserving floodplain functions.

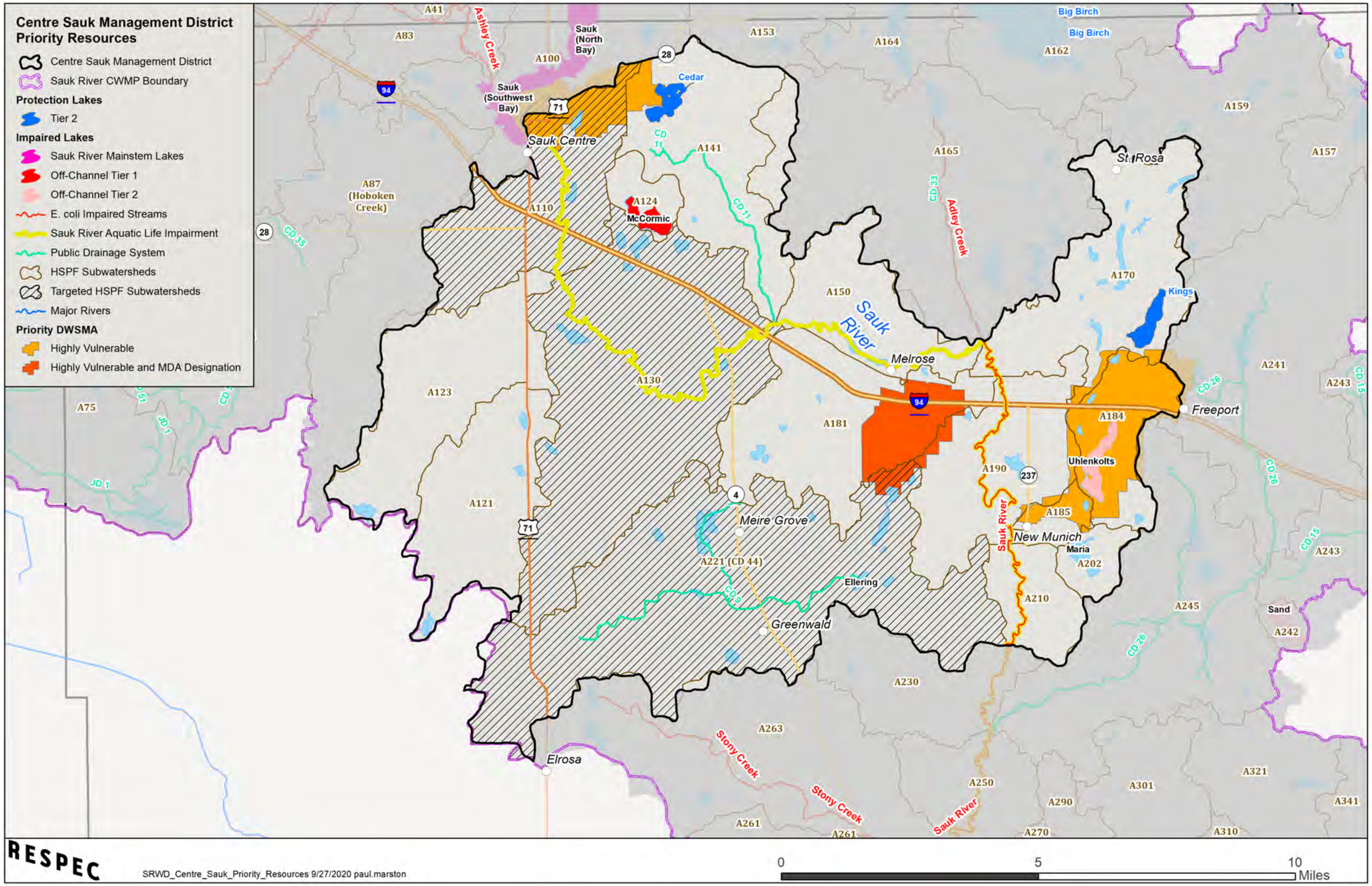


Figure 5-4. Centre Sauk Management District Priority Resources.

Centre Sauk

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY

SAUK RIVER
The Sauk River Dam in Melrose

195
More than 195 miles of watercourses have been altered (third highest in the SRW)

16
16 miles of public drainage systems (fifth highest in the SRW)

7
7 percent of the drained wetlands are deemed restorable in this management district

E. COLI IMPAIRED STREAMS

Sauk River from Adley Creek through the rest of the length of this management district.

NUTRIENT AND SEDIMENT IMPAIRMENTS

IMPAIRED LAKES ON THE SAUK RIVER
McCormic (Tier 1; see "Priority Impaired Lakes" in Ch. 4), Uhlenkolts (Tier 2)

TARGETED SUBWATERSHEDS (REACHES) TO REDUCE DOWNSTREAM IMPACTS
Reach 221 (commonly referred to as CD 44).
Reach 130
Reach 110 (Sauk River Dam to the approximate vicinity of the Sauk Centre Municipal airport).

1ST
This management district ranked first in importance for targeting implementation actions for reducing downstream impacts.

PROTECTION LAKES

- Cedar Lake (east of Sauk Lake) (Tier 2; see "High Water Quality Lakes" in Ch. 4)
- Kings Lake (Tier 2)

GROUNDWATER QUALITY

- New Munich and Sauk Centre have very high groundwater vulnerability because of surface-water/ groundwater interaction.
- Melrose has high groundwater vulnerability and has been designated as a Level 2 mitigation for nitrate contamination by the MDA.

HABITAT

This management district has the sixth-highest percent of land in conservation at slightly more than 16 percent and the third-highest number of acres in conservation at 14,442 acres.

Centre Sauk

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

CD 9 and 11 are major public-drainage systems that are within the subwatershed and are often referred to as the CD 44 subwatershed, which is ranked as one of the highest for contributing excess sediment and nutrients to downstream waters. Greenwald and Meire Grove are in the CD 44/Reach 221 subwatershed and likely have underserved stormwater management facilities.

This management district has 195 miles of altered streams and rivers and 16 miles of county drainage ditches. Priority actions to increase the storage on the landscape and restore natural hydrology will have multiple benefits that improve soil health, provide habitat benefits, and increase groundwater recharge. Innovative approaches for engaging landowners, such as providing agricultural credits for practices that retain water or paying for water storage, may be considered.

10-year Measurable Goal

The 10-year water storage goal for the Centre Sauk Management District is to create 6,132 (including upstream storage) acre-feet of storage to maintain current average discharge. This includes 1,573 acre-feet storage within this management district.

E. COLI IMPAIRED STREAMS (10-YEAR PLAN GOAL B)

The Sauk River is impaired for *E. coli* from the point at which Adley Creek enters the river through the rest of the Centre Sauk Management District until the Sauk River enters the SRCOL. While a TMDL study has not yet been completed on this stretch of the river, it has been designated a priority by the Advisory Committee to leverage the targeted implementation focus on this management district and the immediate impact this management district has to the downstream *E. coli* impairment. Actions to address this impairment will be targeted to management practices that can be implemented within the shoreland district of the Sauk River or tributary.

IMPAIRED LAKES (10-YEAR PLAN GOAL C)

McCormic and Uhlenkolts Lakes are impaired, shallow lakes that are a secondary priority for this management district. A strong understanding of both lakes exists from TMDL studies that were completed for each lake in 2018 (Wenck Associates, Inc., 2018). Both lakes have experienced fish kills in the past, and Uhlenkolts Lake is likely impacted because of the presence of carp. McCormic Lake is used as a walleye-rearing pond by the MNDNR and will only be addressed if the MNDNR proceeds with alternative management planning. Most of the load reduction required to improve the water quality in McCormic Lake is from watershed runoff, whereas internal loading is the largest load reduction needed for Uhlenkolts Lake.

PROTECTION LAKES (10-YEAR PLAN GOAL D)

Cedar and Kings Lakes are Tier 2 protection lakes. Both lakes are approximately 200 acres in size. Cedar Lake is a shallow lake that the MNDNR manages as an aquatic management area and does not have a public access point. Kings Lake is just northwest of the city of Freeport, provides fishing and recreational opportunities, and is surrounded primarily by agricultural land use.

Lake	Lake I.D. Number	Current TP (µg/l)	TP Standard (µg/l)	10-Year Plan Reduction Goal (lbs/year)	Long Term Load Reduction Goal (lbs/year)	Transparency Trend	Biological Significance Rating
Impaired Lakes							
McCormic	73027300	86	60	21[a]	346[a]	No evidence of trend	—
Uhlenkolts	73020800	371	40	132[a]	2,206[a]	NA	—
Protection Lakes							
Cedar	73025500	36	60	6[b]	100[b]	NA	—
Kings	73023300	29	40	8[b]	152[b]	Declining	—

(a) MPCA and Wenck Associates, Inc. (2018)

(b) From 2019 MPCA/MNDNR LPSS Spreadsheet (MNDNR, 2019b) (data through 2018).

GROUNDWATER QUALITY (10-YEAR PLAN GOAL H)

City of Sauk Centre: See Chapter 5, *Sauk Lake Management District* Section.

City of Melrose: The MDA has assigned the city of Melrose a Level 2 mitigation, which means that at least one of the city wells has had nitrate levels at or above 8.0 ppm at any time in the last 10 years. Because of this designation, the MDA will form a local advisory team to develop a monitoring, outreach, and implementation plan to address nitrate contamination. The city of Melrose is also rated as having highly vulnerable groundwater. Reducing the threat of additional contamination will rely on leveraging all of the tools but will primarily be accomplished by converting land uses to those that pose the least threat, including converting agricultural land within the wellhead protection area to conservation lands, reducing nitrogen fertilizer use, and implementing nitrogen fertilizer BMPs in agricultural and urban areas.

City of New Munich:
The city of New Munich's groundwater source is rated as very highly vulnerable. Actions should be taken to reduce the risks associated with unsuitable land management practices. These actions include converting agricultural land to conservation lands, increasing the number of acres covered by manure management plans, reducing nitrogen fertilizer use, and implementing nitrogen management BMPs.

HABITAT (10-YEAR PLAN GOAL J)

The floodplains along the Sauk River throughout the Centre Sauk and downstream management districts provide opportunities to implement conservation projects that obtain multiple benefits, including mitigating altered hydrology and reducing channel and stream bank erosion while providing excellent habitat.

Watershed Partners in Action!

The Sauk River Bottom Whitetails and Wildlife Partnership is a local grassroots organization to promote wildlife habitat in the Sauk River corridor. Believing that a better hunting experience could be had, a group of neighbors banded together approximately 10 years ago to better manage their deer herd and improve the habitat in the area. Word has continued to spread along the Sauk River, and many landowners have begun to improve habitat to benefit not only deer but many non-game and pollinator species.

The partnership currently works to restore native ecosystems, protect water quality, and connect family and friends with the outdoors. By seeing firsthand the enhanced hunting opportunities, many landowners in the area have realized the benefits of maintaining high-quality wildlife habitat. Improved farming practices have gone hand-in-hand with this effort as productive lands are seen as extensions of the adjacent habitat. Families are finding renewed interest in spending time together outdoors thanks to these efforts.

Stemming from the success of this group of private landowners, a coalition of nonprofit organizations and state and local agencies came together to promote habitat and water quality BMPs. This partnership has used more than $7 million in state funding for permanent protection and restoration of these sensitive and environmentally beneficial areas.

Area landowners, agency staff, and members of the Sauk River Bottom Whitetails and Wildlife Partnership are continuing to grow these efforts by developing a working lands program that combines agriculture, wildlife habitat, and improvement of water quality for all to enjoy.

Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe: Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)	Estimated Cost	Lead LGU	Supporting Entities
Centre Sauk										
Altered Hydrology										
Controlled Tile Drainage	Sauk River (Reach A110 subwatershed)	Install controlled tile drainage to treat 40 acres Reduce TP load by 14 lbs				20,000		20,000	Stearns SWCD	
Controlled Tile Drainage	Sauk River (Reach A130 subwatershed)	Install controlled tile drainage to treat 80 acres Reduce TP load by 28 lbs	20,000	20,000				40,000	Stearns SWCD	
Controlled Tile Drainage	CD 44 (Reach A221 subwatershed)	Install controlled tile drainage to treat 80 acres Reduce TP load by 28 lbs	20,000	20,000				40,000	Stearns SWCD	
Controlled Tile Drainage	Stearns County Ditch 11 (Reach A221 subwatershed)	Install controlled tile drainage to treat 80 acres Reduce TP load by 28 lbs	20,000	20,000				40,000	SRWD	SWCD
Controlled Tile Drainage	Stearns County Ditch 9 (Reach A141 subwatershed)	Install controlled tile drainage to treat 80 acres Reduce TP load by 28 lbs	20,000	20,000				40,000	SRWD	SWCD
Streambank Stabilization	Sauk River (Reach A130 subwatershed)	Stabilize or restore 0.1 stream mile of streambank	26,400					26,400	SRWD	TNC, SWCD, DNR
Streambank Stabilization	Sauk River (Reach A150 subwatershed)	Stabilize or restore 0.1 stream mile of streambank	26,400					26,400	SRWD	TNC, SWCD, DNR
Streambank Stabilization	CD 44 (Reach A221 subwatershed)	Stabilize or restore 0.1 stream mile of streambank	26,400					26,400	SRWD	TNC, SWCD, DNR
Streambank Stabilization	CD 44 (Reach A221 subwatershed), Sauk River between Adley and Getchell and other priority Streams	Stabilize or restore 0.67 stream mile of streambank		176,880				176,880	SRWD	TNC, SWCD, DNR
Wetland Restoration	Sauk River (Reach A110 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs	200,000					200,000	Stearns SWCD, SRWD	TNC
Wetland Restoration	Sauk River (Reach A130 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs	100,000	100,000				200,000	Stearns SWCD, SRWD	TNC
Wetland Restoration	CD 44 (Reach A221 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs	200,000					200,000	Stearns SWCD, SRWD	TNC
Subwatershed			$659,200	$356,880	$0	$20,000	$0	$1,036,080		
E. Coli										
Feedlot Improvements/ Manure Storage	CD 44 (Reach A221 subwatershed)	Improve feedlots and manure storage for 2,400 animal units		288,000				288,000	Stearns SWCD	
Nutrient Management	CD 44 (Reach A221 subwatershed)	Implement nutrient management plan with manure incorporation on 900 acres Reduce TP load by 73 lbs	27,000	27,000	27,000	27,000	27,000	135,000	Stearns SWCD	Stearns County
Nutrient Management Plans	CD 44 (Reach A221 subwatershed)	Complete three plan(s)	3,400	6,800				10,200	Stearns SWCD	
Subwatershed			$30,400	$321,800	$27,000	$27,000	$27,000	$433,200		

Centre Sauk											
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment										
Alternative Tile Intakes	Sauk River (Reach A110 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs	16,000					16,000	Stearns SWCD	
Alternative Tile Intakes	Sauk River (Reach A130 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs	16,000					16,000	Stearns SWCD	
Alternative Tile Intakes	CD 44 (Reach A221 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs	16,000					16,000	Stearns SWCD	
Conservation Cover Perennials	Sauk River (Reach A110 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	50,000	50,000				100,000	Stearns SWCD	
Conservation Cover Perennials	Sauk River (Reach A130 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	50,000	50,000				100,000	Stearns SWCD	
Conservation Cover Perennials	CD 44 (Reach A221 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	50,000	50,000				100,000	Stearns SWCD	
Conservation Crop Rotation	Sauk River (Reach A110 subwatershed)	Implement conservation crop rotation on 2,000 acres of cropland Reduce TSS load by 445 tons Reduce TP load by 375 lbs	155,800	155,800	155,800	155,800	155,800	779,000	Stearns SWCD	
Conservation Crop Rotation	Sauk River (Reach A130 subwatershed)	Implement conservation crop rotation on 2,000 acres of cropland Reduce TSS load by 445 tons Reduce TP load by 375 lbs	155,800	155,800	155,800	155,800	155,800	779,000	Stearns SWCD	
Conservation Crop Rotation	CD 44 (Reach A221 subwatershed)	Implement conservation crop rotation on 2,000 acres of cropland Reduce TSS load by 445 tons Reduce TP load by 375 lbs	155,800	155,800	155,800	155,800	155,800	779,000	Stearns SWCD	
Cover Crops	Sauk River (Reach A110 subwatershed)	Implement cover crops on 250 acres Reduce TSS load by 82 tons Reduce TP load by 45 lbs	25,000	25,000	25,000	25,000	25,000	125,000	Stearns SWCD	TNC
Cover Crops	Sauk River (Reach A130 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	Stearns SWCD	
Cover Crops	CD 44 (Reach A221 subwatershed)	Implement cover crops on 750 acres Reduce TSS load by 247 tons Reduce TP load by 136 lbs	75,000	75,000	75,000	75,000	75,000	375,000	Stearns SWCD	TNC
Create Nutrient Management Plans (Including Manure Management)	Sauk River (Reach A110 subwatershed)	Complete three plan(s)	3,400	6,800				10,200	Stearns SWCD	Stearns County
Create Nutrient Management Plans (Including Manure Management)	Sauk River (Reach A130 subwatershed)	Complete three plan(s)	3,400	6,800				10,200	Stearns SWCD	
Create Nutrient Management Plans (Including Manure Management)	CD 44 (Reach A221 subwatershed)	Complete twelve plan(s)	10,200	10,200	6,800	6,800	6,800	40,800	Stearns SWCD	Stearns County

Centre Sauk										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Filter Strips	Sauk River (Reach A110 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	1,400					1,400	Stearns SWCD	
Filter Strips	Sauk River (Reach A130 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	1,400					1,400	Stearns SWCD	
Filter Strips	CD 44 (Reach A221 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	1,400					1,400	Stearns SWCD	
Grassed Waterway	CD 44 (Reach A221 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs		3,000				3,000	Stearns SWCD	
No Tillage	Sauk River (Reach A110 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
No Tillage	Sauk River (Reach A130 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
No Tillage	CD 44 (Reach A221 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
Reduced Tillage	Sauk River (Reach A110 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
Reduced Tillage	Sauk River (Reach A130 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
Reduced Tillage	CD 44 (Reach A221 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
Riparian Buffers	Sauk River (Reach A110 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs	12,500	12,500				25,000	Stearns SWCD	TNC
Riparian Buffers	Sauk River (Reach A130 subwatershed)	Establish 500 linear ft of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs	12,500	12,500				25,000	Stearns SWCD	TNC
Riparian Buffers	CD 44 (Reach A221 subwatershed)	Establish 500 ft feet of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs	12,500	12,500				25,000	Stearns SWCD	TNC
WASCOBs	Sauk River (Reach A110 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs	40,000					40,000	Stearns SWCD	

Centre Sauk

Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)	Estimated Cost	Lead LGU	Supporting Entities
Excess Nutrients and Sediment (cont.)										
WASCOBs	Sauk River (Reach A130 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs	40,000					40,000	Stearns SWCD	
WASCOBs	CD 44 (Reach A221 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs	40,000					40,000	Stearns SWCD	
Stormwater Pond	Cities of Sauk Centre, Melrose and New Munich	Construct stormwater pond(s) to treat 35 acres Reduce TSS load by 286 tons Reduce TP load by 775 lbs	125,000	250,000	3,793			378,793	SRWD	
Culvert and Storage Improvements for Flood and Stormwater Management in Greenwald (3rd Street; Highway 4)	Greenwald	Construct stormwater pond(s) to treat 40 acres Reduce TSS load by 326 tons Reduce TP load by 886 lbs		155,433				155,433	SRWD	
Filtration/Infiltration Basins	Greenwald near Cty Rd 13	Construct infiltration basin(s) to treat 40 acres Reduce TSS load by 384 tons Reduce TP load by 1,476 lbs		113,588				113,588	SRWD	
Filtration/Infiltration Basins	Melrose, North edge of City	Construct infiltration basin(s) to treat 10 acres Reduce TSS load by 96 tons Reduce TP load by 369 lbs		38,775				38,775	SRWD	
Filtration/ Infiltration Basins	New Munich South portion of City	Construct infiltration basin(s) to treat 30 acres Reduce TSS load by 288 tons Reduce TP load by 1,107 lbs	98,997					98,997	SRWD	
Infiltration Basin	Cities of Sauk Centre, Melrose, and New Munich	Construct infiltration basin(s) to treat 5 acres Reduce TSS load by 48 tons Reduce TP load by 185 lbs	46,119					46,119	SRWD	
Stormwater Management in Meire Grove, Target Locations for Regional Ponds South and East of Town, South of CR13	Meire Grove	Construct stormwater pond(s) to treat 80 acres Reduce TSS load by 653 tons Reduce TP load by 1,772 lbs		369,277				369,277	SRWD	
Sediment Forebay at Commercial Development site in Melrose	Melrose	Construct stormwater pond(s) to treat 5 acres Reduce TSS load by 41 tons Reduce TP load by 111 lbs	25,432					25,432	SRWD	
Sediment Forebay to Existing Wetland North of Town	St. Rosa	Construct stormwater pond(s) to treat 1 forebay Reduce TSS load by 8 tons Reduce TP load by 22 lbs				143,696		143,696	SRWD	
Regional Pond	Greenwald near intersection of Hwy 4 and Cty Rd 13	Construct stormwater pond(s) to treat 40 acres Reduce TSS load by 326 tons Reduce TP load by 886 lbs	101,500					101,500	SRWD	
Regional Ponds	St. Rosa North and South of Town	Construct stormwater pond(s) to treat 2 ponds Reduce TSS load by 16 tons Reduce TP load by 44 lbs					140,000	140,000	SRWD	
Subtotal			$1,441,548	$1,809,173	$678,393	$818,296	$814,600	$5,562,010		

Centre Sauk										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Groundwater Quality										
Conservation Cover Perennials	Melrose DWSMA	Implement conservation cover perennials or rotational grazing on 100 acres of areas with high vulnerability Reduce TSS load by 43 tons Reduce TP load by 53 lbs	25,000	25,000				50,000	Stearns SWCD	MDA
Conservation Easements - Groundwater	Melrose DWSMA	Permanently protect 40 acres of habitat in areas of high vulnerability.	80,000	80,000				160,000	SRWD	Stearns SWCD, TNC, MDA
Conservation Easements - Groundwater	New Munich DWSMA	Permanently protect 40 acres of habitat in areas of high vulnerability.		80,000	80,000			160,000	SRWD	Stearns SWCD, TNC
Cover Crops	Melrose DWSMA	Implement cover crops on 200 acres Reduce TSS load by 66 tons Reduce TP load by 36 lbs	20,000	20,000	20,000	20,000	20,000	100,000	Stearns SWCD	TNC, MDA
Create Nutrient Management Plans (Including Manure Management)	Melrose DWSMA	Complete two plan(s)	18,000	18,000				36,000	Stearns SWCD	MDA
Nutrient Management	Melrose DWSMA	Implement nutrient management plan w/manure incorporation on 600 acres Reduce TP load by 49 lbs	$1,800	$1,800	$1,800	$1,800	$1,800	$9,000	Stearns SWCD	MDA
Irrigation Water Management	All DWSMAs	Implement irrigation water management on 200 acres of irrigated cropland	800	800	800	800	800	4,000	Stearns SWCD	MDA
Well Sealing	All DWSMAs	Seal five wells	1,000	1,000	1,000	1,000	1,000	5,000	Stearns SWCD	MDA
Wetland Restoration (E. of New Munich)	New Munich DWSMA	Create restored wetland(s) to treat 40 acres Reduce TSS load by 088 tons Reduce TP load by 493 lbs		200,000				200,000	Stearns SWCD, SRWD	TNC
Septic System Upgrades	DWSMAs (esp. Sauk Centre, Meire Grove, Melrose, New Munich), identified priority lakes and streams	Upgrade ten septic systems	20,000	20,000	20,000	20,000	20,000	100,000	Stearns County	Stearns SWCD, MPCA
Subtotal			$166,600	$446,600	$123,600	$43,600	$43,600	$824,000		
Habitat										
Forest Stand Improvement	Sauk Mainstem within ½ mile	Complete four forestry management plans			12,676			12,676	Stearns SWCD	
Habitat Enhancement	Sauk River WMA	Plant 200 acres of native vegetation	28,000	28,000	28,000	28,000	28,000	140,000	Stearns SWCD	TNC, DNR
Conservation Easements - Habitat	Sauk Mainstem	Permanently protect 500 acres of habitat.	250,000	250,000	250,000	250,000	250,000	1,250,000	SRWD	Stearns SWCD, TNC
Wetland Restoration	Sauk Mainstem within ½ mile	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs				34,696		34,696	Stearns SWCD, SRWD	TNC
Subtotal			$278,000	$278,000	$290,676	$312,696	$278,000	$1,437,372		
Grand Totals:			$2,575,748	$3,212,453	$1,119,669	$1,221,592	$1,163,200	$9,292,662		

(1) Specific SWCD and County will be determined by implementation location.

ADLEY CREEK MANAGEMENT DISTRICT

The Adley Creek Management District is 93 square miles (Figure 5-5). The management district's northern portion contains some of the highest-quality natural resources in the SRW. Because of the extensive forests in the northern region, the Adley Creek Management District has more forest cover than any other management district. Hallmark resources in the northern portion include the Big Birch State Forest, Grey Eagle WMA, and Trout Creek, all of which are protection priorities for the Sauk River CWMP. The Adley Creek Management District has a relatively low year-round population with only a portion of the town of Grey Eagle within its boundaries, but the high-quality lakes of Little Birch and Big Birch draw concentrated development and increased population for the area.

Adley Creek Management District is named for Adley Creek, the largest tributary in the management district, which discharges into the Sauk River just below Melrose. The lower one-third of this management district is in Stearns County. This area is more agricultural than forested, and Adley Creek is impaired by *E. coli* from Sylvia Lake to the mouth of the creek at the Sauk River.

fact:

The northern portion of Adley Creek Management District contains some of the highest-quality natural resources in the SRW.

at a glance

Adley Creek

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY	**88** Nearly 88 miles of watercourses have been altered (seventh-highest out of ten districts in the SRW).	**38.1** 38.1 miles of drainage systems (third-highest in the SRW).	**6** 6 percent restorable wetlands.

E. COLI IMPAIRED STREAMS

Adley Creek from Sylvia Lake to the Sauk River.

NUTRIENT AND SEDIMENT IMPAIRMENTS

PRIORITY SUBWATERSHEDS (REACHES) TO REDUCE DOWNSTREAM IMPACTS

- Reach 165

PROTECTION LAKES

- Big Birch

DRINKING WATER QUALITY

Much of the management district has high vulnerability, especially in the northern portion; however, no wellhead protection areas have high vulnerability.

HABITAT

- Second-highest percentage of land in conservation at 23 percent with slightly more than 13,000 acres (fourth-highest of all ten management districts).
- Big Birch State Forest – one of the smallest in the state; 1,400-acre Grey Eagle WMA.
- This area is ranked highest by TNC fish and wildlife scoring for the Sauk River Watershed.
- Round Prairie Creek (Trout Creek, 3.72 miles).

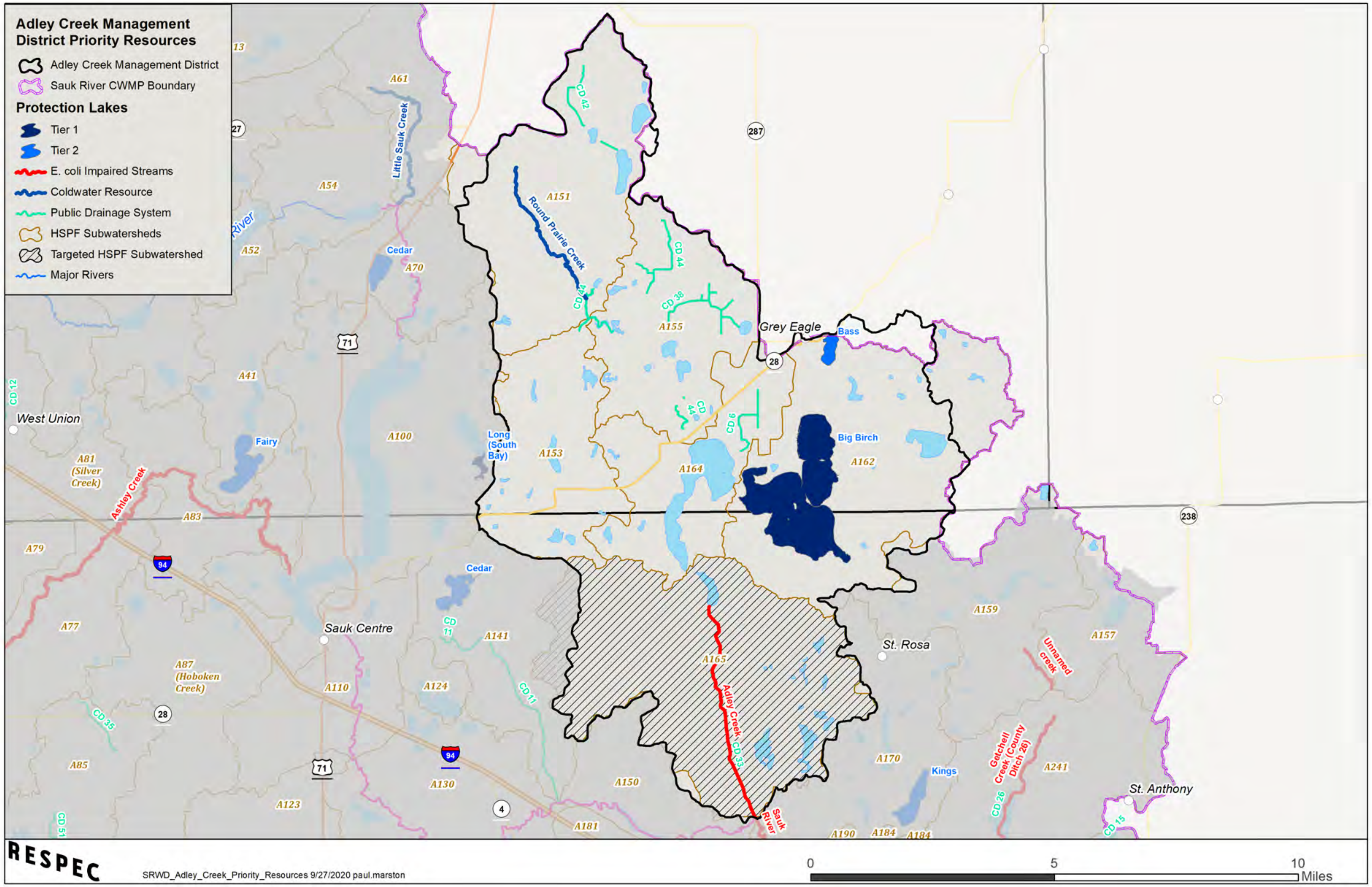


Figure 5-5. Adley Creek Management Area Priority Resources.

Adley Creek

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

The Adley Creek Management District has two district geographical areas served by drainage systems. The northern portion is located upstream of Little Birch and Big Birch Lakes, and the lower portion, CD 33, begins at the Lake Sylvia outlet and extends to the Sauk River. The primary objective for the northern portion is protecting high water quality lakes. Because of this goal, restoring the natural drainage of the area, especially in underused drainage systems, should be given consideration. Priority implementation actions in the northern area are those that will increase the water storage on the landscape and restore natural-stream function. The lower portion of Adley Creek is also CD 33. This area is highly agricultural and the drainage systems have an important functional role in maintaining agricultural productivity. Priority actions here are to reduce the volume of water entering the ditch by retaining water through wetland restoration, as well as slow down the rate at which water is discharged to CD 33 through drainage-water management practices.

10-year Measurable Goal

The 10-year water storage goal for the Adley Creek Management District is to create 1,397 acre-feet of storage to maintain current average discharge.

Ditch Name	Authority	Total System Length (mi)
Stearns CD 33	Stearns County	4.9
Todd CD 6	Todd County	5.6
Todd CD 38	Todd County	18.1
Todd CD 42	Todd County	3.6
Todd CD 44	Todd County	5.9

E. COLI (10-YEAR PLAN GOAL B)

The Adley Creek Watershed has 66 feedlots totaling 9,772 AU, and more than two-thirds of those AU are within 500 feet of the creek (MPCA, 2012). These numbers reflect what is registered or allowed as a maximum but does not reflect what is actually stocked. Restricting livestock access to surface waters and providing an alternative water source for cattle as well as improving pasture management are the most important implementation strategies. Trapping and treating runoff from feedlots with manure storage facility upgrades that include clean water diversions and filter strips, as well as increasing the number of acres implementing manure management plans, are priority practices.

Waterbody Name	Waterbody Description	Very High-Flow Reduction (%)	High-Flow Reduction (%)	Mid-Flow Reduction (%)	Low-Flow Reduction (%)	Very Low-Flow Reduction (%)	Top Two Sources Causing Impairments
Adley Creek	Sylvia Lake to Sauk River	N/A	N/A	26	67	N/A	1. Pasture near streams or waterways 2. Cropland with surface-applied manure

PROTECTION LAKES (10-YEAR PLAN GOAL D)

Big Birch Lake

Big Birch Lake has some of the highest water quality of lakes in the SRW. While the shoreland area is highly developed, forested areas in the Big Birch Lake Watershed provide protection against increased watershed runoff to the lake. Maintaining existing native and forested land cover is of primary importance to this lake. Therefore, implementation efforts should be focused on private forest management as well as zoning controls that limit development or adverse land use changes. Zebra mussels have been found in this lake, which should prompt additional AIS monitoring and prevention to limit the spread of zebra mussels and assess the potential long-term impacts of this AIS to water quality.

Lake	Lake I.D. Number	Current TP (µg/l)	TP Standard (µg/l)	10-Year Plan Reduction[a] Goal (lbs/year)	Long Term Load Reduction Goal[a] (lbs/year)	Transparency Trend	Biological Significance Rating
				Protection Lakes			
Big Birch	77008402	27	40	79	1,354	No evidence of trend	Outstanding

(a) From 2019 MPCA/MNDNR LPSS Spreadsheet (MNDNR, 2019b) (data through 2018).

GROUNDWATER QUALITY (10-YEAR PLAN GOAL H)

While no community or public water supplies exist in this management district, most of the area, particularly the northern portion of the management district, is highly vulnerable to groundwater contamination. Education and outreach efforts should focus on routinely testing private wells. Siting for facilities such as petroleum or chemical storage tanks should be carefully reviewed and include mitigation and emergency management plans to reduce risk.

HABITAT (10-YEAR PLAN GOAL J)

The northern two-thirds of the Adley Creek Management District are ranked highest in the SRW according to TNC's multiple benefits assessment (TNC, 2018). This area has the highest density of forest area that provides habitat and protects downstream resources, including Big Birch Lake, from adverse impacts. In addition to the high-quality lakes and forested areas, Round Prairie Creek (Trout Creek) is a small, shallow, cold-water stream located in the headwaters of the watershed. This creek is also CD 33 and, as such, has been channelized. According to the MNDNR's 2015 assessment report (Marod, 2015), the trout numbers appear to be declining.

Adley Creek										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
Streambank Stabilization	Adley Creek, Trout Creek, Sauk River, and other water courses as necessary	Stabilize or restore 0.3 stream miles of streambank			118,800	118,800		$237,600	SRWD	TNC, DNR
Wetland Restoration	Adley Creek (Reach A165 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs			100,000	100,000		$200,000	Stearns SWCD, SRWD	TNC
Subtotal					$218,800	$218,800		$437,600		
E. Coli										
Livestock Exclusion and Alternative Watering	Adley Creek (Reach A165 subwatershed)	Install fencing and restrict livestock access along 100 acres of riparian areas		25,000				$25,000	Stearns SWCD	
Feedlot Improvements/ Manure Storage	Adley Creek (Reach A165 subwatershed)	Improve feedlots and manure storage for 2,700 animal units	216,000	216,000	216,000	216,000	$216,000	$1,080,000	Stearns SWCD	Stearns County, MPCA
Implement Prescribed Grazing Plans	Adley Creek (Reach A165 subwatershed)	Complete 3 prescribed grazing plans		7,000	3,500			$10,500	Stearns SWCD	
Livestock Exclusion and Alternative Watering	Adley Creek (Reach A165 subwatershed)	Install fencing and restrict livestock access along 120 acres of riparian areas		30,000				$30,000	Stearns SWCD	Todd SWCD
Nutrient Management	Adley Creek (Reach A165 subwatershed)	Implement nutrient management plan w/manure incorporation on 2,700 acres Reduce TP load by 219 lbs	8,100	8,100	8,100	8,100	$8,100	$40,500	Stearns SWCD	Stearns County
Nutrient Management Plans	Adley Creek (Reach A165 subwatershed)	Complete 9 plan(s)	3,400	6,800	6,800	6,800	$6,800	$30,600	Stearns SWCD	
Subtotal			$227,500	$292,900	$234,400	$230,900	$230,900	$1,216,600		
Excess Nutrients and Sediment										
Alternative Tile Intakes	Adley Creek (Reach A165 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs		16,000				$16,000	Stearns SWCD	
Conservation Cover Perennials	Adley Creek (Reach A165 subwatershed)	Implement conservation cover perennials on 250 acres of cropland Reduce TSS load by 107 tons Reduce TP load by 131 lbs		75,000	50,000			$125,000	Stearns SWCD	
Conservation Crop Rotation	Adley Creek (Reach A165 subwatershed)	Implement conservation crop rotation on 500 acres of cropland Reduce TSS load by 111 tons Reduce TP load by 94 lbs	38,950	38,950	38,950	38,950	$38,950	$194,750	Stearns SWCD	
Cover Crops	Adley Creek (Reach A165 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	$50,000	$250,000	Stearns SWCD	TNC
Filter Strips	Adley Creek (Reach A165 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs		1,400				$1,400	Stearns SWCD	
Grassed Waterway	Adley Creek (Reach A165 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 1,994 tons Reduce TP load by 1,201 lbs		30,000				$30,000	Stearns SWCD	

Adley Creek										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
No Tillage	Adley Creek (Reach A165 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	$10,000	$50,000	Stearns SWCD	
Reduced Tillage	Adley Creek (Reach A165 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	$6,800	$34,000	Stearns SWCD	
Riparian Buffers	Adley Creek (Reach A165 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs		25,000				$25,000	Stearns SWCD	TNC
WASCOBs	Adley Creek (Reach A165 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs		40,000				$40,000	Stearns SWCD	
Subtotal			$105,750	$293,150	$155,750	$105,750	$105,750	$766,150		
Groundwater Quality										
Septic System Upgrades	High and Very High Drinking Water Vulnerable Areas	Upgrade 10 septic systems	20,000	20,000	20,000	20,000	$20,000	$100,000	Stearns County	Stearns SWCD, MPCA
Well Sealing	High and Very High Drinking Water Vulnerable Areas	Seal 5 wells	1,000	1,000	1,000	1,000	$1,000	$5,000	Stearns SWCD	
Subtotal			$21,000	$21,000	$21,000	$21,000	$21,000	$105,000		
Habitat										
Forest Stand Improvement	Big and Little Birch Lakeshed Areas (Reach A162 and A164 subwatersheds)	Complete 8 forestry management plans			25,352			$25,352	Stearns SWCD	Todd SWCD
Habitat Enhancement	Big and Little Birch Lakeshed Areas (Reach A162 and A164 subwatersheds)	Plant 40 acres of native vegetation			28,000			$28,000	Stearns SWCD	TNC
Conservation Easements	Big and Little Birch Lakeshed Areas (Reach A162 and A164 subwatersheds)	Permanently protect 500 acres of habitat.	250,000	250,000	250,000	250,000	$250,000	$1,250,000	SRWD	Stearns SWCD, TNC
Subtotal			$250,000	$250,000	$303,352	$250,000	$250,000	$1,303,352		
Grand Totals:			$604,250	$857,050	$933,302	$826,450	$607,650	$3,828,702		

(1) Specific SWCD and County will be determined by implementation location.

GUS PLUS MANAGEMENT DISTRICT

The 132-square-mile GUS Plus Management District (GUS Plus) is comprised of the Getchell Creek, Unnamed Creek, and Stony Creek Watersheds (Figure 5-6). GUS Plus is almost entirely in Stearns County with only a very small portion in Todd and Morrison Counties. Of the three main tributaries, the Getchell Creek subwatershed is the largest and also has the highest sediment and phosphorus discharge loading to the Sauk River (Wenck Associates, Inc., 2010) and is also impaired for *E. coli*. Stony Creek is impaired because of *E. coli* contamination but portions of the creek are also designated as a cold-water resource, which is one of only five such designations in the SRW. The downstream portion of Unnamed Creek, which begins near the town of Lake Henry and flows to the north, is impaired because of excess suspended solids. These three main tributaries, particularly Stony and Unnamed Creeks, have massive stream bank failures. These stream bank failures are a result of altered hydrology, particularly wetland drainage, which increases the rate and volume of runoff into the streams and causes the stream banks to fail (MPCA, 2012). Portions of these streams are also accessed by livestock that degrade buffers and cause stream banks to collapse. Animal agriculture is important in this management district, as approximately one-fifth of the feedlots in the SRW (MPCA, 2012) are located here. Riparian pasturing also appears to be more widespread in GUS Plus than in the other management zones (MPCA, 2012). Reducing the livestock impact is a critical component of restoring natural resources in GUS Plus.

The Sauk River at the upstream end of this management district is in the third-highest priority subwatershed (A230) for addressing nutrients and sediment in the mainstem. This management district also contains biologically significant resources such as calcareous fens and has one of the highest amounts of restorable wetland acres in the SRW. GUS Plus also has the second-highest number of miles of altered hydrology at 204 miles, 29 of which are public-drainage systems.

GUS Plus

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY

200
More than 200 miles of watercourses have been altered (second-highest in the SRW).

29
29 miles of public-drainage systems (fourth-highest in the SRW).

15
15 percent restorable wetlands, tied with one other management area for most restorable wetlands.

E. COLI IMPAIRED STREAMS

» Sauk River
» Stony Creek
» Getchell Creek
» Unnamed Creek (AUID 07010202-542)
» Unnamed Creek (AUID 07010202-615)

NUTRIENT AND SEDIMENT IMPAIRMENTS

TARGETED SUBWATERSHEDS (REACHES) TO REDUCE DOWNSTREAM IMPACTS

» Stony (Reach 263)
» Unnamed (Reach 265)

2ND
This management district ranked second in importance for targeting implementation actions for reducing downstream impacts.

HABITAT

▷ Stony Creek: Portions are classified as cold water and may have the potential for a sustaining a trout population.

▷ Calcareous fens in the headwaters area of Stony Creek.

▷ The lowest percentage (10%) of lands in conservation in the entire SRW and ranks seventh in the total number of acres at slightly more than 7,000 acres.

▷ The lowest percentage of land in conservation and the greatest percentage of acres of lost wetlands

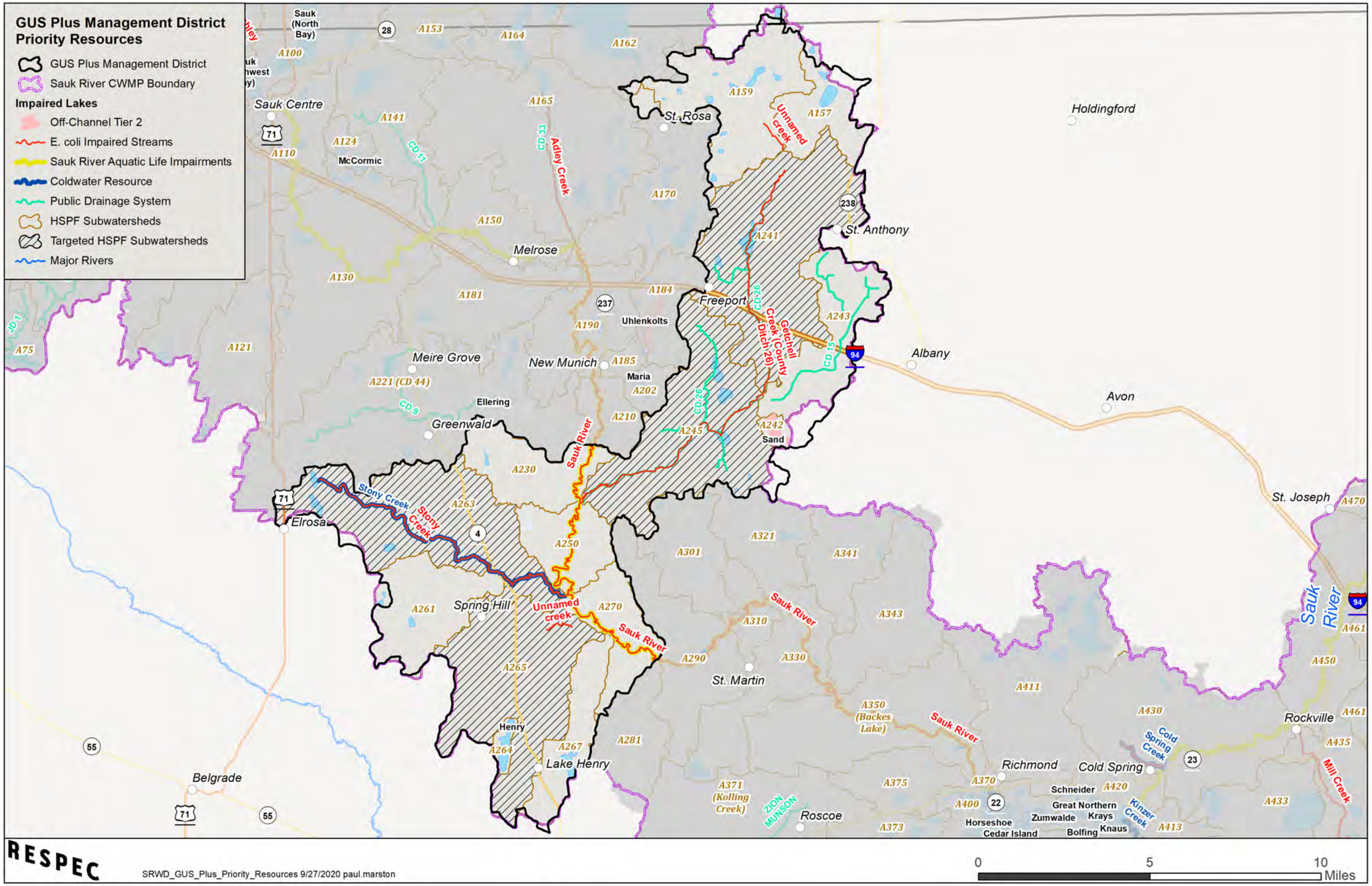


Figure 5-6. GUS Plus Management District Priority Concerns.

Gus Plus

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

This management district has 200 miles of altered stream and rivers and 29 miles of county drainage systems, all of which are in the Getchell Creek subwatershed. The county drainage systems in Getchell Creek account for nearly all of the river miles. Although Stony and Unnamed Creeks are not CD systems, storage has been lost in the upland areas as well because of drained wetlands and the rivers have been channelized. This has resulted in very high-peak flows following even moderate rain events. Impacts to the creeks are evident, including stream bank instability and failure. GUS Plus has the lowest percentage of land in conservation of any management district in the SRW, as well as the highest percentage of restorable wetlands. Priority actions should include implementing upland practices such as large-scale wetland restorations as well as reducing the rate and flow of drainage systems and restoring stream banks.

10-year Measurable Goal

The 10-year water storage goal for the GUS Plus Management District is to create 8,912 (including upstream storage) acre-feet of storage to maintain current average discharge. This includes 1,383 acre-feet storage within this management district.

Ditch Name	Authority	Total System Length (mi)
Stearns CD 15	SRWD	9
Stearns CD 26	SRWD	20

E. COLI IMPAIRED STREAMS (10-YEAR PLAN GOAL B)

Stony Creek and Sauk River:

The Stony Creek Watershed has 56 feedlots totaling 10,212 AU, and more than 8,000 AU are within 500 feet of the creek (MPCA, 2018). The Sauk River TMDL study contains portions of the GUS Plus Management District because it started where Getchell Creek enters the Sauk River. The study continued on to the Sauk River through the Saint Roscoe Management District. This entire study area has 287 feedlots totaling 41,672 AU, and over 90 percent of them are within 500 feet of the stream however the numbers are not available on a management district basis. The feedlot and AU numbers reflect what is registered or allowed as a maximum but does not reflect what is actually stocked. Restoration will require implementing practices that address the sources of the *E. coli* as determined by the river flow condition(s) (e.g., very high, high, medium, low, or very low flow rates) for which water quality standards were exceeded. Reductions in low-flow conditions indicate that riparian pastures, particularly those that allow for livestock access to streams, are the main source of *E. coli*. Restricting livestock access to surface waters and providing an alternative water source for cattle, as well as improving pasture management, are the most important implementation strategies. Trapping and treating runoff from feedlots and increasing the number of acres using manure management plans will reduce *E. coli* loading, particularly during wet-weather periods, which is necessary to address Stony Creek's impairment.

Sauk River (from Adley to Getchell Creeks), and Unnamed Creek (-542):

The TMDL studies for these impairments are scheduled to be completed in 2021. Because these subwatersheds are also targeted for other resource concerns and the TMDL studies are pending, these impairments have been prioritized; however, until the TMDL is completed, targeting is limited to management practices located within 500 feet of each tributary. Targeting will be updated based on the results of the pending TMDL studies.

Waterbody Name	Waterbody Description	Very High-Flow Reduction (%)	High-Flow Reduction (%)	Mid-Flow Reduction (%)	Low-Flow Reduction (%)	Very Low-Flow Reduction (%)	Top Three Sources Causing Impairments
Stony Creek	Headwaters to Sauk River	N/A	50	N/A	86	80	1. Upland pastures 2. Pasture near streams or waterways 3. Cropland with surface-applied manure.
Sauk River	Getchell Creek to SH 23	N/A	N/A	N/A	15	N/A	1. Upland pastures 2. Pasture near streams or waterways 3. Cropland with surface-applied manure
Sauk River (07010202-505)	Adley Creek to Getchell Creek	Reductions will be re-evaluated when TMDL is completed.					
Unnamed Creek (07010202-542)	Unnamed Creek to Sauk River	Reductions will be re-evaluated when TMDL is completed.					

IMPAIRED LAKES
(10-YEAR PLAN GOAL C)

Sand Lake is a small, 209-acre, shallow lake that is a secondary priority for this management district. This lake is located in a headwaters area with a small watershed area of only 594 highly agricultural acres.

Soil conservation practices that hold soil in place and enhanced buffer strips that trap nutrients and sediment from entering the lake should be considered if other priority issues in this management district have been addressed.

Lake	Lake I.D.	Current TP (µg/l)	TP Standard (µg/l)	10-Year Plan Reduction[a] Goal (lbs/year)	Long Term Load Reduction Goal[a] (lbs/year)	Transparency Trend	Biological Significance Rating
Impaired Lakes							
Sand Lake	73019900	134	60	66	1,097	Improving Trend	N/A

(a) MPCA and Wenck Associates, Inc. (2018)

TARGETED SUBWATERSHEDS TO REDUCE SEDIMENT AND NUTRIENTS (10-YEAR PLAN GOAL C)

Major challenges in GUS Plus are field and gully erosion, runoff from agricultural fields, and riparian pastures that are degraded and do not have adequate fencing to prevent cattle from entering the creek. The stream banks in the lower portions of Stony Creek are collapsing, and TSS values for Stony Creek are well above the standard of 30 mg/L.

HABITAT (10-YEAR PLAN GOAL J)

With only 7,000 acres of land in conservation, GUS Plus has the lowest percentage of land in conservation in the SRW. At the headwaters area of Stony Creek near the town of Spring Hill, the creek is a cold water stream that was designated as a trout stream until 1977; however, low-base-flow conditions and high water temperatures have limited trout production and viability. Wetland restorations that help restore base-flow, improved buffers that provide shade, and reducing drainage that increases water temperature are priority actions to help restore the cold-water conditions in Stony Creek (MPCA, 2012).

GUS Plus										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
Streambank Stabilization	Stony Creek	Stabilize or restore 1 stream miles of streambank	396,000	396,000				792,000	SRWD	DNR
Channel Restoration (in Tandem With the 2-Stage Ditch)	Getchell Creek	Convert 10 mile of existing open ditch to 2-stage ditch		558,624				558,624	SRWD	TNC, DNR
Controlled Tile Drainage	Stearns County Ditch 15 Stearns County Ditch 26	Install controlled tile drainage to treat 100 acres Reduce TP load by 34 lbs		50,000				50,000	SRWD	
Wetland Restoration	Getchell Creek (Reach A241 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 24 tons Reduce TP load by 53 lbs		200,000				200,000	Stearns SWCD, SRWD	TNC
Wetland Restoration	Getchell Creek (Reach A245 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 24 tons Reduce TP load by 53 lbs		200,000				200,000	Stearns SWCD, SRWD	TNC
Wetland Restoration	Stony Creek (Reach A263 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 24 tons Reduce TP load by 53 lbs	200,000					200,000	Stearns SWCD, SRWD	TNC
Wetland Restoration	Unnamed Creek (Reach A265 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 24 tons Reduce TP load by 53 lbs		200,000				200,000	Stearns SWCD, SRWD	TNC
Subtotal			$596,000	$1,604,624	$0	$0	$0	$2,200,624		
E. Coli										
Livestock Exclusion and Alternative Watering	Stony Creek, Unnamed Creek, Getchell Creek, Section 35 of Spring Hill Twp	Install fencing, provide water, and restrict livestock access along 80 acres of riparian areas	10,000	10,000				20,000	Stearns SWCD	
Feedlot Improvements/ Manure Storage	Getchell Creek (Reach A241 subwatershed)	Improve feedlots and manure storage for 600 animal units		240,000				240,000	Stearns SWCD	Stearns County, MPCA
Livestock Exclusion and Alternative Watering	Getchell Creek (Reach A241 subwatershed)	Install fencing, provide water, and restrict livestock access along 80 acres of riparian areas		20,000				20,000	Stearns SWCD	
Nutrient Management Plans	Getchell Creek (Reach A241 subwatershed)	Complete 2 plan(s)	6,800					6,800	Stearns SWCD	
Nutrient Management (Implementation)	Getchell Creek (Reach A241 subwatershed)	Implement nutrient management plan w/manure incorporation on 600 acres Reduce TP load by 49 lbs		22,500	22,500	22,500	22,500	90,000	Stearns SWCD	Stearns County
Nutrient Management	Getchell Creek (Reach A241 subwatershed)	Complete 2 prescribed grazing plans		7,000				7,000	Stearns SWCD	
Feedlot Improvements/ Manure Storage	Getchell Creek (Reach A245 subwatershed)	Improve feedlots and manure storage for 3,300 animal units		440,000	440,000	440,000		1,320,000	Stearns SWCD	Stearns County, MPCA
Livestock Exclusion and Alternative Watering	Getchell Creek (Reach A245 subwatershed)	Install fencing, provide water, and restrict livestock access along 80 acres of riparian areas	20,000					20,000	Stearns SWCD	
Nutrient Management Plans	Getchell Creek (Reach A245 subwatershed)	Complete 11 plan(s)	6,800	6,800	6,800	10,200	6,800	37,400	Stearns SWCD	

GUS Plus										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
E. Coli (cont.)										
Nutrient Management	Getchell Creek (Reach A245 subwatershed)	Implement nutrient management plan w/manure incorporation on 3,300 acres Reduce TP load by 268 lbs	99,000	99,000	99,000	99,000	99,000	495,000	Stearns SWCD	Stearns County
Prescribed Grazing Plans	Getchell Creek (Reach A245 subwatershed)	Complete 2 prescribed grazing plans	7,000					7,000	Stearns SWCD	
Feedlot Improvements/ Manure Storage	Stony Creek (Reach A263 subwatershed)	Improve feedlots and manure storage for 1,800 animal units	240,000	240,000	240,000			720,000	Stearns SWCD	Stearns County, MPCA
Livestock Exclusion and Alternative Watering	Stony Creek (Reach A263 subwatershed)	Install fencing, provide water, and restrict livestock access along 80 acres of riparian areas	20,000					20,000	Stearns SWCD	
Nutrient Management Plans	Stony Creek (Reach A263 subwatershed)	Complete 6 plan(s)	10,200	10,200				20,400	Stearns SWCD	
Nutrient Management	Stony Creek (Reach A263 subwatershed)	Implement nutrient management plan w/manure incorporation on 1,800 acres Reduce TP load by 146 lbs	54,000	54,000	54,000	54,000	54,000	270,000	Stearns SWCD	Stearns County
Prescribed Grazing Plans	Stony Creek (Reach A263 subwatershed)	Complete 2 prescribed grazing plans	3,500	3,500				7,000	Stearns SWCD	
Feedlot Improvements/ Manure Storage	Unnamed Creek (Reach A265 subwatershed)	Improve feedlots and manure storage for 1,200 animal units			240,000	240,000		480,000	Stearns SWCD	Stearns County, MPCA
Livestock Exclusion and Alternative Watering	Unnamed Creek (Reach A265 subwatershed)	Install fencing, provide water, and restrict livestock access along 80 acres of riparian areas		20,000				20,000	Stearns SWCD	
Nutrient Management Plans	Unnamed Creek (Reach A265 subwatershed)	Complete 2 plan(s)	3,400	3,400				6,800	Stearns SWCD	
Nutrient Management	Unnamed Creek (Reach A265 subwatershed)	Implement nutrient management plan w/manure incorporation on 1,200 acres Reduce TP load by 98 lbs	36,000	36,000	36,000	36,000	36,000	180,000	Stearns SWCD	Stearns County
Prescribed Grazing Plans	Unnamed Creek (Reach A265 subwatershed)	Complete 2 prescribed grazing plans	3,500	3,500				7,000	Stearns SWCD	
Subtotal			$520,200	$1,215,900	$1,138,300	$901,700	$218,300	$3,994,400		
Excess Nutrients and Sediment										
Alternative Inlets	Getchell Creek (Reach A241 subwatershed)	Install alternative tile intakes to treat 80 acres Reduce TSS load by 320 tons Reduce TP load by 330 lbs	3,200	3,200	3,200	3,200	3,200	16,000	Stearns SWCD, SRWD (as Drainage Authority)	
Conservation Cover Perennials	Getchell Creek (Reach A241 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	20,000	20,000	20,000	20,000	20,000	100,000	Stearns SWCD	
Conservation Crop Rotation	Getchell Creek (Reach A241 subwatershed)	Implement conservation crop rotation on 500 acres of cropland Reduce TSS load by 111 tons Reduce TP load by 94 lbs	38,950	38,950	38,950	38,950	38,950	194,750	Stearns SWCD	

GUS Plus										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Cover Crops	Getchell Creek (Reach A241 subwatershed)	Implement cover crops on 750 acres Reduce TSS load by 247 tons Reduce TP load by 136 lbs	75,000	75,000	75,000	75,000	75,000	375,000	Stearns SWCD	TNC
Filter Strips	Getchell Creek (Reach A241 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 5 tons Reduce TP load by 6 lbs	1,400					1,400	Stearns SWCD	
Grassed Waterway	Getchell Creek (Reach A241 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs	3,000					3,000	Stearns SWCD	
No Tillage	Getchell Creek (Reach A241 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
Reduced Tillage	Getchell Creek (Reach A241 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
WASCOBs	Getchell Creek (Reach A241 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs	16,000	16,000	16,000	16,000	16,000	80,000	Stearns SWCD	
Alternative Inlets	Getchell Creek (Reach A245 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs	3,200	3,200	3,200	3,200	3,200	16,000	Stearns SWCD, SRWD (as Drainage Authority)	
Conservation Cover Perennials	Getchell Creek (Reach A245 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	20,000	20,000	20,000	20,000	20,000	100,000	Stearns SWCD	
Conservation Crop Rotation	Getchell Creek (Reach A245 subwatershed)	Implement conservation crop rotation on 200 acres of cropland Reduce TSS load by 45 tons Reduce TP load by 38 lbs	15,580	15,580	15,580	15,580	15,580	77,900	Stearns SWCD	
Cover Crops	Getchell Creek (Reach A245 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	Stearns SWCD	TNC
Filter Strips	Getchell Creek (Reach A245 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	1,400					1,400	Stearns SWCD	
Grassed Waterway	Getchell Creek (Reach A245 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs	3,000					3,000	Stearns SWCD	
No Tillage	Getchell Creek (Reach A245 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
Reduced Tillage	Getchell Creek (Reach A245 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	

GUS Plus										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
WASCOBs	Getchell Creek (Reach A245 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs	40,000	40,000				80,000	Stearns SWCD	
Alternative Inlets	Stony Creek (Reach A263 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs	8,000	8,000				16,000	Stearns SWCD	
Conservation Cover Perennials	Stony Creek (Reach A263 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	20,000	20,000	20,000	20,000	20,000	100,000	Stearns SWCD	
Conservation Crop Rotation	Stony Creek (Reach A263 subwatershed)	Implement conservation crop rotation on 1,000 acres of cropland Reduce TSS load by 223 tons Reduce TP load by 188 lbs	77,900	77,900	77,900	77,900	77,900	389,500	Stearns SWCD	
Cover Crops	Stony Creek (Reach A263 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	Stearns SWCD	TNC
Filter Strips	Stony Creek (Reach A263 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs	$280	280	280	280	280	1,400	Stearns SWCD	
Grassed Waterway	Stony Creek (Reach A263 subwatershed)	Install 3 acres of grassed waterway Reduce TSS load by 150 tons Reduce TP load by 90 lbs	2,250					2,250	Stearns SWCD	
No Tillage	Stony Creek (Reach A263 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
Reduced Tillage	Stony Creek (Reach A263 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
Streambank Stabilization	Stony Creek (Reach A263 subwatershed)	Stabilize or restore 0.1 stream miles of streambank		26,400				26,400	SRWD	Stearns SWCD, TNC
WASCOBs	Stony Creek (Reach A263 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs	20,000	40,000	20,000			80,000	Stearns SWCD	
Alternative Inlets	Unnamed Creek (Reach A265 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs		16,000				16,000	Stearns SWCD	
Conservation Cover Perennials	Unnamed Creek (Reach A265 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	20,000	20,000	20,000	20,000	20,000	100,000	Stearns SWCD	
Conservation Crop Rotation	Unnamed Creek (Reach A265 subwatershed)	Implement conservation crop rotation on 1,000 acres of cropland Reduce TSS load by 223 tons Reduce TP load by 188 lbs	77,900	77,900	77,900	77,900	77,900	389,500	Stearns SWCD	

GUS Plus											
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Cover Crops	Unnamed Creek (Reach A265 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	Stearns SWCD	TNC
Filter Strips	Unnamed Creek (Reach A265 subwatershed)	Install 2 acres of filter strips Reduce TSS load by 6 tons Reduce TP load by 21 lbs			1,400			1,400	Stearns SWCD	
Grassed Waterway	Unnamed Creek (Reach A265 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs			3,000			3,000	Stearns SWCD	
No Tillage	Unnamed Creek (Reach A265 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
Reduced Tillage	Unnamed Creek (Reach A265 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
WASCOBs	Unnamed Creek (Reach A265 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs		20,000	40,000	20,000		80,000	Stearns SWCD	
Storm Sewer Structure Revisions, Installing 10 Sumps	City of Freeport	Improve storm sewer performance to treat drainage of 10 acres Reduce TSS load by 137 tons Reduce TP load by 0 lbs			29,166			29,166	SRWD	
Infiltration Basin	City of Freeport	Install infiltration basin to treat 5 acres of runoff Reduce TSS load by 48 tons Reduce TP load by 185 lbs			46,119			46,119	SRWD	
Stormwater Diversion and Infiltration Basin	City of Freeport	Install infiltration basin to treat 10 acres of runoff Reduce TSS load by 729 tons Reduce TP load by 443 lbs			107,063			107,063	SRWD	
Stormwater Pond	City of Freeport	Construct a stormwater pond to treat on 10 acres of runoff Reduce TSS load by 82 tons Reduce TP load by 222 lbs		62,500		62,500		125,000	SRWD	
Sediment Forebay on Existing Wetland Near Freeport Lake	Freeport Lake	Install a forebay to capture sediment Reduce TSS load by 389 tons Reduce TP load by 590 lbs				57,012		57,012	SRWD	
Stormwater Pond Improvements	Spring Hill	Install a forebay to capture sediment Reduce TSS load by 389 tons Reduce TP load by 590 lbs		62,839				62,839	SRWD	
Subtotal			$684,260	$880,949	$851,958	$744,722	$605,210	$3,767,099		
Groundwater Quality										
Septic system upgrades	DWSMAs and identified priority lakes and streams	Upgrade 10 septic systems	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000	Stearns County	Stearns SWCD, MPCA
Subtotal			$20,000	$20,000	$20,000	$20,000	$20,000	$100,000		

GUS Plus										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Habitat										
Conservation easements	Getchell Creek (Reach A241 subwatershed)	Permanently protect 200 acres of habitat		175,000	175,000	150,000		500,000	SRWD	Stearns SWCD, TNC
Conservation easements	Getchell Creek (Reach A245 subwatershed)	Permanently protect 200 acres of habitat		75,000	175,000	250,000		500,000	SRWD	Stearns SWCD, TNC
Conservation easements	Stony Creek (Reach A263 subwatershed)	Permanently protect 200 acres of habitat	250,000	250,000				500,000	SRWD	Stearns SWCD
Stream Habitat Improvement		Establish 500 linear feet of riparian buffer Reduce TSS load by 1,837 tons Reduce TP load by 698 lbs		25,000				25,000	SRWD	Stearns SWCD, TNC
Conservation easements	Unnamed Creek (Reach A265 subwatershed)	Permanently protect 200 acres of habitat		175,000	175,000	150,000		500,000	SRWD	Stearns SWCD, TNC
Subtotal			$250,000	$700,000	$525,000	$550,000	$0	$2,025,000		
Grand Totals:			$2,070,460	$4,421,473	$2,535,258	$2,216,422	$843,510	$12,087,123		

(1) Specific SWCD and County will be determined by implementation location.

SAINT ROSCOE MANAGEMENT DISTRICT

The Saint Roscoe Management District is a 108-square-mile, highly agricultural area with a few small wildlife lakes; however, Big Lake is a high-water quality resource with improving water quality trends (Figure 5-7). The southern portion of the Saint Roscoe Management District begins just outside the city of Paynesville as the area extends to the city of Roscoe. Wet meadow and mesic prairie native habitat can be found in this unique glacial-outwash and sand-plain area. Some of this habitat is protected by three WMAs, two WPAs, and one scientific and natural area (SNA).

The Saint Roscoe Management District is ranked third in the targeted areas to implement practices that will reduce the impacts of excessive sediment and nutrients to downstream resources, particularly the Sauk River Chain of Lakes, which is immediately downstream. Stream bank failure, overwidened and channelized streams, and field erosion have caused downstream sediment accumulation and sand deltas to form. The Sauk River stretch that runs through this management district is impaired for *E. coli*.

3RD

The Saint Roscoe Management District is ranked third in the targeted areas to implement practices that will reduce the impacts of excessive sediment and nutrients to downstream resources, particularly the Sauk River Chain of Lakes, which is immediately downstream.

Saint Roscoe

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY

177
Slightly more than 177 miles of watercourses have been altered (4th highest in the SRW).

3
Miles of public-drainage systems

15%
Restorable wetlands

E. COLI IMPAIRMENTS

SAUK RIVER
For the entire extent of the management district.

NUTRIENT AND SEDIMENT IMPAIRMENTS

3RD
This management district ranked third in importance for targeting implementation actions for reducing downstream impacts.

REACH 370 (MAINSTEM SAUK RIVER)
REACH 350 (BACKLES LAKE)
REACH 371 (KOLLING CREEK)

PROTECTION LAKES

▷ Big Lake (Tier 2; see “High Water Quality Lakes” in Ch. 4)

DRINKING WATER QUALITY

Roscoe, St. Martin, and Richmond have high groundwater vulnerability.

The city of Roscoe groundwater supply is highly vulnerable and has been designated as a Level 1 nitrate-mitigation level by the MDA.

HABITAT

16%
16 percent of the land area in the management district is in conservation (seventh-highest out of the ten districts)

11,358 ACRES
11,358 acres in conservation (sixth-highest out of the ten districts).

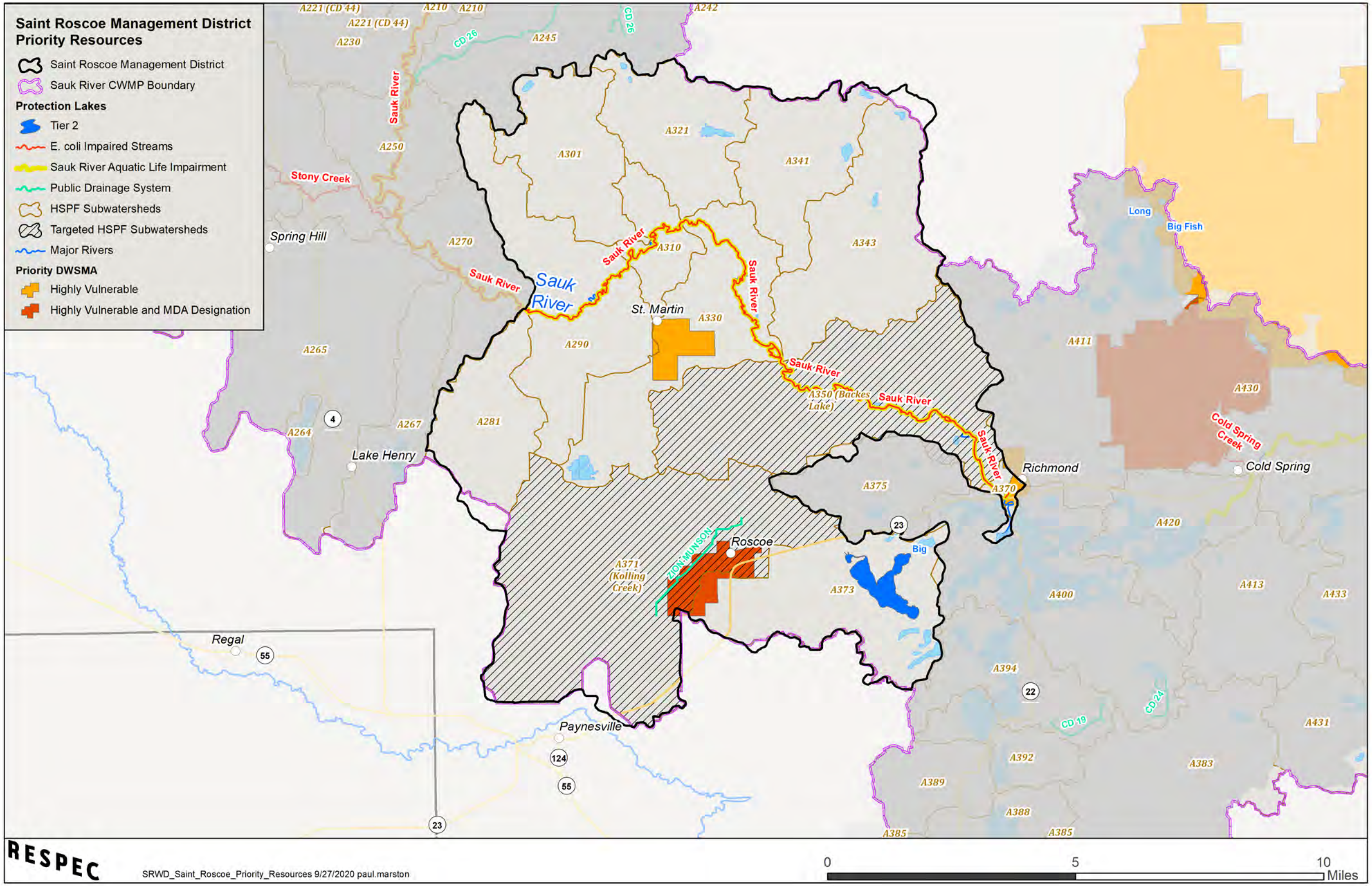


Figure 5-7. Saint Roscoe Management District Priority Resources.

Saint Roscoe

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

This management district has 177 miles of altered streams and rivers but only 3 miles of public-drainage systems. This management district also has the highest percentage of restorable wetlands in the SRW. Therefore, a key implementation action should be to restore wetlands. Other priority practices include those that will slow the rate of flow through the streams, such as controlled-tile drainage and restoring the hydrologic function of stream channels by restoring and stabilizing stream banks. Providing temporary water storage structures like WASOBs, terraces, and grade stabilization structures will also improve issues with flow caused by altered hydrology.

Ditch Name	Authority	Total System Length
Stearns Zion-Munson	SRWD	3

Highest Percentage of Restorable Wetlands

10-year Measurable Goal

The 10-year water storage goal for the Saint Roscoe Management District is to create 11,210 (including upstream storage) acre-feet of storage to maintain current average discharge. This includes 2,298 acre-feet storage within this management district.

E. COLI STREAM IMPAIRMENTS – SAUK RIVER (10-YEAR PLAN GOAL B)

The entire stretch of the Sauk River through the Saint Roscoe Management District is impaired for *E. coli*. Refer to the *E. coli* subsection in the GUS Plus section of Chapter 5, for more information.

HIGH WATER QUALITY LAKES (10-YEAR PLAN GOAL D)

Big Lake –Tier 2

Big Lake is 457 acres in size with nearly half of the area less than 15 feet deep and a mean depth of 14.6 feet. The lake has a large watershed area (6,366 acres) that is highly agricultural, and 68 percent of the land is disturbed. Priorities to protect this lake from declining water quality include additional buffering along Kolling Creek and implementing soil-health practices on fields in the immediate drainage area.

Lake	Lake ID Number	Current TP (μg/l)	Standard	10-Year Plan Reduction[a] Goal (lbs/year)	Long Term Load Reduction Goal[a] (lbs/year)	Transparency Trend	Biological Significance Rating
Protection Lakes							
Big	77008402	28	40	33	529	Improving	High

(a) From 2019 MPCA/MNDNR LPSS Spreadsheet (MNDNR, 2019b) (data through 2018).

GROUNDWATER QUALITY (10-YEAR PLAN GOAL H)

City of Roscoe: The MDA has reviewed data from the Roscoe public wells and completed a nitrate fertilizer point-source review. Based on the reviews, the MDA has defined Roscoe at a mitigation Level 1, which means that at least one of the city wells has had nitrate levels at or above 5.4 ppm within the last 10 years and no point source has been identified as the cause. Because the MDA has defined Roscoe at a mitigation Level 1, they will provide support for project partners to implement protection actions. Roscoe is also rated as having highly vulnerable groundwater. Reducing the threat of additional contamination will rely on leveraging all tools but will primarily be accomplished by converting land uses to those that pose the least threat, including converting agricultural land within the wellhead protection area to conservation lands, reducing nitrogen fertilizer use, and implementing nitrogen fertilizer BMPs in agricultural and urban areas.

City of Richmond: See Chapter 5, *Chain of Lakes Management District* Section.

City of St. Martin: The city of St. Martin's wellhead protection area is rated as highly vulnerable to contamination. Reducing the risks associated with land management practices is of primary importance to protecting the groundwater supply from contamination. Threat removal includes converting agricultural land to conservation lands, identifying and removing or containing petroleum and chemical storage tanks, and implementing emergency preparedness exercises to contain threats in the event of an emergency spill.

HABITAT (10-YEAR PLAN GOAL J)

The Saint Roscoe Management District offers tremendous opportunity to expand and improve habitat because of its unique geology and high percentage of restorable wetlands. Key strategies include expanding existing conservation areas and creating habitat complexes and corridors.

Saint Roscoe										
Implementation Action	Targeted Resources	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
Wetland Restoration	Backes Lakes Reach 350 (excluding priority reaches above)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs		200,000				200,000	Stearns SWCD, SRWD	TNC, MLT
Controlled Tile Drainage	Backes Lake (Reach A350 subwatershed)	Install controlled tile drainage to treat 100 acres Reduce TP load by 34 lbs	25,000	25,000				50,000	Stearns SWCD	TNC
Streambank Stabilization	Backes Lake (Reach A350 subwatershed)	Stabilize or restore 0.1 stream mile of streambank		26,400				26,400	SRWD	Stearns SWCD, TNC, DNR
WASCOBs	Backes Lake (Reach A350 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs		80,000				80,000	Stearns SWCD	
Controlled Tile Drainage	Kolling Creek (Reach A371 subwatershed)	Install controlled tile drainage to treat 100 acres Reduce TP load by 34 lbs		25,000	25,000			50,000	Stearns SWCD	
Streambank Stabilization	Kolling Creek (Reach A371 subwatershed)	Stabilize or restore 0.1 stream mile of streambank			26,400			26,400	SRWD	Stearns SWCD, TNC, DNR
Stream Channel Stabilization	Section 30 of Farming Township, Priority Streams	Stabilize or restore 0.5 stream mile of streambank						396,000	SRWD	Stearns SWCD, TNC, DNR
Controlled Tile Drainage	Stearns Zion Munson Ditch	Install controlled tile drainage to treat 100 acres Reduce TP load by 34 lbs		25,000	25,000			50,000	SRWD	
Subtotal			$25,000	$381,400	$76,400	$0	$0	$482,800		
E. Coli										
Feedlot Improvements/Manure Storage	Backes Lakes HUC12 (excluding priority reaches above)	Improve feedlots and manure storage for 900 animal units		180,000	180,000			360,000	Stearns SWCD	Stearns County, MPCA
Nutrient Management	Entire management district	Implement nutrient management plan w/manure incorporation on 600 acres Reduce TP load by 49 lbs	18,000	18,000	18,000	18,000	18,000	90,000	Stearns SWCD	Stearns County
Nutrient Management Plans	Entire management district	Complete 4 plan(s)	3,400	3,400	3,400	3,400		13,600	Stearns SWCD	
Livestock Exclusion and Alternative Watering	Backes Lake (Reach A350 subwatershed)	Install fencing, provide water, and restrict livestock access along 80 acres of riparian areas		20,000				20,000	Stearns SWCD	
Prescribed Grazing Plans	Backes Lake (Reach A350 subwatershed)	Complete 2 prescribed grazing plans		3,500	3,500	3,500		10,500	Stearns SWCD	
Feedlot Improvements/ Manure Storage	Kolling Creek (Reach A371 subwatershed)	Improve feedlots and manure storage for 900 animal units		180,000	180,000			360,000	Stearns SWCD	Stearns County, MPCA
Livestock Exclusion and Alternative Watering	Kolling Creek (Reach A371 subwatershed)	Install fencing, provide water, and restrict livestock access along 80 acres of riparian areas			20,000			20,000	Stearns SWCD	

Saint Roscoe										
Implementation Action	Targeted Resources	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
E. Coli (cont.)										
Nutrient Management Plans	Kolling Creek (Reach A371 subwatershed)	Complete 3 plan(s)	3,400	3,400	3,400			10,200	Stearns SWCD	
Prescribed Grazing Plans	Kolling Creek (Reach A371 subwatershed)	Complete 2 prescribed grazing plans			3,500	3,500		7,000	Stearns SWCD	
Livestock Exclusion and Alternative Watering	Section 30 of Farming Township	Install fencing, provide water, and restrict livestock access along 100 acres of riparian areas		12,500	12,500			25,000	Stearns SWCD	
Subtotal			$24,800	$420,800	$424,300	$28,400	$18,000	$916,300		
Excess Nutrients and Sediment										
Cover Crops	Backes Lake (Reach A350 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	Stearns SWCD	TNC
Filter Strips	Backes Lake (Reach A350 subwatershed)	Install 10 acres of filter strips Reduce TSS load by 312 tons Reduce TP load by 1,069 lbs	35,000	35,000				70,000	Stearns SWCD	TNC
Saturated Buffer	Backes Lake (Reach A350 subwatershed)	Construct saturated buffer(s) to treat 100 acres		3,350				3,350	Stearns SWCD	TNC
Tile Line Bioreactors	Backes Lake (Reach A350 subwatershed)	Install tile line bioreactors to treat 100 acres		16,000				16,000	Stearns SWCD	TNC
Shoreline Buffers	Big Lake	Establish 200 linear feet of riparian buffer Reduce TSS load by 321 tons Reduce TP load by 124 lbs		10,000				10,000	Stearns SWCD	Stearns County
Shoreline Restoration	Big Lake	Complete shoreline restoration on 200 linear feet of shoreline	20,000					20,000	Stearns SWCD	Stearns County
Infiltration Basin	City of Richmond	Construct infiltration basin(s) to treat 10 acres Reduce TSS load by 96 tons Reduce TP load by 369 lbs	92,238					92,238	SRWD	
Stormwater Pond	City of Richmond	Construct a stormwater pond to treat on 20 acres Reduce TSS load by 164 tons Reduce TP load by 442 lbs		250,000				250,000	SRWD	
Alternative Inlets	Backes Lake (Reach A350 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs	16,000					16,000	Stearns SWCD	TNC
Conservation Cover Perennials	Backes Lake (Reach A350 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	25,000	50,000	25,000			100,000	Stearns SWCD	
Conservation Crop Rotation	Backes Lake (Reach A350 subwatershed)	Implement conservation crop rotation on 1,000 acres of cropland Reduce TSS load by 223 tons Reduce TP load by 188 lbs	77,900	77,900	77,900	77,900	77,900	389,500	Stearns SWCD	

Saint Roscoe										
Implementation Action	Targeted Resources	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Grassed Waterway	Backes Lake (Reach A350 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs	3,000					3,000	Stearns SWCD	
No Tillage	Backes Lake (Reach A350 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
Reduced Tillage	Backes Lake (Reach A350 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
Alternative Inlets	Kolling Creek (Reach A371 subwatershed)	Install alternative tile intakes to treat 80 acres of cropland Reduce TSS load by 320 tons Reduce TP load by 330 lbs	16,000					16,000	Stearns SWCD, SRWD	TNC
Conservation Cover Perennials	Kolling Creek (Reach A371 subwatershed)	Implement conservation cover perennials on 200 acres of cropland Reduce TSS load by 85 tons Reduce TP load by 105 lbs	25,000	50,000	25,000			100,000	Stearns SWCD	
Conservation Crop Rotation	Kolling Creek (Reach A371 subwatershed)	Implement conservation crop rotation on 1,000 acres of cropland Reduce TSS load by 223 tons Reduce TP load by 188 lbs	77,900	77,900	77,900	77,900	77,900	389,500	Stearns SWCD	
Cover Crops	Kolling Creek (Reach A371 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	Stearns SWCD	TNC
Filter Strips	Kolling Creek (Reach A371 subwatershed)	Install 8 acres of filter strips Reduce TSS load by 249 tons Reduce TP load by 855 lbs		56,000				56,000	Stearns SWCD	
Grassed Waterway	Kolling Creek (Reach A371 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs	3,000					3,000	Stearns SWCD	
No Tillage	Kolling Creek (Reach A371 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
Reduced Tillage	Kolling Creek (Reach A371 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
WASCOBs	Kolling Creek (Reach A371 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs		80,000				80,000	Stearns SWCD	
Infiltration Basins Along Trail/2nd Street NE	Richmond	Construct infiltration basin(s) to treat 10 acres Reduce TSS load by 96 tons Reduce TP load by 369 lbs	74,813					74,813	SRWD	
Regional Pond North of Town	Roscoe	Construct stormwater pond(s) to treat 40 acres Reduce TSS load by 326 tons Reduce TP load by 886 lbs		148,714				148,714	SRWD	

Saint Roscoe											
Implementation Action	Targeted Resources	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Improve Stormwater Pond Outlet	St. Martin	Construct stormwater pond(s) to treat Reduce TSS load by 8 tons Reduce TP load by 22 lbs		14,027				14,027	SRWD	
Regional Pond Improvements - North of City	St. Martin	Construct stormwater pond(s) to treat 1 Reduce TSS load by 8 tons Reduce TP load by 22 lbs	91,578					91,578	SRWD	
Sediment Forebay Added to Existing Pond - East of CR12	St. Martin	Construct stormwater pond(s) to treat 1 Reduce TSS load by 8 tons Reduce TP load by 22 lbs		57,935				57,935	SRWD	
Subtotal			$691,029	$1,060,426	$339,400	$289,400	$289,400	$2,669,655		
Groundwater Quality										
Septic System Upgrades	DWSMAs and identified priority lakes and streams	Upgrade 10 septic systems	20,000	20,000	20,000	20,000	20,000	100,00	Stearns County	Stearns SWCD, MPCA, MDA
Well Sealing	Roscoe, St. Martin, Richmond DWSMAs	Seal 6 we;;s	1,200	1,200	1,200	1,200	1,200	6,000	Stearns SWCD	MDA
Subtotal			$21,200	$21,200	$21,200	$21,200	$21,200	$106,000		
Habitat										
Conservation Easements	Backes Lake (Reach A350 subwatershed)	Permanently protect 200 acres of habitat.		250,000	250,000			500,000	SRWD	Stearns SWCD, TNC, MLT
Conservation Easements	Kollinig Creek	Permanently Protected 200 acres of habitat.	200,000	300,000				500,000	SRWD	Stearns SWCD, TNC
Stream Habitat Improvement	Backes Lake (Reach A350 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 803 tons Reduce TP load by 155 lbs			25,000			25,000	Stearns SWCD	TNC
Stream Habitat Improvement	Kolling Creek (Reach A371 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 803 tons Reduce TP load by 155 lbs			25,000			25,000	Stearns SWCD	TNC
Subtotal			$200,000	$550,000	$300,000	$0	$0	$1,050,000		
Grand Totals:			$962,029	$2,433,826	$1,161,300	$339,000	$328,600	$5,620,755		

CHAIN OF LAKES MANAGEMENT DISTRICT

The Chain of Lakes Management District is a 95-square-mile area that is characterized as having abundant lakes (Figure 5-8). Big Fish and Long Lakes (73-0107-00 and 77-0149-00, respectively) are the high-water quality lakes located in the northern portion of the district. As the Sauk River begins to run through this management district, it is transformed into a complex reservoir system known as the SRCOL, which was formed in 1856 when the Cold Spring Dam was installed (Heiskary, 2015). The SRCOL is a significant recreational and economic resource to Stearns County and central Minnesota. It is highly influenced by the Sauk River, which drains 760 miles of upstream watershed area and is the source of 85 percent of the nutrient loading to these lakes. Because of the impact that the Sauk River has on this significant resource, the Sauk River inlet to the SRCOL is the number-one priority location to track for reducing the impacts of excess sediment and nutrients. The subwatersheds that have the highest pollutant levels loading to the SRCOL have been identified in the upstream management districts. The lakes in the SRCOL have a short residence time, which means that water quickly flows in and out of each lake. Therefore, the reductions in excess nutrient loading from upstream areas will result in improved water quality in the SRCOL.

The SRCOL has a second headwaters region that lies in the southern portion of the management district and is referred to as the Eden Valley Creek Chain of Lakes. This area includes Eden Lake, Vails Lake, North Browns Lake, and Long Lake (73-0139-00). These lakes do not meet water quality standards and, as they flow into the SRCOL at Horseshoe Lake (south) via Long Lake Creek, they also contribute excessive nutrients to the SRCOL.

#1 PRIORITY

Because of the impact that the Sauk River has on this significant resource, the Sauk River inlet to the SRCOL is the number-one priority location to track for reducing the impacts of excess sediment and nutrients.

Groundwater quality is also a major concern in the Chain of Lakes Management District because DWSMAs for four cities are within the district. Portions of the area where residents have private wells are also highly vulnerable to groundwater contamination.

High-quality fish, bird, and wildlife habitat can be found in Big Fish and Long Lakes (73-0107-00 and 77-0149-00), which are located in the southern boundary of the Avon Hills conservation area. The Avon Hills area has a unique landscape of rolling hills and hardwood forest with tamarack bogs and fragile, highly erodible soils. This area is considered a site of biodiversity significance by the MNDNR and has been designated as an IBA by Audubon Minnesota. Stearns County has designated the Avon Hills Area as a Conservation Overlay District. Open space protection through techniques such as conservation easements, limited residential development emphasizing conservation, and carefully siting houses and structures to protect rural roads and scenic views all make the protection of these resources a priority.

Chain of Lakes

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY

137
Slightly more than 137 miles of watercourses have been altered (sixth-highest in the SRW).

3.8
Miles of public-drainage systems (seventh-highest out of the eight)

9%
Restorable wetlands

EDEN LAKE
(MNDNR unspecified spillway).wetlands

NUTRIENT AND SEDIMENT IMPAIRMENTS

LAKES ON THE SAUK RIVER

Cedar Island East
Cedar Island (Koetter Lake)
Great Northern
Horseshoe
Knaus
Krays
Zumwalde

LAKES IN THE WATERSHED

Bolfing (Tier 1)
Schneider (Tier 1)
Long (Tier 2)
North Browns (Tier 2)
Eden (Tier 2)
Vails (Tier 2)

REACH 420 (SAUK RIVER-KNAUS LAKE TO COLD SPRING DAM)
Targeted Subwatershed (Reaches) to Reduce Downstream Impacts

PROTECTION LAKES

- Big Fish (Tier 1; see "High-Water Quality Lakes" in Ch. 4)
- Long Lake-by Big Fish Lake (Tier 1)

DRINKING WATER QUALITY

Cold Spring, Eden Valley/Watkins, and St. Joseph have very high groundwater vulnerability.

Cold Spring has been designated as Level 2 mitigation for nitrate contamination by the MDA.

Richmond has high groundwater vulnerability.

High groundwater vulnerability in the immediate vicinity of the SRCOL and south to Eden Valley.

LAND USE

This area is high-growth, particularly within the vicinity of the lakes.

HABITAT

18.5 percent of the land is in conservation (fourth-highest out of the ten districts in the SRW, totaling 11,375 acres [fifth-highest in the SRW]).

Big Fish and Long Lakes.

Northern portion of the subwatershed ranks second-highest in TNC fish and wildlife scoring and is part of the Avon Hills IBA as designated by Audubon Minnesota.

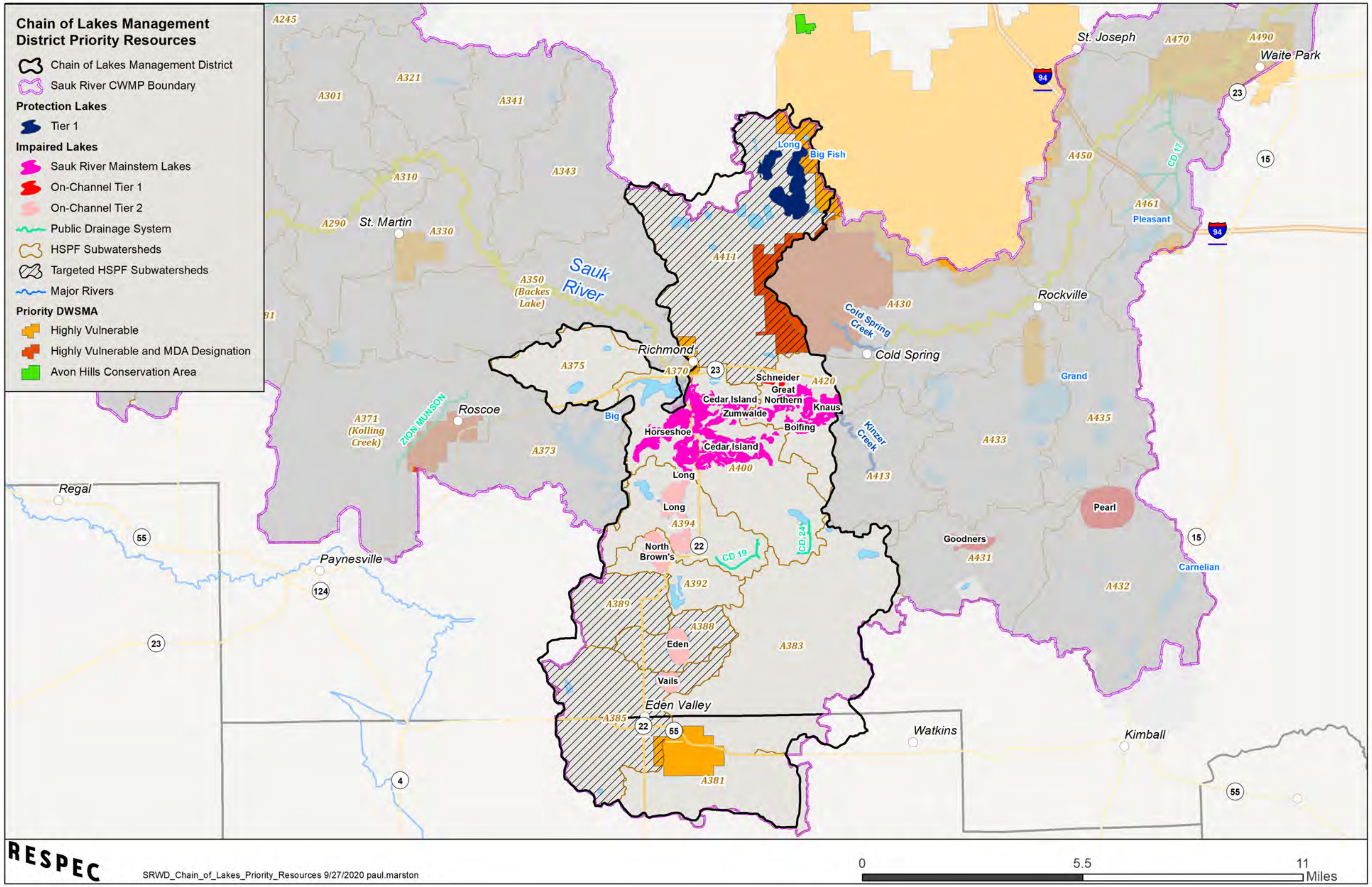


Figure 5-8. Chain of Lakes Management District Priority Resources. (Note: several DWSMAs in the Cold Spring area overlap each other)

Chain of Lakes

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

This management district has 137 miles of altered streams and rivers but only approximately 4 miles of county drainage systems (CDs 19 and 24). Restoring hydrology to the Eden-Vails Chain of Lakes, including North Browns Lake, is a priority because wetland storage loss and stream channelization have caused increased peak flows and unstable base flows in numerous drainage areas and resulted in eroded stream banks, gullies, and sediment plumes into lakes. Restoring wetlands and upland areas will reduce the flow volume and rate into the creeks and channels. Steps should also be taken to reduce the velocity of creeks that are eroding into gullies.

The Chain of Lakes Management District has highly developed portions, particularly in the immediate lakeshore areas and along SH 23. Urban stormwater improvement and retrofit projects should be targeted to these areas, and the impacts of future development should be minimized by implementing Minimal Impact Design Standards (MIDS) developed by the MPCA.

10-year Measurable Goal

The 10-year water storage goal for the Chain of Lakes Management District is to create 12,526 (including upstream storage) acre-feet of storage to maintain current average discharge. This includes 1,316 acre-feet storage within this management district.

Ditch Name	Authority	Total System Length (mi)
Stearns CD 19	SRWD	1.8
Stearns CD 24	SRWD	2

IMPAIRED LAKES (10-YEAR PLAN GOAL C)

On the Sauk River:

Sauk River Chain of Lakes

The draft TMDL study (MPCA and Emmons & Olivier Resources, Inc., 2014) calls for reducing the Sauk River TP load to the SRCOL by 56,083 lbs/year, which represents a 45 percent reduction to reach the long-term goal of 100 µg/L TP. The lakes that are directly along the main-river channel are referred to as flowage lakes, and their water quality is primarily determined by the water quality of the Sauk River. Lakes that are part of the SRCOL but are not directly on the mainstem Sauk River are referred to as non-flowage lakes; these areas include the main bay of Cedar Island Lake, Bolfing Lake, and Schneider Lake. See Figure 5-9 for a diagram of the flow network of the SRCOL. Some of the lakes have high-internal loading rates; however, in-lake phosphorus management projects should be focused on non-flowage lakes, such as Cedar Island Lake. Schneider Lake received approximately 90 percent of its phosphorus load from the Unnamed Creek that drains the northern portion of the management district. The long-term goal is to reduce the load from this creek by 43 percent to approximately 921 lbs/year. Most of the phosphorus loading to Horseshoe Lake (south) is from Long Lake, which is the last lake in the Eden Valley Creek chain. Horseshoe Lake (south) needs a 56 percent load reduction (2,024 lbs/year) from Long Lake as well as internal load reductions to meet water quality standards. Although the most notable water quality benefits that the SRCOL will obtain will be from improvement actions that happen in upstream watershed areas, reductions can also be obtained in immediate shoreland and drainage areas. Implementation actions that can be taken to reduce near-shore and lakeshed pollution loading include upgrading septic systems, repairing gullies, and improving shoreland buffers. Land use management tools that limit runoff, such as increasing restrictions on impervious areas and requiring stormwater management practices, should also be employed.

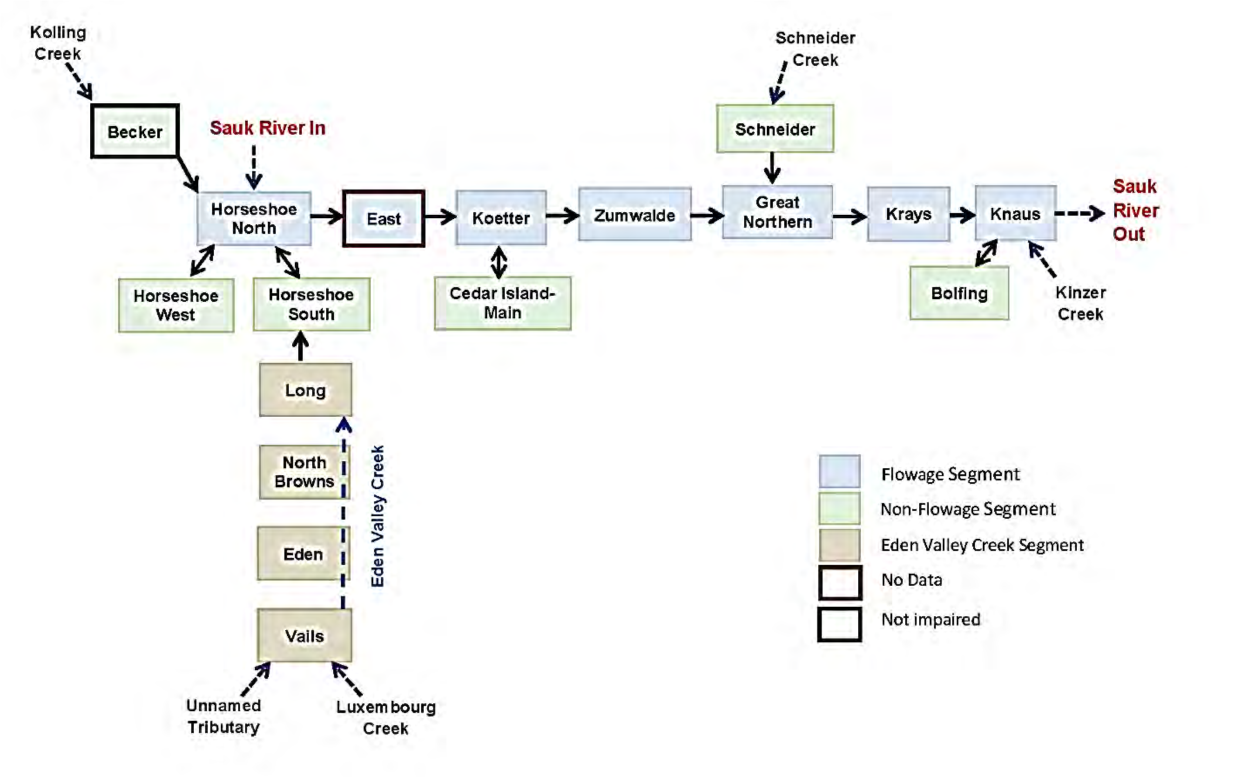


Figure 5-9. Sauk River Chain of Lakes and Eden Valley Watershed Flow Network (From Draft TMDL by the MPCA and Emmons & Olivier Resources, Inc [2014]).

In the Watershed:

Eden Valley Creek Chain of Lakes

The Eden Valley Creek Chain of Lakes includes Vails, Eden, North Browns, and Long Lakes. This area is highly agricultural and characterized by sandy soils and steep slopes. Vails Lake is a shallow lake that forms the headwaters of this chain and is highly influenced by Luxembourg Creek and the immediate lakeshed. As Eden Valley Creek flows to the north from Vails Lake to the SRCOL, the phosphorus levels increase; however, internal loading accounts for approximately 30 percent of the load in Vails Lake, 25 percent of the load in Eden Lake, and 75 percent of the load in North Browns Lake. As watershed sources are more thoroughly addressed, consideration should be given to sequestering the internal phosphorus loads.

The priority implementation actions are those listed in the Chain of Lakes section above that will be implemented to address altered hydrology. Other critical implementation actions are agricultural practices that keep soil in place, such as cover crops and reduced tillage; volume controls on drainage systems; and upgrading septic systems.

HIGH WATER QUALITY LAKES (10-YEAR PLAN GOAL D)

Big Fish and Long Lakes are Tier 1 protection lakes. Big Fish Lake is 577 acres with a mean depth of 26.4 feet; only 22 percent of its 3,326-acre watershed is disturbed. The MNDNR has listed Big Fish Lake as infested with zebra mussels.

Long Lake is 152 acres with a mean depth of 19.3 feet, and only 11 percent of its 1,068-acre watershed is disturbed. Key implementation measures include land protection to keep the forests in place, continual AIS monitoring, and rapid-response and containment efforts.

Lake Name	Lake I.D. Number	Current TP (µg/l)	TP Standard (µg/l)	10-Year Plan Reduction Goal (lbs/year)	Long Term Load Reduction Goal (lbs/year)	Transparency Trend	Biological Significance Rating
Impaired Lakes							
Horseshoe	73015700	177	90	3,606[a]	60,093[a]	No evidence of trend	NA
Cedar Island	73013301	112	55	58[a]	971[a]	Improving	NA
Great Northern	73008300	189	90	2,208[a]	36,802[a]	No evidence of trend	NA
Knaus	73008600	178	90	3,066[a]	51,096[a]	Improving	NA
Krays	73008700	165	90	2,446[a]	40,764[a]	No evidence of trend	NA
Zumwalde	73008900	187	90	2,195[a]	36,591[a]	Improving	NA
Bolfing	73008800	106	55	11[a]	178[a]	Improving	NA
Schneider	73008200	58	40	44[a]	729[a]	Improving	NA
Long	73013900	97	40	277[a]	4,615[a]	Improving	NA
North Browns	73014700	112	40	759[a]	12,649[a]	Declining	NA
Eden	73015000	108	40	356[a]	5,942[a]	Declining	NA
Vails	73015100	187	40	414[a]	6,897[a]	No evidence of trend	NA
Protection Lake							
Big Fish	73010600	16	40	12[b]	181[b]	Improving	Outstanding
Long	73010700	22	40	5[b]	89[b]	Improving	Outstanding

(a) MPCA and Emmons & Olivier Resources, Inc. (2014)
(b) From 2019 MPCA/MNDNR LPSS Spreadsheet (MNDNR, 2019b) (data through 2018).

GROUNDWATER QUALITY (10-YEAR PLAN GOAL H)

All Water Management District areas are discussed in this section. Portions of each Management District discussed overlap the Wellhead Protect Area.

City of Cold Spring: The MDA has assigned Cold Spring a Level 2 mitigation, which means that at least one of the city wells had nitrate levels at or above 8.0 ppm at any time in the last 10 years. Because of this designation, the MDA will form a local advisory team to develop a monitoring, outreach, and implementation plan to address nitrate contamination. Cold Spring is also rated as having a very highly vulnerable groundwater because of the strong interaction between surface water and groundwater. Reducing the threat of additional contamination will rely on leveraging all tools but will primarily be accomplished by converting land uses to those that pose the least threat, including converting agricultural land within the DWSMA to conversion lands, reducing nitrogen fertilizer use, and implementing nitrogen fertilizer BMPs in agricultural and urban areas.

See *Cold Spring Management District*.

City of St. Joseph:

St. Joseph is rated as having very highly vulnerable groundwater because of the strong interaction between surface water and groundwater. St. Joseph's wellhead protection area covers a large area and will require increased outreach and education to create awareness about the risks of groundwater contamination. The city of Waite Park's wellhead protection area is rated as highly vulnerable to contamination. Key actions to reduce the threat of contamination are changing land uses to those that pose the least threat, such as converting agricultural land within the DWSMA to permanent conservation, reducing nitrogen fertilizer use, and implementing nitrogen fertilizer BMPs in agricultural and urban areas. Consideration should be given to land use suitability as development occurs, and measures should be taken to protect the areas of the highest vulnerability.

See *Mini-Metro Management District*.

Cities of Eden Valley/Watkins and Richmond: The Eden Valley/Watkins and Richmond groundwater sources are rated as highly vulnerable and the general area surrounding the SRCOL down to Eden Valley is also highly vulnerable. BMPs such as converting agricultural land to conservation lands, increasing the number of acres covered by manure management plans, reducing nitrogen fertilizer use, and implementing nitrogen management should be taken to reduce risks associated with unsuitable land management practices.

HABITAT (10-YEAR PLAN GOAL J)

TNC has ranked the Avon Hills conservation area in the northern portion of the watershed as one of the highest priorities in the watershed to target for fish and wildlife habitat protection. Stearns County already has protective zoning requirements in place to preserve the quality and character of the area. Caution should be exercised in reviewing and approving variances and conditional use permits to ensure that unintentional consequences, such as forest fragmentation, are minimized. Priority actions to maintain the high-quality habitat in this area include forest management, permanent conservation easements, and reducing near-shore impacts to lakes by upgrading septic systems and enhancing shoreline and riparian habitat quality.

Chain of Lakes

Implementation Action	Targeted Resource	Measurable Output for This Activity	Years 1 and 2 ($)					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
Controlled Tile Drainage	Eden Lake vicinity	Install controlled tile drainage to treat 40 acres Reduce TP load by 14 lbs	4,000	4,000	4,000	4,000	4,000	20,000	Stearns SWCD	Stearns SWCD
Streambank Stabilization	Kinzer Creek, Sauk River, and other priority water courses	Stabilize or restore 0.2 stream miles of streambank	31,680	31,680	31,680	31,680	31,680	158,400	SRWD	SRWD, TNC, DNR
Controlled Tile Drainage	Eden Valley (Reach A385 subwatershed)	Install controlled tile drainage to treat 40 acres Reduce TP load by 14 lbs	4,000	4,000	4,000	4,000	4,000	20,000	Stearns SWCD	Stearns SWCD
Wetland Restoration	Eden Valley (Reach A385 subwatershed)	Create restored wetland(s) to treat 10 acres Reduce TSS load by 035 tons Reduce TP load by 170 lbs			8,674			8,674	Stearns SWCD, SRWD	TNC
Controlled Tile Drainage	Eden Valley (Reach A388 subwatershed)	Install controlled tile drainage to treat 40 acres Reduce TP load by 14 lbs	4,000	4,000	4,000	4,000	4,000	20,000	Stearns SWCD	Stearns SWCD
Wetland Restoration	North Browns Lake (Reach A389 subwatershed)	Create restored wetland(s) to treat 2,154 acres Reduce TSS load by 266 tons Reduce TP load by 291 lbs				$1,035,030		$1,035,030	Stearns SWCD, SRWD	TNC
Controlled Tile Drainage	Unnamed to Schneider Lake (Reach A411)	Install controlled tile drainage to treat 40 acres Reduce TP load by 14 lbs	4,000	4,000	4,000	4,000	4,000	20,000	Stearns SWCD	Stearns SWCD
Wetland Restoration	Unnamed to Schneider Lake (Reach A411)	Create restored wetland(s) to treat 10 acres Reduce TSS load by 035 tons Reduce TP load by 170 lbs		8,674				8,674	Stearns SWCD, SRWD	TNC
Controlled Tile Drainage	Knaus/Bolfing (Reach A420)	Install controlled tile drainage to treat 40 acres Reduce TP load by 14 lbs	4,000	4,000	4,000	4,000	4,000	20,000	Stearns SWCD	Stearns SWCD
Wetland Restoration	Knaus/Bolfing (Reach A420)	Create restored wetland(s) to treat 10 acres Reduce TSS load by 035 tons Reduce TP load by 170 lbs					8,674	8,674	Stearns SWCD, SRWD	TNC
Controlled Tile Drainage	Stearns County Ditch 19 Stearns County Ditch 24	Install controlled tile drainage to treat 120 acres Reduce TP load by 41 lbs	12,000	12,000	12,000	12,000	12,000	60,000	Stearns SWCD	Stearns SWCD
Stream Restoration (Feasibility Study Needed)	Eden Brook Creek	Perform one feasibility study	125,000					125,000	SRWD	SRWD, DNR
Subtotal			$188,680	$72,354	$72,354	$1,098,710	$72,354	$1,504,452		
Excess Nutrients and Sediment										
Infiltration Basin	Eden Valley (Reach A388 subwatershed)	Construct infiltration basin(s) to treat 5 acres Reduce TSS load by 48 tons Reduce TP load by 185 lbs			46,119			46,119	SRWD	
Stormwater Pond	Eden Valley (Reach A388 subwatershed)	Construct stormwater pond(s) to treat 10 acres Reduce TSS load by 82 tons Reduce TP load by 222 lbs	62,500	62,500				125,000	SRWD	
Stormwater Pond	Horseshoe/Cedar Island/ Zumwalde Lakes Watershed	Construct stormwater pond(s) to treat 10 acres Reduce TSS load by 82 tons Reduce TP load by 222 lbs		62,500	62,500			125,000	SRWD	

Chain of Lakes										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Years 1 and 2 ($)					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Infiltration Basin	North Browns Lake (Reach A389 subwatershed)	Construct infiltration basin(s) to treat 5 acres Reduce TSS load by 48 tons Reduce TP load by 185 lbs	46,119					46,119	SRWD	
Stormwater Pond	North Browns Lake (Reach A389 subwatershed)	Construct stormwater pond(s) to treat 10 acres Reduce TSS load by 82 tons Reduce TP load by 222 lbs	62,500		62,500			125,000	SRWD	
Grassed Waterway	North Browns Lake, Eden Lake, Bolfing, Cedar Island Lake Areas	Install 23 acres of grassed waterway Reduce TSS load by 5 tons Reduce TP load by 5 lbs		$1,017				$1,017	Stearns SWCD	Stearns SWCD
WASCOBs	North Browns Lake, Eden Lake, Bolfing, Cedar Island Lake Areas	Construct WASCOB(s) to treat 236 acres Reduce TSS load by 68 tons Reduce TP load by 68 lbs		$63,509	$63,509			$127,018	Stearns SWCD	Stearns SWCD
Alternative Inlets	Eden Valley (Reach A385 subwatershed)	Install alternative tile intakes to treat 40 acres of cropland Reduce TSS load by 160 tons Reduce TP load by 165 lbs			8,000			8,000	Stearns SWCD	Stearns SWCD
Conservation Cover Perennials	Eden Valley (Reach A385 subwatershed)	Implement conservation cover perennials on 100 acres of cropland Reduce TSS load by 43 tons Reduce TP load by 53 lbs		25,000	25,000			50,000	Stearns SWCD	Stearns SWCD
Cover Crops	Eden Valley (Reach A385 subwatershed)	Implement cover crops/conservation crop rotation on 80 acres Reduce TSS load by 26 tons Reduce TP load by 15 lbs	8,000	8,000	8,000	8,000	8,000	40,000	Stearns SWCD	TNC
Grassed Waterway	Eden Valley (Reach A385 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs			3,000			3,000	Stearns SWCD	Stearns SWCD
No Tillage	Eden Valley (Reach A385 subwatershed)	Implement no till on 100 acres Reduce TSS load by 36 tons Reduce TP load by 43 lbs	5,000	5,000	5,000	5,000	5,000	25,000	Stearns SWCD	Stearns SWCD
Reduced Tillage	Eden Valley (Reach A385 subwatershed)	Implement reduced tillage on 100 acres Reduce TSS load by 22 tons Reduce TP load by 21 lbs	3,400	3,400	3,400	3,400	3,400	17,000	Stearns SWCD	Stearns SWCD
WASCOBs	Eden Valley (Reach A385 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs	40,000					40,000	Stearns SWCD	Stearns SWCD
Alternative Inlets	Eden Valley (Reach A388 subwatershed)	Install alternative tile intakes to treat 40 acres of cropland Reduce TSS load by 160 tons Reduce TP load by 165 lbs			8,000			8,000	Stearns SWCD	Stearns SWCD

Chain of Lakes										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Years 1 and 2 ($)					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Conservation Cover Perennials	Eden Valley (Reach A388 subwatershed)	Implement conservation cover perennials on 50 acres of cropland Reduce TSS load by 21 tons Reduce TP load by 26 lbs		25,000				25,000	Stearns SWCD	Stearns SWCD
Conservation Crop Rotation	Eden Valley (Reach A388 subwatershed)	Implement conservation crop rotation on 200 acres of cropland Reduce TSS load by 45 tons Reduce TP load by 38 lbs	15,580	15,580	15,580	15,580	15,580	77,900	Stearns SWCD	Stearns SWCD
Grassed Waterway	Eden Valley (Reach A388 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs		3,000				3,000	Stearns SWCD	Stearns SWCD
No Tillage	Eden Valley (Reach A388 subwatershed)	Implement no till on 100 acres Reduce TSS load by 36 tons Reduce TP load by 43 lbs	5,000	5,000	5,000	5,000	5,000	25,000	Stearns SWCD	Stearns SWCD
Reduced Tillage	Eden Valley (Reach A388 subwatershed)	Implement reduced tillage on 100 acres Reduce TSS load by 22 tons Reduce TP load by 21 lbs	3,400	3,400	3,400	3,400	3,400	17,000	Stearns SWCD	Stearns SWCD
WASCOBs	Eden Valley (Reach A388 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs	40,000					40,000	Stearns SWCD	Stearns SWCD
Alternative Inlets	Unnamed to Schneider Lake (Reach A411 subwatershed)	Install alternative tile intakes to treat 40 acres of cropland Reduce TSS load by 160 tons Reduce TP load by 165 lbs	1,600	1,600	1,600	1,600	1,600	8,000	Stearns SWCD	Stearns SWCD
Conservation Cover Perennials	Unnamed to Schneider Lake (Reach A411 subwatershed)	Implement conservation cover perennials on 100 acres of cropland Reduce TSS load by 43 tons Reduce TP load by 53 lbs		25,000	25,000			50,000	Stearns SWCD	Stearns SWCD
Conservation Crop Rotation	Unnamed to Schneider Lake (Reach A411 subwatershed)	Implement conservation crop rotation on 100 acres of cropland Reduce TSS load by 22 tons Reduce TP load by 19 lbs	7,790	7,790	7,790	7,790	7,790	38,950	Stearns SWCD	Stearns SWCD
Cover Crops	Unnamed to Schneider Lake (Reach A411 subwatershed)	Implement cover crops on 500 acres Reduce TSS load by 165 tons Reduce TP load by 91 lbs	50,000	50,000	50,000	50,000	50,000	250,000	Stearns SWCD	TNC
Grassed Waterway	Unnamed to Schneider Lake (Reach A411 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs			3,000			3,000	Stearns SWCD	Stearns SWCD
No Tillage	Unnamed to Schneider Lake (Reach A411 subwatershed)	Implement no till on 100 acres Reduce TSS load by 36 tons Reduce TP load by 43 lbs	5,000	5,000	5,000	5,000	5,000	25,000	Stearns SWCD	Stearns SWCD

Chain of Lakes

Implementation Action	Targeted Resource	Measurable Output for This Activity	Years 1 and 2 ($)					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Reduced Tillage	Unnamed to Schneider Lake (Reach A411 subwatershed)	Implement reduced tillage on 100 acres Reduce TSS load by 22 tons Reduce TP load by 21 lbs	3,400	3,400	3,400	3,400	3,400	17,000	Stearns SWCD	Stearns SWCD
Shoreline Buffers	Unnamed to Schneider Lake (Reach A411 subwatershed)	Establish 200 linear feet of riparian buffer Reduce TSS load by 321 tons Reduce TP load by 124 lbs			10,000			10,000	Stearns SWCD	Stearns County
Shoreline Restoration	Unnamed to Schneider Lake (Reach A411 subwatershed)	Complete shoreline restoration on 200 linear feet of shoreline			20,000			20,000	Stearns SWCD	Stearns County
WASCOBs	Unnamed to Schneider Lake (Reach A411 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs			20,000	20,000		40,000	Stearns SWCD	Stearns SWCD
Alternative Inlets	Knaus/Bolfing (Reach A420 subwatershed)	Install alternative tile intakes to treat 40 acres of cropland Reduce TSS load by 160 tons Reduce TP load by 165 lbs			8,000			8,000	Stearns SWCD	Stearns SWCD
Conservation Cover Perennials	Knaus/Bolfing (Reach A420 subwatershed)	Implement conservation cover perennials on 50 acres of cropland Reduce TSS load by 21 tons Reduce TP load by 26 lbs			25,000			25,000	Stearns SWCD	Stearns SWCD
Conservation Crop Rotation	Knaus/Bolfing (Reach A420 subwatershed)	Implement conservation crop rotation on 200 acres of cropland Reduce TSS load by 45 tons Reduce TP load by 38 lbs	15,580	15,580	15,580	15,580	15,580	77,900	Stearns SWCD	Stearns SWCD
Cover Crops	Knaus/Bolfing (Reach A420 subwatershed)	Implement cover crops on 120 acres Reduce TSS load by 40 tons Reduce TP load by 22 lbs	12,000	12,000	12,000	12,000	12,000	60,000	Stearns SWCD	TNC
Grassed Waterway	Knaus/Bolfing (Reach A420 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs			3,000			3,000	Stearns SWCD	Stearns SWCD
No Tillage	Knaus/Bolfing (Reach A420 subwatershed)	Implement no till on 100 acres Reduce TSS load by 36 tons Reduce TP load by 43 lbs	5,000	5,000	5,000	5,000	5,000	25,000	Stearns SWCD	Stearns SWCD
Reduced Tillage	Knaus/Bolfing (Reach A420 subwatershed)	Implement reduced tillage on 100 acres Reduce TSS load by 22 tons Reduce TP load by 21 lbs	3,400	3,400	3,400	3,400	3,400	17,000	Stearns SWCD	Stearns SWCD
Shoreline Buffers	Knaus/Bolfing (Reach A420 subwatershed)	Establish 200 linear feet of riparian buffer Reduce TSS load by 321 tons Reduce TP load by 124 lbs				10,000		10,000	Stearns SWCD	Stearns County
Shoreline Restoration	Knaus/Bolfing (Reach A420 subwatershed)	Complete shoreline restoration on 200 linear feet of shoreline				20,000		20,000	Stearns SWCD	Stearns County

Chain of Lakes										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Years 1 and 2 ($)					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
WASCOBs	Knaus/Bolfing (Reach A420 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs				40,000		40,000	Stearns SWCD	Stearns SWCD
Subtotal			$395,269	$411,676	$536,778	$234,150	$144,150	$1,722,023		
Groundwater Quality										
Septic System Upgrades	DWSMAs and identified priority lakes and streams	Upgrade 10 septic systems	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000	Stearns County	Stearns SWCD, MPCA
Conservation Cover Perennials Rotational Grazing	Richmond, Cold Spring, Eden Valley DWSMAs	Implement conservation cover perennials or rotational grazing on 200 acres of areas with high vulnerability Reduce TSS load by 85 tons Reduce TP load by 105 lbs	$50,000	$50,000				$100,000	Stearns SWCD	Stearns SWCD
Conservation Easements - Groundwater	Richmond, Cold Spring, Eden Valley DWSMAs	Permanently protect 40 acres of habitat in areas of high vulnerability.	$80,000	$80,000				$160,000	SRWD	Stearns SWCD, TNC
Well Sealing	Richmond, Cold Spring, Eden Valley DWSMAs	Seal 10 wells	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000	Stearns SWCD	Stearns SWCD
Subtotal			$152,000	$152,000	$22,000	$22,000	$22,000	$370,000		
Habitat										
Riparian Habitat Improvement	Eden Valley (Reach A385 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 115 tons Reduce TP load by 0 lbs	$25,000					$25,000	Stearns SWCD	TNC
Riparian Habitat Improvement	Eden Valley (Reach A388 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 115 tons Reduce TP load by 0 lbs	$25,000					$25,000	Stearns SWCD	TNC
Riparian Habitat Improvement	Unnamed to Schneider Lake (Reach A411 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 115 tons Reduce TP load by 0 lbs		$25,000				$25,000	Stearns SWCD	Stearns SWCD
Riparian Habitat Improvement	Knaus/Bolfing (Reach A420 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 115 tons Reduce TP load by 0 lbs		$25,000				$25,000	Stearns SWCD	TNC
Subtotal			$50,000	$50,000	$0	$0	$0	$100,000		
Grand Totals:			785,949	686,030	631,132	1,354,860	238,504	3,696,475		

COLD SPRING MANAGEMENT DISTRICT

At only 18 square miles, the Cold Spring Management District is the smallest of the management districts (Figure 5-10). The management district begins at the Cold Spring Dam and ends just a few miles downstream at the city of Rockville. Cold Spring Creek is the main tributary in the management district. This creek is a designated trout stream that is impaired for *E. coli*. Flows in the creek are highly dependent on an adequate supply of groundwater, and because of excessive groundwater pumping, the flow in the river may not be able to sustain the trout population. Therefore, the Minnesota Legislature directed the MNDNR to develop a groundwater model that, when completed, will be used to establish sustainable groundwater pumping rates for groundwater appropriation permits. Groundwater quality is also a major concern for this management district. The city of Cold Spring's DWSMA is rated as very high risk to nitrate contamination by the MDH and has been designated by the MDA as a Level 2 mitigation for nitrate contamination because wells have tested at 8.0 ppm at some time during the last 10 years. The Cold Spring Management District is potentially a high-growth area because of its proximity to the St. Cloud/Waite Park area and accessibility on SH 23 just a few miles off of Interstate 94.

NO_3^-

Cold Spring

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY	**17** Slightly more than 17 miles of watercourses have been altered (least miles in the SRW)	**8%** Restorable wetlands	**COLD SPRING DAM**

E. COLI IMPAIRED STREAMS

- Cold Spring Creek

NUTRIENT AND SEDIMENT IMPAIRMENTS

- Reach 420 (the entire management district). Not impaired for sediment

DRINKING WATER QUALITY

- Cold Spring and St. Joseph have very high groundwater vulnerability.
- Pilgrim's Pride and Rockville (southwest) have high groundwater vulnerability.
- High groundwater vulnerability around the Cold Spring area and to the north of Cold Spring.
- The city of Cold Spring's groundwater supply is highly vulnerable and has been designated as a Level 2 nitrate mitigation level by the MDA.

GROUNDWATER AVAILABILITY

- Area of second highest concern within the SRW.
- MNDNR groundwater model will be used to set sustainable groundwater appropriations; scheduled for completion in 2021.

ST. CLOUD DRINKING WATER

3RD Ranked third-most important management district.

HABITAT

10TH This management district is ninth out of the ten districts on a percentage basis (10 percent) and tenth in number of acres

COLD SPRING CREEK Priority Trout Resource

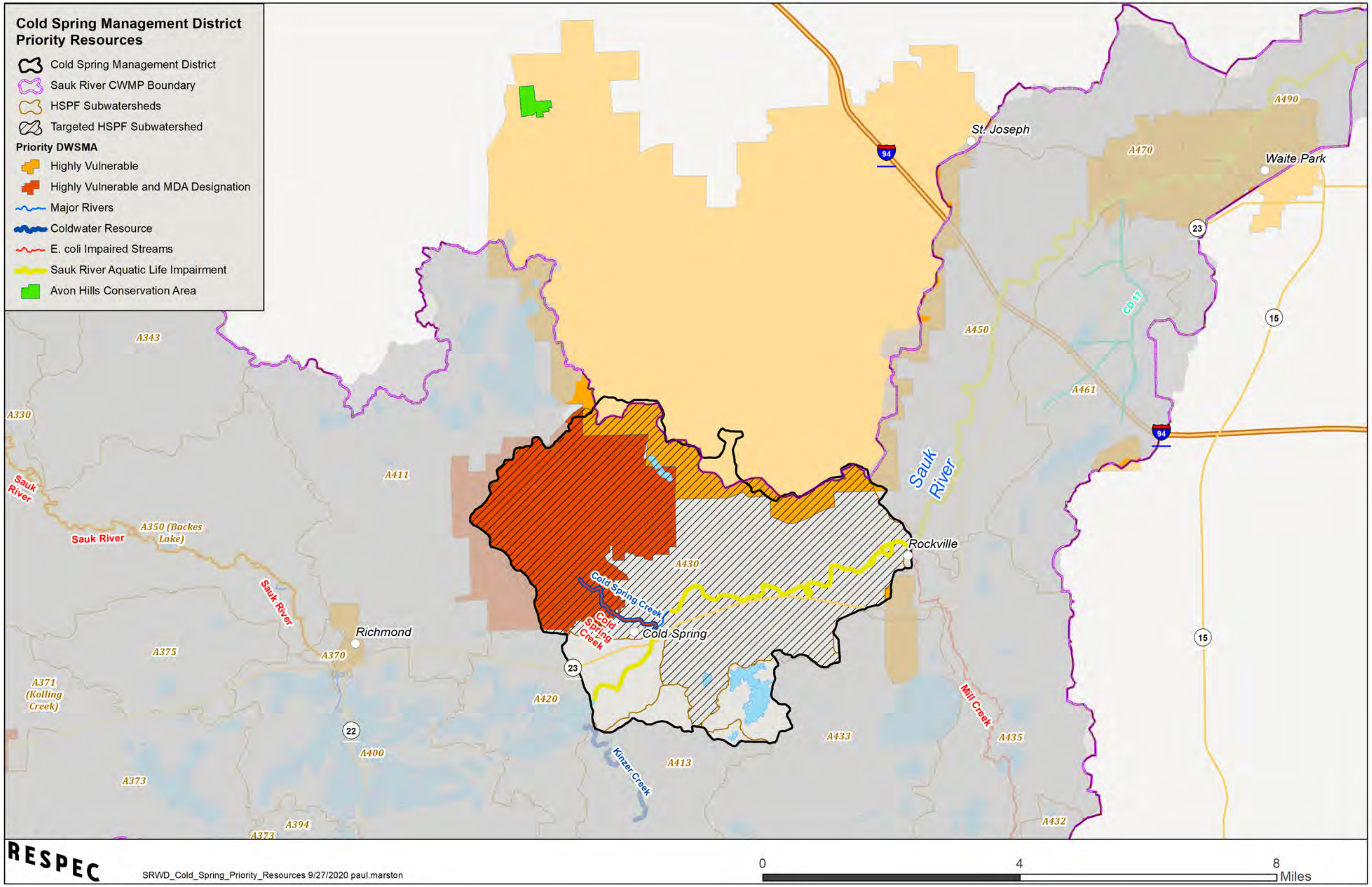


Figure 5-10. Cold Spring Management District Priority Resources.

Cold Spring

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

This management district has only 17 miles of altered stream and rivers and no public-drainage systems; however, the natural hydrology of this management district is highly altered by urbanization and development. Primary strategies to restore hydrology include restoring wetlands and natural channels, increasing storage in urban areas through stormwater management and rate/volume control, and urban stormwater improvement, infiltration and retrofit projects

10-year Measurable Goal

The 10-year water storage goal for the Cold Spring Management District is to create 12,971 (including upstream storage) acre-feet of storage to maintain current average discharge. This includes 445 acre-feet storage within this management district.

E. COLI IMPAIRED STREAMS (10-YEAR PLAN GOAL B)

Cold Spring Creek is only 1.7 miles long and the area that drains to it has seven feedlots. Specific actions will be identified in the upcoming TMDL study. Until the study is completed, priority actions include feedlot upgrades within 500 feet of the creek and improved manure management practices. Education and outreach on proper pet-waste handling will also reduce urban sources of *E. coli* to the creek.

GROUNDWATER AVAILABILITY (10-YEAR PLAN GOAL G)

Cold Spring: The MNDNR is collecting data and developing a groundwater-flow model to evaluate the impacts of pumping on Cold Spring Creek. A groundwater-flow model simulates existing groundwater conditions and can be used as a predictive tool to guide future groundwater use. The MNDNR will monitor and collect data through 2020. An interim groundwater-flow model was developed in 2018. A final report will be completed in 2021 (MNDNR, 2016).

GROUNDWATER QUALITY (10-YEAR PLAN GOAL H)

Cold Spring: The MDA has assigned Cold Spring a Level 2 mitigation, which means that at least one of the city wells has had nitrate levels at or above 8.0 ppm at any time in the last 10 years. Because of this designation, the MDA will form a local advisory team to develop a monitoring, outreach, and implementation plan to address nitrate contamination.

Cold Spring is also rated as having very highly vulnerable groundwater because of the strong interaction between surface water and groundwater. Reducing the threat of additional contamination will rely on leveraging all tools but will primarily be accomplished by converting land uses to those that pose the least threat, including converting agricultural land within the DWSMA to conservation lands, reducing nitrogen fertilizer use, and implementing nitrogen fertilizer BMPs in agricultural and urban areas.

City of St. Joseph: St. Joseph is rated as having very highly vulnerable groundwater because of the strong interaction between surface water and groundwater. St. Joseph's wellhead protection area covers a large area and will require increased outreach and education to create awareness about the risks of groundwater contamination. Key actions to reduce the threat of contamination are changing land uses to those that pose the least threat, such as converting agricultural land within the DWSMA to permanent conservation, reducing nitrogen fertilizer use, and implementing nitrogen fertilizer BMPs in agricultural and urban areas. Consideration should be given to land use suitability as development occurs, and measures should be taken to protect the areas of the highest vulnerability.

See *Mini-Metro Management District*.

City of Rockville and the Pilgrim's Pride Industrial Facility (Pilgrim's Pride): The Rockville and Pilgrim's Pride wellhead protection areas are rated as being highly vulnerable to contamination. Containing threats from emergency spills and properly siting suitable land use activities will reduce groundwater contamination risk.

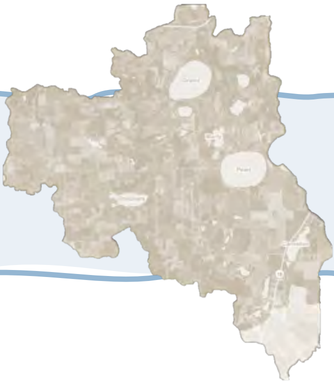
HABITAT (10-YEAR PLAN GOAL J)

Cold Spring Creek is an MNDNR designated trout stream with a low but viable population of brook trout. Conditions in Cold Spring Creek are not optimal for Brook Trout as the creek receives high volumes of stormwater runoff during rain events, occasionally experiences periods of low flow volume, and the lower portions of the creek are characterized as wide, shallow, and sandy (Pelham, 2018). Opportunities to improve the conditions for brook trout include stormwater management practices that slow down or divert stormwater runoff, protecting the upstream areas with permanent conservation easements, restoring and narrowing the downstream reaches, and removing a sheet-pile structure that restricts fish movement downstream.

Cold Spring										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
Streambank Stabilization	Sauk River and other Priority Streams	Stabilize or restore 0.2 stream mile of streambank			158,400			158,400	SRWD	DNR
Subtotal			$0	$0	$158,400	$0	$0	$158,400		
E. Coli										
Feedlot Improvements/ Manure Storage	Entire management district (Reach A430 subwatershed)	Improve feedlots and manure storage for 300 animal units			36,000			36,000	Stearns SWCD	Stearns County, MPCA
Nutrient Management	Entire management district (Reach A430 subwatershed)	Implement nutrient management plan w/manure incorporation on 300 acres Reduce TP load by 24 lbs	900	900	900	900	900	4,500	Stearns SWCD	Stearns County
Nutrient Management Plans	Entire management district (Reach A430 subwatershed)	Complete one plan	3,400					3,400	Stearns SWCD	
Subtotal			$4,300	$900	$36,900	$900	$900	$43,900		
Excess Nutrients and Sediment										
Stormwater Management	City of Cold Spring	Construct stormwater pond(s) to treat 20 acres Reduce TSS load by 163 tons Reduce TP load by 443 lbs		15,173				15,173	SRWD	
Stormwater Practices	Entire management district (Reach A430 subwatershed)	Construct 2 infiltration basins Reduce TSS load by 19 tons Reduce TP load by 74 lbs	50,000	50,000	50,000	50,000	50,000	250,000	SRWD	SWCDs
Conservation Crop Rotation	Entire management district (Reach A430 subwatershed)	Implement conservation crop rotation on 1,500 acres of cropland Reduce TSS load by 334 tons Reduce TP load by 281 lbs	116,850	116,850	116,850	116,850	116,850	584,250	Stearns SWCD	
Grassed Waterway	Entire management district (Reach A430 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs			3,000			3,000	Stearns SWCD	
No Tillage	Entire management district (Reach A430 subwatershed)	Implement no till on 200 acres Reduce TSS load by 71 tons Reduce TP load by 85 lbs	10,000	10,000	10,000	10,000	10,000	50,000	Stearns SWCD	
Reduced Tillage	Entire management district (Reach A430 subwatershed)	Implement reduced tillage on 200 acres Reduce TSS load by 45 tons Reduce TP load by 41 lbs	6,800	6,800	6,800	6,800	6,800	34,000	Stearns SWCD	
Riparian Buffers	Entire management district (Reach A430 subwatershed)	Establish 500 linear feet of riparian buffer Reduce TSS load by 1,492 tons Reduce TP load by 543 lbs		5,500		5,750		11,250	Stearns SWCD	TNC
Streambank Stabilization	Entire management district (Reach A430 subwatershed)	Stabilize or restore 0.1 stream miles of streambank				1,347		1,347	SRWD	Stearns SWCD, TNC
WASCOBs	Entire management district (Reach A430 subwatershed)	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs			1,973			1,973	Stearns SWCD	
Subtotal			$183,650	$204,323	$188,623	$190,747	$183,650	$950,993		

Cold Spring										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)	Estimated Cost	Lead LGU	Supporting Entities
Groundwater Availability										
Irrigation Water Management	Entire management district (Reach A430 subwatershed)	Implement irrigation water management on 200 acres of irrigated cropland	800	800	800	800	800	4,000	Stearns SWCD	
Wetland Restoration	Entire management district (Reach A430 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs			200,000			200,000	Stearns SWCD, SRWD	TNC
Subtotal			$800	$800	$200,800	$800	$800	$204,000		
Groundwater Quality										
Septic system upgrades	DWSMAs and identified priority lakes and streams	Upgrade 10 septic systems	20,000	20,000	20,000	20,000	20,000	100,000	Stearns County	Stearns SWCD, MPCA, MDA
Conservation Cover Perennials (Kernza)	Entire management district (Reach A430 subwatershed)	Implement conservation cover perennials or rotational grazing on 200 acres of areas with high vulnerability Reduce TSS load by 85 tons Reduce TP load by 105 lbs	20,000	20,000	20,000	20,000	20,000	100,000	Stearns SWCD	MDA
Conservation easements	Entire management district (Reach A430 subwatershed)	Permanently protect 80 acres of habitat in areas of high vulnerability.	64,000	64,000	64,000	64,000	64,000	320,000	SRWD	Stearns SWCD, TNC, MDA
Cover crops	Entire management district (Reach A430 subwatershed)	Implement cover crops on 1,000 acres Reduce TSS load by 329 tons Reduce TP load by 181 lbs	100,000	100,000	100,000	100,000	100,000	500,000	Stearns SWCD	TNC, MDA
Nutrient Management (Implementation)	Entire management district (Reach A430 subwatershed)	Implement nutrient management plan w/manure incorporation on 1,200 acres Reduce TP load by 98 lbs	3,600	3,600	3,600	3,600	3,600	18,000	Stearns SWCD	MDA
Nutrient Management Plans	Entire management district (Reach A430 subwatershed)	Complete 4 plans	3,400	3,400	3,400	3,400		13,600	Stearns SWCD	MDA
Well sealing	Entire management district (Reach A430 subwatershed)	Seal 10 wells	2,000	2,000	2,000	2,000	2,000	10,000	Stearns SWCD	MDA
Subtotal			$213,000	$213,000	$213,000	$213,000	$209,600	$1,061,600		
Habitat										
Conservation easements	Entire management district (Reach A430 subwatershed)	Permanently protect 200 acres of habitat.	100,000	100,000	100,000	100,000	100,000	500,000	SRWD	Stearns SWCD, TNC
Subtotal			$100,000	$100,000	$100,000	$100,000	$100,000	$500,000		
Grand Totals:			$501,750	$519,023	$897,723	$505,447	$494,950	$2,918,893		

(1) Specific SWCD and County will be determined by implementation location.



GRAND PEARL MANAGEMENT DISTRICT

The 55-square-mile area of the Grand Pearl Management District is highly agricultural with livestock operations that have negatively impacted surface-water resources (Figure 5-11). Because of the management district's proximity to the drinking water intake for the city of St. Cloud, surface-water quality is of special concern. Four priority lakes are in this management district: two that are impaired and two that have high water quality. Kinzer Creek is a cold-water creek that no longer supports trout populations but remains a priority for the planning partnership.

The Grand Pearl Management District ranks second highest in the SRW for groundwater availability and groundwater quality concerns. The lower portion of the area has sandy soils that are irrigated for agricultural productivity. That region's geology allows for high-infiltration rates that can restore groundwater used for irrigation; however, care must be taken to prevent groundwater contamination from upland practices. The water quality for private drinking water wells in the area around Grand and Pearl Lakes is of concern, as is the drinking water source for the city of Rockville.

Grand Pearl

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY

45
Nearly 45 miles of watercourses have been altered (third-lowest in the SRW)

0
No public-drainage systems

8%
Restorable wetlands

Grand Lake Dam (MNDNR)

Mill Creek (fish barrier)

Pearl Lake (MNDNR)

E. COLI IMPAIRED STREAMS

MILL CREEK
Watershed priority because of the St. Cloud drinking

NUTRIENT AND SEDIMENT IMPAIRMENTS

IMPAIRED LAKES IN THE WATERSHED
Pearl (Tier 1; see "Priority Impaired Lakes" in Ch. 4)
Goodners (Tier 1)

REACH 430 (MAINSTEM SAUK)
PrioritySubwatershed (Reaches) to Reduce Downstream Impacts

PROTECTION LAKES

- Grand (Tier 2; see "High Water Quality Lakes" in Ch. 4)
- Carnelian (Tier 2)

DRINKING WATER QUALITY

- Rockville southwest has high groundwater
- High groundwater vulnerability around the Grand and Pearl Lakes area

GROUNDWATER AVAILABILITY

Currently no known issues, but this area has the second-most agricultural irrigation wells in the SRW.

SAINT CLOUD DRINKING WATER

2ND
Ranked second-most important management district.

HABITAT

3RD
Third in the percentage of lands in conservation (30 percent) for a total of 7.7075 acres (eighth out of ten districts in number of acres).

GRAND AND PEARL LAKES
are biologically significant.

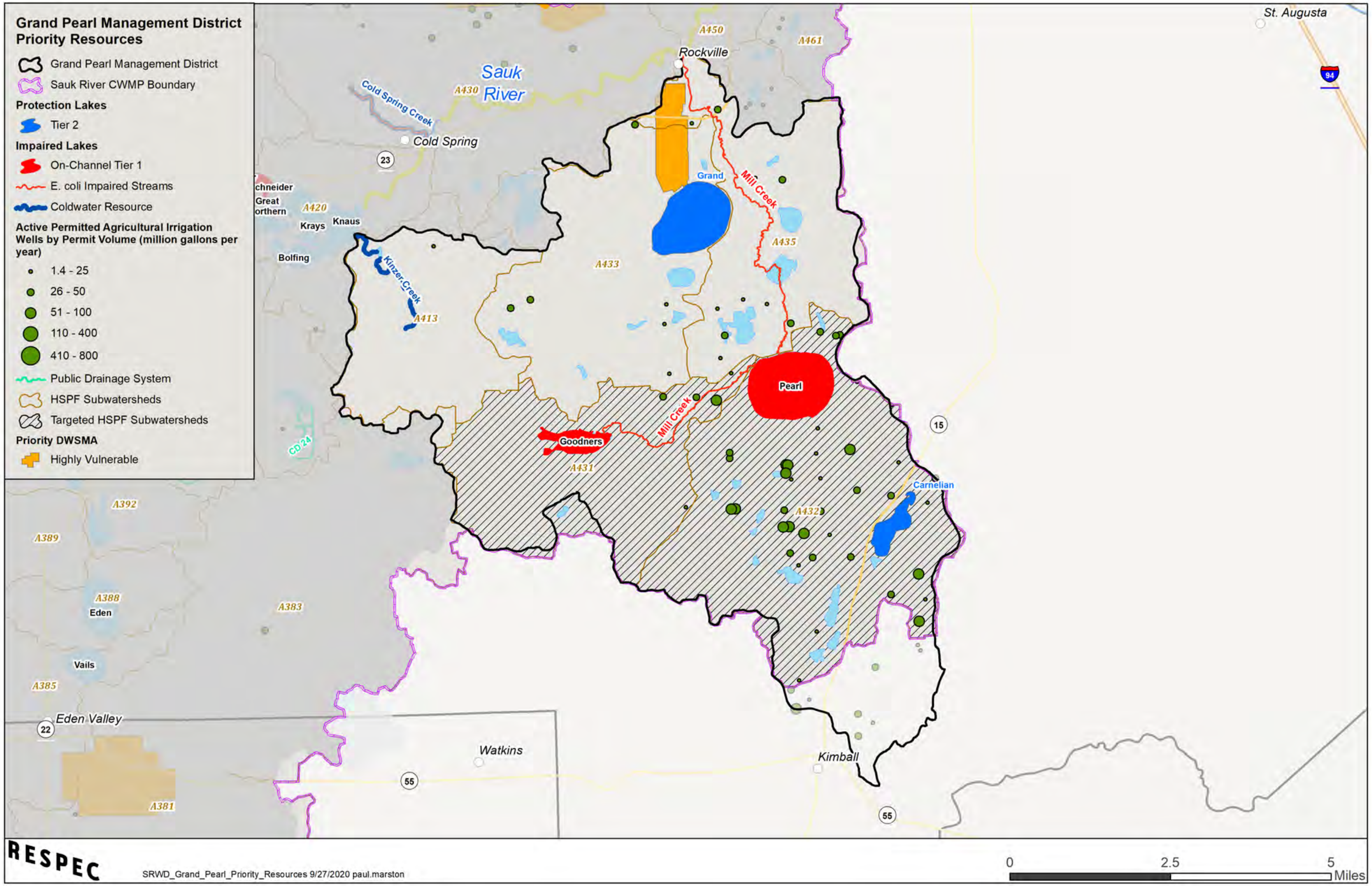


Figure 5-11. Grand Pearl Management District Priority Resources.

Grand Pearl

KEY RESOURCES, STRATEGIES, AND GOALS

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

This management district has 45 miles of altered streams and rivers, which is the second lowest number of miles in the SRW. Implementation actions that increase the storage on the landscape and allow sediment and nutrient settling to occur upstream from the priority lakes will result in the greatest impact. Projects can include completely restoring drained wetlands, as well as projects that temporarily hold water, such as WASCOBs. Wetland restorations should be targeted to locations that allow for infiltration and groundwater recharge.

10-year Measurable Goal

The 10-year water storage goal for the Grand Pearl Management District is to create 324 acre-feet of storage in order to maintain current average discharge.

E. COLI IMPAIRED STREAMS (10-YEAR PLAN GOAL B)

Mill Creek from its headwaters to the Sauk River was determined to be impaired for aquatic recreation in 2006 because of excess *E. coli* (Barr, 2012). Riparian pastures are the main source of *E. coli* (Barr, 2012) during all weather conditions, and especially in dry weather. Restricting livestock access to surface waters and providing an alternative water source for cattle, as well as improving pasture management, are the most important implementation strategies. Trapping and treating runoff from feedlots and increasing the number of acres using manure management plans will reduce *E. coli* loading, particularly during wet-weather periods. Mill Creek is the highest priority for *E. coli* because of concerns for St. Cloud drinking water.

Waterbody Name	Waterbody Description	Very High-Flow Reduction (%)	High-Flow Reduction (%)	Mid-Flow Reduction (%)	Low-Flow Reduction (%)	Very Low-Flow Reduction (%)	Top Three Sources Causing Impairments
Mill Creek	Headwaters to Sauk River	59	68	61	84	93	1. Pasture near streams or waterways 2. Feedlots without runoff controls 3. Cropland with surface-applied manure.

IMPAIRED LAKES (10-YEAR PLAN GOAL C)

Pearl Lake – Tier 1

Pearl Lake is 750 acres with an average depth of 32 feet, developed shoreline, and a large watershed area of 18,237 acres of primarily agricultural land use. The lake needs to have an overall 25 percent reduction in TP loading to achieve water quality standards (Barr, 2012) with internal and watershed loading sources having nearly an equal share of the load-reduction targets. Curly-leaf pondweed should be managed to reduce the in-lake TP fluxes during die-off that fuels algal blooms. Conservation cover and cover crops should be implemented in the immediate drainage area, eroding stream banks should be stabilized, and native vegetation should be restored along shorelines to improve habitat and trap excess nutrients and sediment. Pearl Lake is monitored by the MNDNR's Sentinel Lakes, which is a long-term ecosystem-monitoring program to detect, understand, and learn from changes in lakes over time.

Goodners Lake – Tier 1

Goodners Lake is a 190-acre recreational development lake within the North Central Hardwood Forest ecosystem. It has a relatively stable water level range, within 2.56 feet (1697 – 2005 record). Goodners Lake has a maximum depth of 24 feet with approximately 51 percent (97 acres) being less than 15 feet in depth. Goodners Lake has a nice variety of fish (20 species) and is known as an excellent northern pike fishery, with good walleye and panfish as well. Goodners Lake is not always suitable for swimming and wading due to low clarity or excessive algae from nutrients such as Phosphorus. For example, Phosphorus levels were 56 parts per million in September 2017. Since 1975, when water clarity has been monitored, there has been a reduction in clarity. Currently, the water quality of Goodners Lake is only better than 15 percent of lakes in Minnesota. The land use within 1,000 feet of Goodners Lake is primarily wetland, agricultural (planted/cultivated) and forest. Only 5.5 percent of the shoreland district area is developed. A TMDL study has not yet been completed on this lake.

PROTECTION LAKES (10-YEAR PLAN GOAL D)

Grand Lake – Tier 2

Grand Lake is 650 acres in size with an average depth of 19 feet. The drainage area for this lake is 41 percent disturbed and approximately 25 percent of the watershed area is in forested land cover; however, several feedlots are within close proximity of the lake. Grand Lake is infested with starry stonewort, which is being controlled thanks to a successful early detection and ongoing control program. Complete eradication of starry stonewort is difficult, and ongoing control will be necessary.

Carnelian Lake – Tier 2

Carnelian Lake is a 180-acre, landlocked lake, listed as a recreational development lake within the North Central Hardwood Forest ecosystem. It is very highly connected to the water table aquifer. As such, and without an outlet, Carnelian Lake has a significant range of water levels of 10.56 feet (1957 – 2009 record). Carnelian Lake has a maximum depth of 36 feet with approximately 35 percent (63 acres) being less than 15 feet in depth. Carnelian Lake has a nice variety of fish (19 species) with good spawning success for northern pike and panfish. Carnelian Lake is considered suitable for swimming and wading with good clarity and low algae levels throughout the open water season. Regarding clarity, Carnelian Lake has better water quality than 57 percent of lakes in Minnesota. In September 2017, for example, Phosphorus levels were at just 8.5 parts per million, indicating low nutrient loading. The land use within 1,000 feet of Carnelian Lake is primarily agricultural (planted/cultivated) or forest and 16 percent of the shoreland district area is developed. The drainage area to the lake is highly disturbed at 75 percent.

Lake Name	Lake I.D. Number	Current TP (µg/l)	TP Standard (µg/l)	10-Year Plan Reduction[a] Goal (lbs/year)	Long Term Load Reduction Goal[a] (lbs/year)	Transparency Trend	Biological Significance Rating
Impaired Lakes							
Pearl	73003700	34	40	91	3,108	No evidence of trend	Moderate
Goodners	73007600	86	40	50	835	NA	Moderate
Protection Lakes							
Grand	73005500	33	40	46	774	Improving	Moderate
Carnelian	73003800	27	40	14	242	Declining	NA

(a) From 2019 MPCA/MNDNR LPSS Spreadsheet (MNDNR, 2019b) (data through 2018).

GROUNDWATER AVAILABILITY (10-YEAR PLAN GOAL G)

Seventy high-capacity agricultural irrigation wells are in the management district. Most of these irrigators are within the southeastern portion of the district in an area closely associated with the Anoka Sand Plain, a unique ecological region characterized by excessively well-drained, sandy soils. Prioritized on-the-ground conservation measures are those that reduce the demand for groundwater consumption and improve groundwater recharge. Restoring wetlands, improving soil health, and supporting irrigation management are key actions. Consideration should be given to increasing incentives for wetland banking in areas with high-recharge potential.

GROUNDWATER QUALITY (10-YEAR PLAN GOAL H)

City of Rockville:

The city of Rockville (the City) has a highly vulnerable groundwater supply. Reducing the threat of additional contamination will rely on leveraging all tools but will primarily be accomplished by implementing land management practices to protect the City of Rockville's groundwater supply from contamination. Threat removal includes converting agricultural land to conservation lands, identifying and removing or containing petroleum and chemical storage tanks, and implementing emergency preparedness exercises to contain threats in the event of an emergency spill. Preventative measures include properly siting suitable land management activities.

CITY OF ST. CLOUD DRINKING WATER (10-YEAR PLAN GOAL I)

The Grand Pearl Management District is within Priority Area A of the city of St. Cloud drinking water intake. It takes less than 8 hours for water leaving this district to reach St. Cloud's drinking water intake location. To reduce the threat of drinking water contamination, key factors such as improper manure management and manure storage facilities, sediment from stream banks and agriculture runoff, and failing septic systems should be addressed.

HABITAT (10-YEAR PLAN GOAL J)

Kinzer Creek is a small, coldwater creek that drains into Knaus Lake. Although Kinzer Creek is no longer designated as a trout stream, the Advisory Committee determined that it should remain a priority high-quality resource. Field investigations should be undertaken to determine opportunities for habitat improvement, particularly those that create a shaded overstory to keep the stream water temperatures cool and enhance buffers to slow drainage into the creek.

Grand Pearl										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
Wetland Restoration	Goodners Lake (Reach A431 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs					200,000	200,000	Stearns SWCD, SRWD	TNC
Streambank Stabilization	Pearl Lake (Reach A432 subwatershed)	Stabilize or restore 0.1 stream miles of streambank					26,400	26,400	SRWD	Stearns SWCD, TNC, DNR
Wetland Restoration	Pearl Lake (Reach A432 subwatershed)	Create restored wetland(s) to treat 40 acres Reduce TSS load by 142 tons Reduce TP load by 680 lbs					200,000	200,000	Stearns SWCD, SRWD	TNC
Subtotal			$0	$0	$0	$0	$426,400	$426,400		
E. Coli										
Nutrient Management	Entire management district	Implement nutrient management plan w/manure incorporation on 600 acres Reduce TP load by 49 lbs	1,800	1,800	1,800	1,800	1,800	9,000	Stearns SWCD	Stearns County
Nutrient Management Plans	Entire management district	Complete 2 plans	3,400	3,400				6,800	Stearns SWCD	Stearns County
Feedlot Improvements/Manure Storage	Goodners Lake (Reach A431 subwatershed)	Improve feedlots and manure storage for 600 animal units				240,000		240,000	Stearns SWCD	Stearns County, MPCA
Livestock Exclusion and Alternative Watering	Goodners Lake (Reach A431 subwatershed)	Install fencing and restrict livestock access along 80 acres of riparian areas				20,000		20,000	Stearns SWCD	
Nutrient Management	Goodners Lake (Reach A431 subwatershed)	Implement nutrient management plan w/manure incorporation on 600 acres Reduce TP load by 49 lbs	1,800	1,800	1,800	1,800	1,800	9,000	Stearns SWCD	Stearns County
Nutrient Management Plans	Goodners Lake (Reach A431 subwatershed)	Complete 2 plan(s)	3,400	3,400				6,800	Stearns SWCD	
Prescribed Grazing Plans	Goodners Lake (Reach A431 subwatershed)	Complete 2 prescribed grazing plans			3,500		3,500	7,000	Stearns SWCD	
Feedlot Improvements/Manure Storage	Pearl Lake (Reach A432 subwatershed)	Improve feedlots and manure storage for 600 animal units				240,000		240,000	Stearns SWCD	Stearns County, MPCA
Livestock Exclusion and Alternative Watering	Pearl Lake (Reach A432 subwatershed)	Install fencing, provide water, and restrict livestock access along 80 acres of riparian areas		20,000				20,000	Stearns SWCD	
Nutrient Management	Pearl Lake (Reach A432 subwatershed)	Implement nutrient management plan w/manure incorporation on 600 acres Reduce TP load by 49 lbs	1,800	1,800	1,800	1,800	1,800	9,000	Stearns SWCD	Stearns County
Nutrient Management Plans	Pearl Lake (Reach A432 subwatershed)	Complete 2 plans	3,400	3,400				6,800	Stearns SWCD	
Prescribed Grazing Plans	Pearl Lake (Reach A432 subwatershed)	Complete 2 prescribed grazing plans		3,500		3,500		7,000	Stearns SWCD	
Sutotal			$15,600	$39,100	$8,900	$508,900	$8,900	$581,400		

Grand Pearl											
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment										
Shoreline Buffers	Pearl Lake (Reach A432 subwatershed)	Establish 200 linear feet of riparian buffer Reduce TSS load by 321 tons Reduce TP load by 124 lbs				10,000		10,000	Stearns SWCD	Stearns County
Shoreline Restoration	Pearl Lake (Reach A432 subwatershed)	Complete shoreline restoration on 200 linear feet of shoreline				20,000		20,000	Stearns SWCD	Stearns County
Stormwater Management at John Clark Elementary, Parking Lot	City of Rockville	Construct stormwater pond(s) to treat 40 acres Reduce TSS load by 326 tons Reduce TP load by 886 lbs			416,366			416,366	SRWD	
Stormwater Management via catchment sumps, perimeter sand filters, etc.	City of Rockville	Implement stormwater practices(s) to treat 10 acres Reduce TSS load by 82 tons Reduce TP load by 221 lbs				125,000		125,000	SRWD	
Conservation Cover Perennials	Goodners Lake (Reach A431 subwatershed)	Implement conservation cover perennials on 50 acres of cropland Reduce TSS load by 21 tons Reduce TP load by 26 lbs				25,000		25,000	Stearns SWCD	
Conservation Crop Rotation	Goodners Lake (Reach A431 subwatershed)	Implement conservation crop rotation on 100 acres of cropland Reduce TSS load by 22 tons Reduce TP load by 19 lbs	7,790	7,790	7,790	7,790	7,790	38,950	Stearns SWCD	
Cover crops	Goodners Lake (Reach A431 subwatershed)	Implement cover crops on 180 acres Reduce TSS load by 59 tons Reduce TP load by 33 lbs	18,000	18,000	18,000	18,000	18,000	90,000	Stearns SWCD	TNC
Grassed Waterway	Goodners Lake (Reach A431 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs				3,000		3,000	Stearns SWCD	
No Tillage	Goodners Lake (Reach A431 subwatershed)	Implement no till on 50 acres Reduce TSS load by 18 tons Reduce TP load by 21 lbs	2,500	2,500	2,500	2,500	2,500	12,500	Stearns SWCD	
Reduced Tillage	Goodners Lake (Reach A431 subwatershed)	Implement reduced tillage on 50 acres Reduce TSS load by 11 tons Reduce TP load by 10 lbs	1,700	1,700	1,700	1,700	1,700	8,500	Stearns SWCD	
WASCOBs	Goodners Lake (Reach A431 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs				80,000		80,000	Stearns SWCD	
Conservation Cover Perennials	Pearl Lake (Reach A432 subwatershed)	Implement conservation cover perennials on 100 acres of cropland Reduce TSS load by 43 tons Reduce TP load by 53 lbs			50,000			50,000	Stearns SWCD	
Conservation Crop Rotation	Pearl Lake (Reach A432 subwatershed)	Implement conservation crop rotation on 100 acres of cropland Reduce TSS load by 22 tons Reduce TP load by 19 lbs	7,790	7,790	7,790	7,790	7,790	38,950	Stearns SWCD	
Cover crops	Pearl Lake (Reach A432 subwatershed)	Implement cover crops on 50 acres Reduce TSS load by 16 tons Reduce TP load by 9 lbs	5,000	5,000	5,000	5,000	5,000	25,000	Stearns SWCD	TNC

Grand Pearl										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Grassed Waterway	Pearl Lake (Reach A432 subwatershed)	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs				3,000		3,000	Stearns SWCD	
No Tillage	Pearl Lake (Reach A432 subwatershed)	Implement no till on 100 acres Reduce TSS load by 36 tons Reduce TP load by 43 lbs	5,000	5,000	5,000	5,000	5,000	25,000	Stearns SWCD	
Reduced Tillage	Pearl Lake (Reach A432 subwatershed)	Implement reduced tillage on 100 acres Reduce TSS load by 22 tons Reduce TP load by 21 lbs	3,400	3,400	3,400	3,400	3,400	17,000	Stearns SWCD	
WASCOBs	Pearl Lake (Reach A432 subwatershed)	Construct WASCOB(s) to treat 80 acres Reduce TSS load by 32 tons Reduce TP load by 43 lbs				80,000		80,000	Stearns SWCD	
Stormwater Practices	Sauk River, Grand Lake, Pearl Lake, Goodners Lake, and Carnelian Lake	Construct 5 stormwater ponds Reduce TSS load by 41 tons Reduce TP load by 111 lbs				125,000	125,000	250,000	SRWD	Stearns SWCD
Subtotal			$51,180	$51,180	$517,546	$522,180	$176,180	$1,318,266		
Groundwater Availability										
Irrigation water management/scheduling	Entire management district	Implement irrigation water management on 1,000 acres of irrigated cropland	4,000	4,000	4,000	4,000	4,000	20,000	Stearns SWCD	
Subtotal			$4,000	$4,000	$4,000	$4,000	$4,000	$20,000		
Groundwater Quality										
Septic system upgrades	DWSMAs and identified priority lakes and streams	Upgrade 10 septic systems	20,000	20,000	20,000	20,000	20,000	100,000	Stearns County	Stearns SWCD
Conservation Cover Perennials	Grand and Pearl Lakes Area, Rockville SW	Implement conservation cover perennials or rotational grazing on 80 acres of areas with high vulnerability Reduce TSS load by 34 tons Reduce TP load by 42 lbs				20,000	20,000	40,000	Stearns SWCD	
Conservation easements	Grand and Pearl Lakes Area, Rockville SW	Permanently protect 40 acres of habitat.				160,000		160,000	SRWD	Stearns SWCD, TNC
Well Sealing	Grand and Pearl Lakes Area, Rockville SW	Seal 10 wells	2,000	2,000	2,000	2,000	2,000	10,000	Stearns SWCD	
Subtotal			$22,000	$22,000	$22,000	$202,000	$42,000	$310,000		
Habitat										
Conservation easements	Pearl Lake (Reach A432 subwatershed)	Permanently protect 200 acres of habitat.				250,000	250,000	500,000	SRWD	Stearns SWCD, TNC
Streambank Stabilization	Goodners Lake (Reach A431 subwatershed)	Stabilize or restore 0.1 stream miles of streambank				26,400		26,400	SRWD	Stearns SWCD, TNC
Shoreline Buffers	Grand Lake (Reach A433 subwateshed)	Establish 200 linear feet of riparian buffer Reduce TSS load by 321 tons Reduce TP load by 124 lbs				10,000		10,000	Stearns SWCD	City of Rockville

Grand Pearl										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Habitat (cont.)										
Shoreline Restoration	Grand Lake (Reach A433 subwateshed)	Complete shoreline restoration on 200 linear feet of shoreline				20,000		20,000	Stearns SWCD	City of Rockville
Subtotal			$0	$0	$0	$306,400	$250,000	$556,400		
Grand Totals:			92,780	116,280	552,446	1,543,480	907,480	3,212,466		

MINI METRO MANAGEMENT DISTRICT

The Mini-Metro Management District is the furthermost downstream reach and covers a 35-square-mile area (Figure 5-12). Of the management districts, the Mini-Metro Management District is the most populous, encompassing the city of Waite Park and major portions of the cities of St. Joseph and St. Cloud. The Sauk River outlets to the Mississippi River just above the drinking water intake for the city of St. Cloud, which provides clean and safe drinking water to 70,000 people each day. The Sauk River's importance to the city of St. Cloud's drinking water is the priority concern for this management district. Therefore, targeting implementation actions for this management district is weighted to those practices that address known contaminant sources, such as manure storage facilities, stormwater discharge, cropland sediment runoff, stream bank erosion, and failing septic systems or aging sanitary sewer infrastructure. Stearns County sends most land use notices to the cities of St. Joseph, Waite Park, and St. Cloud with the intent of that the city reviews the application for compliance with DWSMA protection policies and provides comments to the county for possible permit conditions.

The Sauk River experiences high levels of nutrients and because most of the downstream portion of the management district is developed, planning for and managing stormwater is one of the primary implementation strategies. Proper planning for land use conversion along growth corridors will be important because of the potential for increasingly more altered hydrology. The upstream portions of the management district are mixed land use, including pasture, cultivated crops, some forested areas, and approximately 15 feedlots. The cities of St. Joseph and Waite Park obtain their drinking water from groundwater and have DWSMAs with very high (St. Joseph) or high (Waite Park) vulnerability. Groundwater supplies for private well owners are also a concern as much of the area rates as highly sensitive to pollution.

The scenic, lower portion of the Sauk River provides an excellent opportunity for canoeing and kayaking. The river flow is faster in this area, and paddlers are advised to use caution through the area as they may experience rapids depending on flow.

Mini Metro

PRIORITY ISSUES AND RESOURCES

ALTERED HYDROLOGY

35
Nearly 35 miles of watercourses have been altered (second-lowest in the SRW)

7.5
Miles of public-drainage systems.; ranked sixth out of the eight management districts that have public-drainage systems.

10%
Restorable wetlands

NUTRIENT AND SEDIMENT IMPAIRMENTS

REACH 470

REACH 490

PROTECTION LAKES

- Pleasant (Tier 2; see "High Water Quality Lakes" in Ch. 4)

GROUNDWATER QUALITY

- St. Joseph has very high groundwater vulnerability and Waite Park has high groundwater vulnerability.
- High groundwater vulnerability throughout much of the area.

DRINKING WATER QUALITY

This management area is the *most critical* to focus on for preventing degradation of St. Cloud's drinking water supply.

LAND USE

Most highly developed of the ten districts (approximately 14 percent developed).

HABITAT

8TH Ranks eighth in percent of area in conservation (14 percent) and ninth in number of acres (3,368 acres).

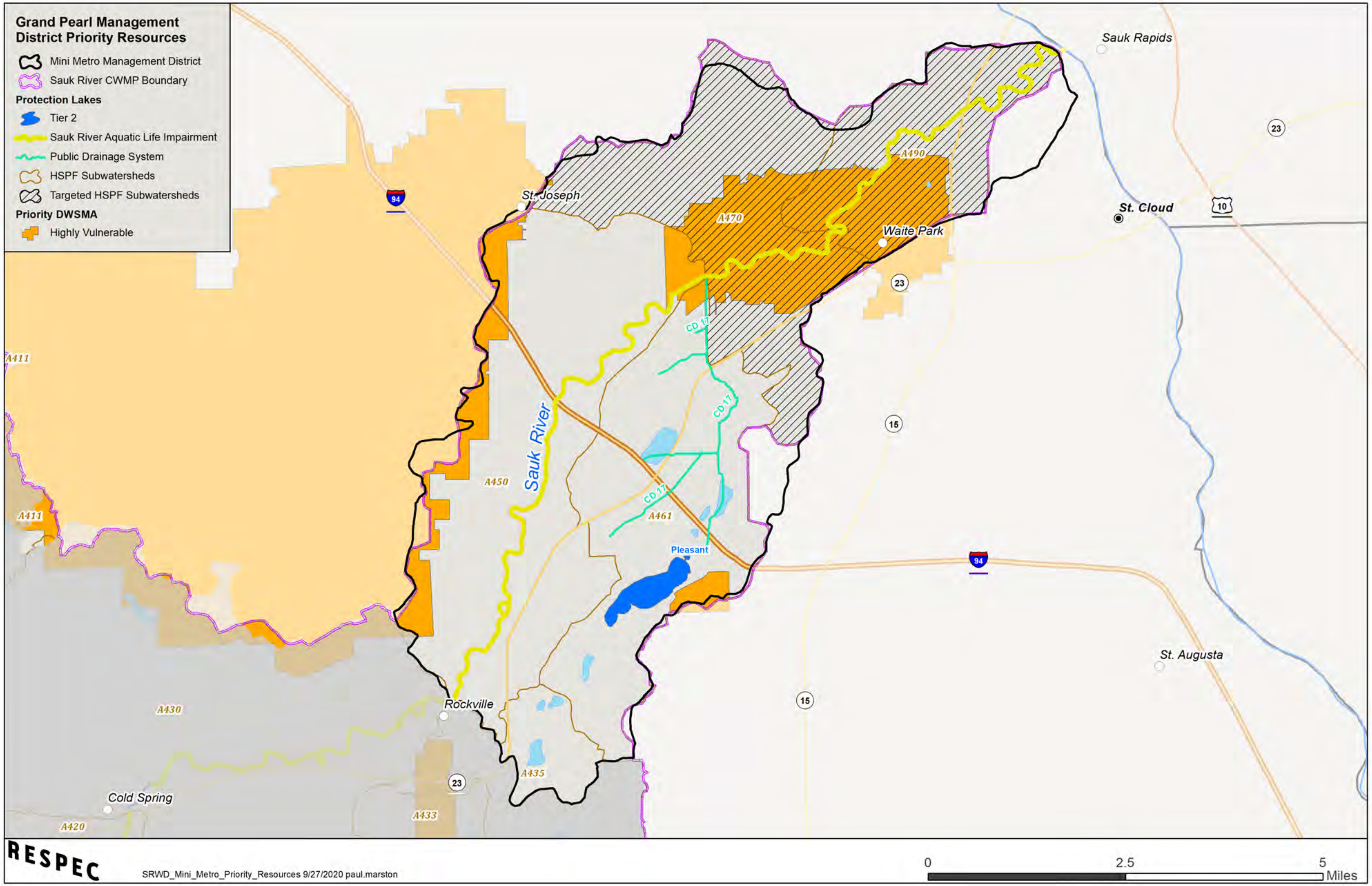


Figure 5-12. Mini-Metro Management District Priority Resources.

Mini Metro

KEY RESOURCES AND STRATEGIES

ALTERED HYDROLOGY (10-YEAR PLAN GOAL A)

Although the Mini-Metro Management District ranks second to the lowest in the number of altered stream miles, the landscape has been highly altered by urbanization in the St. Cloud and Waite Park areas. This growth area will continue to have increased development pressure that will require more aggressive stormwater management strategies to be implemented. Stormwater management options that consider reduced rate, volume, and flow to the Sauk River as well as retrofits to currently developed areas should be considered. New development options should include low impact development tools that provide open space and natural areas. Wetland banking could be used as a tool to encourage restoration of drained wetlands.

10-year Measurable Goal

The 10-year water storage goal for the Mini Metro Management District is to create 14,065 (including upstream storage) acre-feet of storage to maintain current average discharge. This includes 770 acre-feet storage within this management district.

PROTECTION LAKES (10-YEAR PLAN GOAL D)

Pleasant lake – Tier 2

Pleasant Lake is a Tier 2 priority lake. This 218-acre lake has a 1,645-acre watershed with nearly 60 percent disturbed land use. Managing stormwater in the immediate drainage area and maintaining naturally vegetated buffers in shoreland and riparian areas are key implementation strategies.

Ditch Name	Authority	Total System Length (mi)
Stearns CD 17	SRWD	7.5

Lake Name	Lake I.D. Number	Current TP (µg/l)	TP Standard (µg/l)	10-Year Plan Reduction[(a)] Goal (lbs/year)	Long Term Load Reduction Goal[(a)] (lbs/year)	Transparency Trend	Biological Significance Rating
Pleasant	73005100	23	40	8	129	No evidence of trend	

(a) From 2019 MPCA/MNDNR LPSS Spreadsheet (MNDNR, 2019b) (data through 2018).

GROUNDWATER QUALITY (10-YEAR PLAN GOAL H)

Cities of St. Joseph and Waite Park:

St. Joseph is rated as having very highly vulnerable groundwater because of the strong interaction between surface water and groundwater. St. Joseph's wellhead protection area covers a large area and will require increased outreach and education to create awareness about the risks of groundwater contamination. The city of Waite Park's wellhead protection area is rated as highly vulnerable to contamination. All available tools will be used to reduce the threat of contamination, but key actions are changing land uses to those that pose the least threat, such as converting agricultural land within the DWSMA to permanent conservation, reducing nitrogen fertilizer use, and implementing nitrogen fertilizer BMPs in agricultural and urban areas. Consideration should be given to land use suitability as development occurs, and measures should be taken to protect the areas of the highest vulnerability.

ST. CLOUD DRINKING WATER PROTECTION (10-YEAR PLAN GOAL I)

Priority strategies to protect the city of St. Cloud's drinking water are based on identifying sources of known contaminants and reducing the risk that these contaminants will make their way into the Sauk River. The entire geographical area of the Mini-Metro Management District is considered a Priority A area because any contaminants that enter the Sauk River have a less-than-8-hour time of travel to the St. Cloud drinking water intake. Key implementation actions include:

- Improving feedlot and manure storage facilities.
- Providing composting facilities for areas with too much manure compared to available land.
- Increasing outreach to ensure manure management plans are being followed.
- Implementing stormwater projects that treat pollutants and reduce the runoff rate, flow, and volume.
- Upgrading failing SSTSs that are likely to impact surface water.
- Installing high-value, pilot stormwater-reuse projects to demonstrate value and provide outreach to appropriate audiences on the value of stormwater reuse.

HABITAT (10-YEAR PLAN GOAL J)

The lower portion of the Sauk River is an urbanizing area. With 10 percent of the drained wetlands considered restorable, opportunities exist to protect and restore wetland habitats that will provide multiple benefits for flood, sediment, and nutrient reduction to downstream waters. These opportunities

FOREVER GREEN

The Forever Green Initiative consists of a team of experts in the areas of genomics, breeding, agronomics, and commercialization who are developing new crops and high efficiency cropping systems. In Fall 2019, the city of St. Cloud planted 10 acres of Kernza, a perennial grain with a deep root system, as part of a series of demonstration plots. The ancient grain's deep roots help with soil remediation efforts including decreasing soil erosion and preventing the release of nitrates into groundwater. The plants have year-round soil coverage, providing erosion protection throughout every season, something that is difficult to come by in Minnesota's climate. The Kernza grain planted in St. Cloud will be harvested and a local brewery has committed to creating a custom, unique Kernza beer. The Forever Green Initiative, as well as the St. Cloud Kernza demonstration site, is aimed at creating a sustainable cycle of growth that will help provide clean water and renewable resources in the area.

Mini-Metro										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Altered Hydrology										
Streambank Stabilization	Sauk River (Reach A470 subwatershed)	Stabilize or restore 0.1 stream mile of streambank				26,400		26,400	SRWD	Stearns SWCD, DNR
Streambank Stabilization	Sauk River (Reach A490 subwatershed)	Stabilize or restore 0.1 stream mile of streambank					26,400	26,400	SRWD	Stearns SWCD, DNR
Streambank Stabilization	Sauk River, County Ditch 17, Sauk River from CR 122 north to CR 121	Stabilize or restore 4.1 stream mile of streambank					3,247,200	3,247,200	SRWD	DNR
Conservation Easements	St. Joseph and Waite Park DWSMAs	Permanently protect 200 acres of habitat in areas of high vulnerability.				400,000	400,000	800,000	SRWD	Stearns SWCD
Controlled Tile Drainage	Stearns County Ditch 17	Install controlled tile drainage to treat 80 acres of cropland Reduce TP load by 28 lbs				20,000	20,000	40,000	SRWD	
Subtotal						$446,400	$3,693,600	$4,140,000		
Excess Nutrients and Sediment										
Infiltration Basin	Management districtwide	Construct infiltration basin(s) to treat 20 acres Reduce TSS load by 192 tons Reduce TP load by 738 lbs					184,477	184,477	SRWD	Cities
Stormwater Pond	Management districtwide	Construct stormwater pond(s) to treat 40 acres Reduce TSS load by 326 tons Reduce TP load by 886 lbs				500,000		500,000	SRWD	Cities
Shoreline Buffers	Pleasant Lake	Establish 200 linear feet of riparian buffer Reduce TSS load by 321 tons Reduce TP load by 124 lbs				10,000		10,000	Stearns SWCD	City of Rockville
Shoreline Restoration	Pleasant Lake	Complete shoreline restoration on 200 linear feet of shoreline				20,000		20,000	Stearns SWCD	City of Rockville
Stormwater Practices	Management districtwide	Implement stormwater practices(s) to treat 20 acres Reduce TSS load by 163 tons Reduce TP load by 443 lbs				250,000	250,000	500,000	SRWD	SWCDs
Infiltration Basin	Pleasant Lake Watershed	Construct infiltration basin(s) to treat 5 acres Reduce TSS load by 48 tons Reduce TP load by 185 lbs					46,119	46,119	SRWD	Cities
Stormwater Practices	Pleasant Lake Watershed	Implement stormwater practices(s) to treat 5 acres Reduce TSS load by 41 tons Reduce TP load by 111 lbs					125,000	125,000	SRWD	Cities, SWCD
Infiltration Basin	St. Joseph	Construct infiltration basin(s) to treat 5 acres Reduce TSS load by 48 tons Reduce TP load by 185 lbs			46,119			46,119	SRWD	
Stormwater Pond	St. Joseph	Construct stormwater pond(s) to treat 10 acres Reduce TSS load by 82 tons Reduce TP load by 222 lbs				125,000		125,000	SRWD	City of St. Joseph
Updated St. Cloud Stormwater BMP Implementation Plan	Sauk River - St. Cloud	Implement 1 high priority project Reduce TSS load by 60% per year from project area Reduce TP load by 40% per year from project area		400,000				400,000	SRWD	City of St. Cloud, Stearns SWCD, MPCA

Mini-Metro										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
Excess Nutrients and Sediment (cont.)										
Implement Stormwater Pond Treatment Effectiveness Improvement Projects	Sauk River - St. Cloud	Construct stormwater pond(s) to treat 10 acres Reduce TSS load by 60% per year from the project area Reduce TP load by 50% per year from the project area				125,000		125,000	SRWD	City of St. Cloud, SWCD
Infiltration Basin	Sauk River - St. Cloud	Construct infiltration basin(s) to treat 10 acres Reduce TSS load by 96 tons Reduce TP load by 369 lbs		92,238				92,238	SRWD	City of St. Cloud, MPCA
Infiltration Basin	Waite Park	Construct infiltration basin(s) to treat 5 acres Reduce TSS load by 48 tons Reduce TP load by 185 lbs				49,119		49,119	SRWD	
Stormwater Pond	Waite Park	Construct stormwater pond(s) to treat 10 acres Reduce TSS load by 82 tons Reduce TP load by 221 lbs				62,500	62,500	125,000	SRWD	City of Waite Park, MPCA
Subtotal				$492,238	$46,119	$1,141,619	$668,096	$2,348,072		
Groundwater Quality										
Septic System Upgrades	DWSMAs and identified priority lakes and streams	Upgrade 10 septic systems	20,000	20,000	20,000	20,000	20,000	100,000	Stearns County	Stearns SWCD, MPCA
Well Sealing	St. Joseph and Waite Park DWSMAs	Seal 10 wells	2,000	2,000	2,000	2,000	2,000	10,000	Stearns SWCD	MPCA
Subtotal			$22,000	$22,000	$22,000	$22,000	$22,000	$110,000		
St. Cloud Drinking Water Protection										
Conservation Cover Perennials (Kernza)	Entire management district	Implement conservation cover perennials (Kernza) on 80 acres of cropland Reduce TSS load by 34 tons Reduce TP load by 42 lbs				20,000	20,000	40,000	Stearns SWCD	
Conservation Crop Rotation	Entire management district	Implement conservation crop rotation on 200 acres of cropland Reduce TSS load by 45 tons Reduce TP load by 38 lbs	15,580	15,580	15,580	15,580	15,580	77,900	Stearns SWCD	
Cover Crops	Entire management district	Implement cover crops on 250 acres Reduce TSS load by 82 tons Reduce TP load by 45 lbs	25,000	25,000	25,000	25,000	25,000	125,000	Stearns SWCD	TNC
Feedlot Improvements/Manure Storage	Entire management district	Improve feedlots and manure storage for 300 animal units			120,000			120,000	Stearns SWCD	Stearns County, MPCA
Grassed Waterway	Entire management district	Install 4 acres of grassed waterway Reduce TSS load by 199 tons Reduce TP load by 120 lbs			3,000			3,000	Stearns SWCD	
No Tillage	Entire management district	Implement no till on 80 acres Reduce TSS load by 28 tons Reduce TP load by 34 lbs	4,000	4,000	4,000	4,000	4,000	20,000	Stearns SWCD	
Nutrient Management (Implementation)	Entire management district	Implement nutrient management plan with manure incorporation on 300 acres Reduce TP load by 24 lbs	9,000	9,000	9,000	9,000	9,000	45,000	Stearns SWCD	Stearns County
Nutrient Management Plans	Entire management district	Complete 1 plan(s)	3,400					3,400	Stearns SWCD	

Mini-Metro										
Implementation Action	Targeted Resource	Measurable Output for This Activity	Timeframe					Estimated Cost	Lead LGU	Supporting Entities
			Years 1 and 2 ($)	Years 3 and 4 ($)	Years 5 and 6 ($)	Years 7 and 8 ($)	Years 9 and 10 ($)			
St. Cloud Drinking Water Protection (cont.)										
Reduced Tillage	Entire management district	Implement reduced tillage on 80 acres Reduce TSS load by 18 tons Reduce TP load by 17 lbs	2,720	2,720	2,720	2,720	2,720	13,600	Stearns SWCD	
WASCOBs	Entire management district	Construct WASCOB(s) to treat 40 acres Reduce TSS load by 16 tons Reduce TP load by 21 lbs					40,000	40,000	Stearns SWCD	
Subtotal			$59,700	$56,300	$179,300	$76,300	$116,300	$487,900		
Grand Totals:			$81,700	$570,538	$247,419	$1,686,319	$4,499,996	$7,085,972		

6 WATERSHED-WIDE PROGRAMS IMPLEMENTATION SCHEDULE

The watershed-wide programs implementation scheduled for the Sauk River CWMP identifies the specific activities, targeted locations, measurable outcomes, estimated costs (where available), and organizational responsibilities for each activity. Lead LGU's take ownership of the specific activities while supporting entities actively support the lead LGU through time, money, enforcement, or other means. The Sauk River CWMP watershed-wide targeted implementation schedule is organized according to each of the following program areas: monitoring, studies, and planning (Table 6-1); land use and regulatory (Table 6-2); outreach and education (Table 6-3).

Targeted Implementation Schedule Organization

- Monitoring, studies, and planning
- Land use and regulatory
- Outreach and education

Table 6-1. Watershed-Wide Data, Monitoring, and Planning Implementation Schedule

Data, Monitoring, Planning																							
	Priority Implementation Action	Location	Measurable Output for This Activity	Current Implementation Level	Time Frame Years 1 and 2 ($$)	Years 3 and 4 ($$)	Years 5 and 6 ($$)	Years 7 and 8 ($$)	Years 9 and 10 ($$)	Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface-Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
1	Determine non-contributing areas in the watershed. This information will be used to target water storage activities and to develop regulatory controls that restrict the creation of a hydrologic connection.	Watershed-wide	Non-contributing areas are mapped, evaluated, and provided to planning partners to determine if any areas require additional protection or implementation actions.	NA		$7,500				$7,500	SRWD	MN DNR	3		2		1	1		3		1
2	Assess baseflow and develop hydrographs for public drainage systems. This information will be used to refine storage goals and target implementation actions.	All public drainage systems in the watershed (refer to table in the plan).	A report on potential storage goals would be developed.	NA	$15,000	$15,000	$15,000	$15,000	$15,000	$75,000	SRWD	MN DNR	3	1	3	2	2			2		1
3	Scope the need and opportunity to develop a data repository for long-term storage of data and information collected by the partnership. Proceed to develop as recommended by the scoping process.	Watershed-wide	Complete scoping and needs assessment (estimate in table). Proceed to create, launch, and implement as recommended (estimate not included at this time.	NA	$7,500					$7,500	Coordinator of 1W1P	All Partners	1	1	1	1	1	1	1	1	1	1
5	Continue investments in existing research projects to help develop tools and techniques to address groundwater contamination from surficial uses, as well as addressing contamination once present.	Rosholt Research Farm – located in Pope County.	Development of tools and techniques that are used in education and outreach as well as technical assistance programs	Pope SWCD	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000	Pope SWCD and Stearns SWCD	MDA			1	1	3	3		3		

Data, Monitoring, Planning																								
Priority Implementation Action		Location	Measurable Output for This Activity	Current Implementation Level	Time Frame					Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface-Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
					Years 1 and 2 ($$)	Years 3 and 4 ($$)	Years 5 and 6 ($$)	Years 7 and 8 ($$)	Years 9 and 10 ($$)													
6	Complete storm pond inventory, type, and outfall on public facilities. As priority DWSMAs are completed, maps are created to focus implementation efforts and implementation plans are devised and executed.	Vulnerable groundwater and drinking water supply management areas (Cold Spring, Roscoe, Melrose, Sauk Centre).	A report of the stormwater pond inventory that identifies stormwater ponds that could be adapted to improve groundwater infiltration and protect groundwater supplies from contamination.	NA	$10,000	$10,000	$10,000	$10,000		$40,000	SRWD	SWCDs, Cities, MDH	3	2	2		2	3		2		
15	Identify wetland restoration areas and priority areas that will have a high probability of promoting infiltration and recharge.	Ashley Creek, GUS Plus, Grand Pearl; then move to secondary priorities.	GIS database and associated maps with identified areas for wetland restoration ranked by priority.	NA	$10,000					$10,000	SRWD	MN DNR, MDA; Stearns SWCD, TNC	3		3	2	3	2		3		1
21	Watercourse assessment; determine vulnerability of channel barrier that prevents hydrologic connectivity between the Long Prairie Watershed and the Sauk River Watershed.	Channel between Lake Osakis and Long Prairie River	Complete watercourse assessment	NA				$2,500		$2,500	Todd SWCD	MN DNR	3									2
22	Assess the Berscheid Pond Dam for opportunities to improve ecological function; evaluate for fish passage opportunities.	Between Sauk Lake and Cedar Lake	Complete dam assessment	NA		$10,000				$10,000	Todd SWCD	MN DNR	3									3
25	Conduct inspections on feedlots: (1) within 300 yards (900 feet) of *E. coli* impaired waters or direct tributaries to *E. coli* impaired waters, (2) highly vulnerable groundwater areas to assess manure management and feedlot upgrade program needs.	Ashley Creek Mill Creek Adley Creek Stony Creek Cold Spring Creek	Complete 10 feedlot inspections per year.		$10,000	$10,000	$10,000	$10,000	$10,000	$50,000	Delegated Counties	MDA, MPCA		3	3			3	3			2
26	Develop and implement an assessment and monitoring program for existing stormwater ponds to determine which ponds are releasing or have the highest potential to release phosphorus.	Mini Metro MD Sauk Centre Melrose Cold Spring	1 standard approach to assess and monitor ponds for TP treatment effectiveness based on MPCA/University of Minnesota research 4 regional ponds in the city of St. Cloud monitored/assessed for TP treatment effectiveness		$10,000	$10,000	$10,000	$7,500		$37,500	SRWD	City of St. Cloud, Cities	2		3	2		1	3	1		1

	Priority Implementation Action	Location	Measurable Output for This Activity	Current Implementation Level	Time Frame: Years 1 and 2 ($$)	Time Frame: Years 3 and 4 ($$)	Time Frame: Years 5 and 6 ($$)	Time Frame: Years 7 and 8 ($$)	Time Frame: Years 9 and 10 ($$)	Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface-Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
Data, Monitoring, Planning																						
27	Create hydraulic models for subwatersheds within the city of St. Cloud to evaluate stormwater drainage with the goal to identify and prioritize flooding concerns, protection BMPs, WQ improvement projects/types/locations, and groundwater impact concerns as related to stormwater infrastructure.	City of St. Cloud	Subwatershed models will be created 2 years before a City CIP. Develop mode(s) for top-priority subwatershed(s)		$40,000	$40,000	$40,000	$40,000	$40,000	$200,000	SRWD	Stearns County; Stearns SWCD, City of St. Cloud	2	2	3		2	2	3			
28	Support and assist updating the city of St. Cloud's 2011 Stormwater BMP Implementation Plan within the SRWD.	City of St. Cloud	Completion of the updated Stormwater BMP plan.		$75,000			$7,500		$82,500	SRWD	Stearns SWCD, City of St. Cloud, MPCA	2		3				3	2		
29	Based on TNC's 202 analysis, conduct an analysis for wetland water quality benefit – phosphorus discharge. We will be working to develop a tool for predicting the benefits of restored wetlands for nitrogen (N) and phosphorus (P) removal, as well as carbon (C) storage, which can be used to help prioritize or rank wetland restoration projects for TNC and partners by using a combination of GIS, modeling, and field data collection. The project will use a partnership with University of Minnesota staff in the Department of Bioproducts and Biosystems Engineering to carry out the study. (See attachment for additional information.) This study has been delayed because of COVID-19, but we hope to still complete the study by the end of the year. The budget for the project is $30,000, which is being paid by TNC.	Watershed-wide; prioritized management districts (Osakis, Sauk, Centre, GUS, Saint Roscoe)	Report and analysis on where wetlands are P sources/sinks; inform wetland restoration efforts				$5,000			$5,000	SRWD	TNC, MPCA	1		3	2						2

Data, Monitoring, Planning																						
Priority Implementation Action		Location	Measurable Output for This Activity	Current Implementation Level	Time Frame					Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface-Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
					Years 1 and 2 ($$)	Years 3 and 4 ($$)	Years 5 and 6 ($$)	Years 7 and 8 ($$)	Years 9 and 10 ($$)													
30	Complete culvert inventories in prioritized subwatersheds and where street, road, and bridge projects are occurring. Assess for opportunities to improve habitat, store or slow water, and implement sediment- and erosion-reduction enhancements, and recommend actions.	Prioritized based on altered hydrology, stressor ID findings from 2019-2020 MPCA fieldwork.	A GIS database and report on culvert replacement priorities and goals as well as recommendations on future sizing requirements; annual updates to inventory and GIS database.		$120,000	$20,000	$20,000	$20,000	$20,000	$200,000	SRWD	Counties, SWCDs, Townships, Cities, TNC	3		3	2				2	2	2
35	Finalize and implement stormwater management program for municipalities, Including assistance with annual stormwater pond maintenance and identifying stormwater treatment opportunities to street reconstruction projects.	Watershed-wide		75% complete		$2,500		$2,500		$5,000	SRWD		3		3	2	2	2		3		
37	Continually build information and knowledge regarding groundwater quantity and quality data, identifying gaps, and addressing those gaps though local and state agency efforts.		Annual workshop (groundwater summit) with state and local partners, which would result in a data acquisition plan.		$3,000	$3,000	$3,000	$3,000	$3,000	$15,000							3	3				
38	Continue water quality monitoring on main Sauk River and primary tributaries. Also continue the rotational lake monitoring program.	Watershed-wide	Trend data throughout the watershed on the Sauk River, primary tributaries, and approximately 20 lakes. River/tributary data collected include: TP, OP, TKN, N+N, chloride and TSS, instantaneous DO, specific conductivity, Ph, temperature, flow/discharge measurements, and water-level data. Lake data include TP, OP, Chlorophyll-a, TKN, chloride, secchi, instantaneous profiles of DO, specific conductivity, pH, and temperature. Bottom samples as needed.	High – The following costs are estimated costs for laboratory analysis of samples. Staff time, equipment costs, and additional modeling are not included.	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000	SRWD	MPCA, DNR	2	3	3	3			2			

Data, Monitoring, Planning

	Priority Implementation Action	Location	Measurable Output for This Activity	Current Implementation Level	Time Frame: Years 1 and 2 ($$)	Years 3 and 4 ($$)	Years 5 and 6 ($$)	Years 7 and 8 ($$)	Years 9 and 10 ($$)	Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface-Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
39	Develop a field-verified, hydrologically conditioned, digital elevation model (DEM). This information is fundamental to understanding hydrology and to target restoration practices related to restoring hydrology, improving surface water quality, and restoring habitat.	Watershed-wide	A hydrologically conditioned and field-verified DEM will be developed and updated periodically to include new culvert inventory information.	NA	$100,000		$7,500		$7,500	$115,000	Stearns SWCD	MN DNR, SRWD	3	1	2	3	2	1	1	3	1	3
	Complete GIS analysis of hydrologically conditioned, digital elevation model (DEM) such as PTMApp or ACPF to identify specific locations best suitable for implementation of BMPs.	Watershed-wide	A completed terrain analysis tool that provides specific locations for implementing BMPs.	NA	$15,000					$15,000			3	1	2	3	2	1	1	3	1	3
39	Investigate feasibility of reducing internal loading on priority impaired lakes. Opportunities may include rough fish management on in-channel lakes, invasive aquatic plant management, and alum treatments, as well as other management strategies as determined through a feasibility study.	Priority impaired lakes identified in Tables 4-9 and 4-10.	Feasibility studies completed on 1 lake each biennium.		$75,000	$75,000	$75,000	$75,000	$75,000	$375,000	SRWD	MPCA, MN DNR			3							2
40	Conduct study to identify other calciferous fens in the watershed.	Watershed-wide	GIS database and associated maps with newly identified fens.								MN DNR		3			3	3	3		3	2	3

	Priority Implementation Action	Location	Measurable Output for This Activity	Current Implementation Level	Years 1 and 2 ($$)	Years 3 and 4 ($$)	Years 5 and 6 ($$)	Years 7 and 8 ($$)	Years 9 and 10 ($$)	Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface-Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
	Data, Monitoring, Planning																					
41	Assess issued WCA exemptions and corresponding impacts in the past 10 years to evaluate if more stringent measures are needed; develop recommendations as appropriate. See Item #14 in regulatory and land use table ("Explore ordinances and requirements to restrict certain exemptions under WCA rules; specific details to be developed.")	Watershed-wide	Report summarizing issued WCA exemptions by type and location, amount of wetlands impacted, and recommendation redress			$7,500				$7,500	WCA Authorities	BWSR	3		2		1	1		3		1
	Implement stormwater monitoring in the Mini Metro Watershed to help calibrate stormwater modeling that will be created for the Sauk River TMDL that will assign a WLA to MS4s.	Mini Metro	Sufficient monitoring data to calibrate modeling to help determine actual pollutant loading from MS4s to the Sauk River			$75,000				$75,000	SRWD	City of St. Cloud										
	Evaluate and potentially update time of travel to the city of St. Cloud's Drinking Water Treatment Facility with a focus on key sites in the watershed that are particularly concerning. Review for accurate flows and fluctuations related to weather	Watershed-wide	1 Time of Travel study reviewed and updated			$50,000				$50,000	City of St. Cloud	SRWD, Stearns County, Stearns SWCD										
	Modeling climate change impacts to hydrology and water quality using Climate Change Module in the HSPF-SAM model to improve and refine implementation strategies and programs.	Watershed-wide	Updated modeling results reflecting changes in climate to inform implementation strategies throughout planning period.																			
	Assess the Cold Spring Dam for modification oppoertunities to improve ecological functions; fish passage, water quality, and altered hydrology improvements.	City of Cold Spring downstream from the Sauk River Chain of Lakes	Complete a Feasibility Study on the Cold Spring Dam Modification				$115,000				Stearns SWCD	MNDNR, City of Cold Spring, Sauk River Chain of Lakes Association										

Table 6-2. Watershed-Wide Regulatory and Land Use Implementation Schedule

Regulatory and Land Use																							
Priority	Implementation Action	Location	Measurable Output for This Activity	Contingent on Other Action	Time Frame: Years 1 and 2 ($$)	Time Frame: Years 3 and 4 ($$)	Time Frame: Years 5 and 6 ($$)	Time Frame: Years 7 and 8 ($$)	Time Frame: Years 9 and 10 ($$)	Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
5	Review ordinances regarding land use management that pose the greatest risk to resources to ensure that priorities identified in the Sauk River CWMP have adequate protection.	Watershed-wide; Cornerstone effort; other actions build on this action.	Complete review and develop recommendations.		$10,000	$25,000	$5,000	$5,000	$5,000	$50,000	Counties, SRWD		2	2	2	2	2	2	2	3	3	3
3	Explore the adoption of additional ordinances and requirements to protect identified calciferous fens, including setbacks.	GUS Plus and others, as identified	Develop draft ordinance, rule, or zoning requirement.	Complete concurrent with Item 5 above, "Review ordinances regarding land use management that pose..."		$10,000				$10,000	Counties, SRWD	MN DNR	3			3	3	3		3	2	3
6	Review impact of mining operations and determine if additional requirements should be established for conditional use permits (e.g., groundwater-level monitoring or density analysis over time).	Along the Sauk River (multiple locations)	Complete review and develop recommendations.	Complete concurrent with Item 5 above, "Review ordinances regarding land use management that pose..."		$10,000				$10,000	Counties	SRWD			1		3	3	3	3	4	1
12	Review existing ordinances and requirements regarding SSTS systems to develop uniformity across the watershed to ensure SSTS are being inspected with an interval of regularity to ensure threats to public health, groundwater, and/or surface waters are being addressed timely.	Watershed-wide	Complete review and develop recommendations.	Complete concurrent with Item 5 above, "Review ordinances regarding land use management that pose..."		$10,000				$10,000	Counties	SRWD, MPCA, SWCDs		3	3	2		3		3		
12	Review existing ordinances and requirements regarding storage tanks that are not subject to MPCA requirements to develop uniformity across the watershed and ensure that these storage tanks are being inspected with an interval of regularity to ensure threats to public health, groundwater, and/or surface waters are being addressed timely.	Watershed-wide	Complete review and develop recommendations.	Complete concurrent with Item 5 above, "Review ordinances regarding land use management that pose..."		$10,000				$10,000	Counties	SRWD, MPCA, SWCDs		3	3	2		3		3		

Priority Implementation Action		Location	Measurable Output for This Activity	Contingent on Other Action	Time Frame: Years 1 and 2 ($$)	Time Frame: Years 3 and 4 ($$)	Time Frame: Years 5 and 6 ($$)	Time Frame: Years 7 and 8 ($$)	Time Frame: Years 9 and 10 ($$)	Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
Regulatory and Land Use																						
7	Explore the adoption of ordinances and requirements that any changes in land use that will significantly alter hydrology in the watershed first identify the impacts to said hydrology and secondly, propose solutions to mitigate the impact if change is to be approved; specific details to be developed.	Watershed-wide	Develop draft ordinance, rule, or zoning requirement.	Complete after Item 5 above, "Review ordinances regarding land use management that pose..."			$7,500			$7,500	Counties, SRWD	Stearns SWCD	3		3	2	2	2	2	2	3	3
13	Explore establishing ordinances to protect potential wetland restoration areas that have the highest probability of promoting infiltration and recharge from development; specific details to be developed.	Watershed-wide	Develop draft ordinance or zoning requirements.	Complete after Item 5 above, "Review ordinances regarding land use management that pose..."		$7,500				$7,500	Counties, SRWD	MN DNR, MDH, SWCDs	3		1	1	3	2		3		2
18	Explore ordinances and requirements to increase restrictions on impervious coverage; specific details to be developed.	Priority is within the flood fringe of the mainstem of the Sauk River; watershed-wide	Develop draft ordinance or zoning requirements.	Complete after Item 5 above, "Review ordinances regarding land use management that pose..."			$7,500			$7,500	Counties	SRWD	3	2	3	2	1		2	3	3	1
22	Explore establishing a consistent excessive soil-loss ordinance or requirement; specific details to be developed.	Watershed-wide	Develop draft ordinance or zoning requirements.	Complete after Item 5 above, "Review ordinances regarding land use management that pose..."				$7,500		$7,500	Counties, SRWD	SWCDs, BWSR			3	3				3		
8	Explore the adoption of ordinances and requirements where developers must prove that there are both adequate quality (per safe drinking water act via water testing) and quantity (via pump testing) for the proposed development; specific details to be developed.	Watershed-wide	Develop draft ordinance or zoning requirements.	Complete after Item 5 above, "Review ordinances regarding land use management that pose..."			$7,500			$7,500	Counties	SRWD, MDH, DNR					3	3		2		

Regulatory and Land Use																							
Priority Implementation Action		Location	Measurable Output for This Activity	Contingent on Other Action	Time Frame					Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
					Years 1 and 2 ($$)	Years 3 and 4 ($$)	Years 5 and 6 ($$)	Years 7 and 8 ($$)	Years 9 and 10 ($$)													
9	Explore the adoption of additional controls limiting development that will use groundwater sources where groundwater contamination is suspected (e.g., limit subdivision development, require that subdivision developers undertake additional declarations/measures to ensure future purchasers know of potential costs to provide safe drinking water); specific details to be developed.	Suspected contamination areas as identified in the GRAPS	Develop draft ordinance or zoning requirements.	Complete after Item 5 above, "Review ordinances regarding land use management that pose..."				$7,500		$7,500	Specific Counties per GRAPS	SRWD, MDH, MPCA						3		3		
10	Explore the adoption of ordinances or requirements for portions of wellhead protection areas outside of municipal boundaries that limit development in said areas where high groundwater infiltration exists; specific details to be developed.	Specific wellhead protection areas where high groundwater infiltration identified	Develop draft ordinance or zoning requirements.	Complete after Item 5 above, "Review ordinances regarding land use management that pose..."		$7,500				$7,500	Specific Counties where areas are located	SRWD, MDH, DNR, Stearns SWCD					3	3		3		
11	Explore the adoption of ordinances or requirements requiring entities provide detailed well logs as part of property sales/transfers; specific details to be developed.	Watershed-wide	Develop draft ordinance or zoning requirements.	Complete after Item 5 above, "Review ordinances regarding land use management that pose..."					$10,000	$10,000	Counties	MDH						3		2		
15	Jointly review existing shoreland ordinances throughout the watershed to determine differences; work together to achieve uniformity and potential improvements.	Watershed-wide	Joint meetings with counties and SRWD to complete review; develop draft changes to ordinance or zoning requirements	Complete concurrent with Item 5 above, "Review ordinances regarding land use management that pose..."		$7,500				$7,500	Counties SRWD	Stearns SWCD	3	3	2	2			1	3	3	3
16	Explore establishing a greenbelt protection corridor; specific details to be developed.	Watershed-wide; prioritize Ashley Creek, Hobeken Creek, Stony, Getchell, Adley & Mainstem subwatershed	Develop draft ordinance or zoning requirements.		$20,000	$10,000				$30,000	SRWD	Counties, Stearns SWCD	2	2	2	2				3	3	3

Regulatory and Land Use

Priority Implementation Action		Location	Measurable Output for This Activity	Contingent on Other Action	Time Frame					Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface-Water 1: *E. coli*	Surface-Water 2: Excess Nutrients and Sediment	Surface-Water 3: Protection of High-Quality Resources	Groundwater Availability	Groundwater Quality	Surface Water/ Drinking Water - St Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
					Years 1 and 2 ($$)	Years 3 and 4 ($$)	Years 5 and 6 ($$)	Years 7 and 8 ($$)	Years 9 and 10 ($$)													
20	Coordinate the development of consistent postconstruction stormwater requirements with all MS4 permittees and the SRWD; specific details to be developed.	MS4 Permitted Local Governmental Units in the watershed.	One consistent regulatory mechanism standard used by all MS4 permittee's.				$10,000			$10,000	SRWD	MS4 entities in watershed, Stearns SWCD, MPCA			3				2			
1	Explore the adoption of ordinances and requirements that restrict the connection of non-contributing areas; specific details to be developed.	Watershed-wide	Develop draft ordinance, rule, or zoning requirement.	See table 6-1 – "Determine non-contributing areas in the watershed..."		$10,000				$10,000	SRWD	Counties	3		2	2	2			3	3	1
14	Explore ordinances and requirements to restrict certain exemptions under WCA rules; specific details to be developed.	Watershed-wide	Complete assessment, evaluation, and develop recommendations.	See table 6-1 – "Assess issued WCA exemptions..."		$10,000				$10,000	Counties	BWSR, Stearns SWCD	3	2	2	3	1	1	1	3		3
2	In public drainage systems, explore requiring all new drain tile above 4 inches to have metered release and/or other conservation drainage management systems installed; specific details to be developed.	Watershed-wide	Develop draft ordinance, rule, or zoning requirement.	See table 6-3 – "...outreach campaign to landowners within public drainage areas..."	$15,000					$15,000	Drainage Authorities	SWCDs, SRWD	3		3	2			1	3	2	2
4	Evaluate opportunities to convert urbanized public drainage systems County Ditch #17 to stormwater utilities.	Mini Metro	Meet with city of Waite Park to determine preference and method to covert to City's stormwater utility system (and MS4)				$15,000			$15,000	SRWD	City of Waite Park	2		3				2			

Table 6-3. Watershed-Wide Outreach and Education Implementation Schedule

Outreach and Education																								
	Priority Implementation Action	Targeted Location	Measurable Output for This Activity	Timeframe					Estimated Cost ($$)	Lead LGU	Supporting Entities	Altered Hydrology	Surface Water 1: *E. coli*	Surface Water 2: Excess Nutrients and Sediment	Surface Water 3: Protection of High-Quality Resources:	Groundwater Availability	Groundwater Quality	Surface Water/ Drinking Water – St. Cloud	Land Use Decisions That Impact Long-Term Sustainability	Land Use Activities in Riparian and Adjacent Areas	Habitat
				Years 1 and 2 ($$)	Years 3 and 4 ($$)	Years 5 and 6 ($$)	Years 7 and 8 ($$)	Years 9 and 10 ($$)													
1	Sauk River Watershed Citizenship Program: Develop a comprehensive outreach and education program that establishes watershed citizenship norms, assesses current knowledge and understanding, engages in programming to build a watershed stewardship ethic, assesses change and effectiveness of programming, and addresses needed changes in programming through an adaptive management process. Regular, periodic updates on program accomplishments and results will be provided to the Policy Committee and local governmental partners.	Watershed-wide	Develop and implement a comprehensive watershed citizenship program; conduct an evaluation on program effectiveness, and update program on a biennial basis.	$50,000	$20,000	$20,000	$20,000	$20,000	$130,000	SRWD	All partnership LGUs, U of M Extension Service, MPCA, BWSR, MN DNR, MDH, MDA.	2	2	2	2	2	2	2	2	2	2
2	Driving Implementation Through Civic Engagement and Targeted Outreach: the Prioritize, Target, and Measure framework approach will be developed to strategically identify targeted audiences and implement education and outreach programs with the explicit purpose of increasing the adoption of practices identified in the implementation tables that are necessary to meet Plan goals. Barriers to adoption will be identified and strategies to address those barriers will be pursued. An adaptive management approach to evaluating program effectiveness will be implemented and allow for changes in the targeted delivery of programming efforts to meet the goals outlined in the SRCWMP.	Watershed-wide	Develop and implement a comprehensive civic engagement and targeted outreach program; conduct an evaluation of program effectiveness, and update program on a biennial basis.	$100,000	$20,000	$20,000	$20,000	$20,000	$180,000	SRWD	All partnership LGUs, U of M Extension Service, BWSR, MN DNR, MDH, MDA, TNC.	3	3	3	3	3	3	3	3	3	3

7 IMPLEMENTATION PLAN PROGRAMS

This chapter outlines key plan components to support and implement the targeted implementation schedule. These components include incentive programs, cost-share programs, capital-improvement projects, regulatory and enforcement programs, and outreach and engagement programs.

INCENTIVE PROGRAMS

Incentive programs are formal programs used to promote specific actions or behaviors. Participation in incentive programs is voluntary. Various mechanisms can be used for conducting incentive programs, including financial assistance or providing benefits for enrolling in programs.

COST-SHARE PROGRAMS

In a cost-share program, the costs of systems or practices for water quality improvements (designed to protect and improve habitat and soil-and-water resources) are shared between the landowner state (percentage) or federal programs (flat-rate). State-funded nonstructural land management cost-share is also typically based on a flat-rate. Landowners seeking cost-share assistance should contact their county SWCD office to get information on available programs. The BMPs and conservation practices (CPs) typically eligible are those that avoid, control, and trap (ACT) nutrients, sediment, and *E. coli* from entering surface water and groundwater. Eligibility may vary depending on local priorities and needs.

MINNESOTA AGRICULTURAL WATER QUALITY CERTIFICATION PROGRAM

The Minnesota Agricultural Water Quality Certification Program (MAWQCP) provides an opportunity for producers to voluntarily enroll in this program. By enrolling, producers agree to implement and maintain approved farm management practices and obtain certification that their operation protects surface waters from the impacts of agricultural practices. Technical and financial assistance is prioritized for those who enroll but are not yet certified. After participants have been certified, they obtain regulatory certainty for a period of 10 years.

FEE DISCOUNTS

Local governments or nonprofit entities may offer reduction in fees for implementing projects and practices that align with program goals; for instance, public-drainage authorities could offer discounted permit application, review, and inspection fees if the landowner voluntarily implements a rate-reduction project, or stormwater fees could be reduced if a landowner voluntarily converts cropped acres to a permanent vegetative cover.

LOW INTEREST LOANS

Low interest loans may be available through various state agencies to landowners for agricultural best management practices, septic system replacement, or other project that meet funding eligibility criteria.

BMP SELECTION

The specific implementation actions identified and geographically targeted in Chapter 5 are based on Advisory Committee selection of the BMPs that are most likely to be implemented. However, flexibility of BMP selection will be necessary based on landowner preferences, site conditions, funding restrictions, and technical capacity. Typical BMPs that will be implemented are listed in Table 7-1 The planning partnership will strive to meet the stated goals when exercising flexibility on the BMP choice. Innovative practices and emerging technologies will be reviewed and approved by the Implementation Team and Advisory Committee prior to receiving approval for funding.

Table 7-1 Typical BMPs to Address Resource Concerns.

Avoid Surface Water Runoff and Leaching to Groundwater	Conservation Cover Perennials Conservation Crop Rotation Contour Buffer Strips Cover Crops Livestock Access Control/Fencing Manure/Fertilizer Incorporation Traditional Pasture to Rotational Grazing
Control Surface Water Runoff and Leaching to Groundwater	Alternative Tile Intakes Controlled-Tile Drainage Drainage Side-Inlet Improvements Feedlot Manure/Runoff Storage Grassed Waterways Reduced Tillage Enhanced buffers Stream Bank/In-Channel Restoration Bioretention Constructed Stormwater Pond Constructed Wetland Septic-System Upgrades
Trap Stop Contaminants from Entering Surface Water or Groundwater	Edge-of-Field Filter Strips Restore Tiled Wetlands Saturated Buffer Tile-Line Bioreactors WASCOBs Biofiltration Infiltration Basin Permeable Pavement Sand Filter

CAPITAL IMPROVEMENT PROJECTS

An approach to implementing a large-scale project or program affords some economies of scale in acquiring and implementing funds for BMPs that are conducted as part of a project, rather than implementing BMPs on an individual basis. Capital improvement projects can be multifaceted and involve either one large complex of activities, such as stream restorations that include on- and off-stream storage components or providing groundwater recharge through restoring drained wetlands. Capital improvement projects typically take a 5- to 7-year time frame from concept development through completion. The concept plan and feasibility study often must be completed before engineering and construction are funded. At the time of this plan development, the SRWD does not have a capital improvement plan (CIP), and the other project partners do not have capital improvement plans that include watershed restoration and protection measures. The SRWD has implemented two capital improvement projects: the Big Sauk Lake Aquatic Plant Management project and the JD2 sediment pond construction project.

Capital improvement projects can generate public interest, controversy, and regulatory challenges because of their scale, costs, and complexity. The Policy Committee recognized that BMPs and conservation practices alone will not be enough to realize the vision the committee adopted. The Policy Committee acknowledged that the SRWD has an important role and unique authorities that facilitate implementing larger-scale projects that could make significant progress toward plan goals. The Policy Committee also agreed that capital improvement projects needed to be developed and vetted using a process that generates support, provides clarity on the issues and solutions, explicitly defines goals and outcomes as aligned with the plan, and recommends a fair funding plan. To meet that end, the Policy Committee directed the development of a capital improvement project team framework modeled after and borrowing extensively from the Red River Basin Project Team Handbook (Red River Water Management Board, 2007). The draft project team framework document is included as Appendix G at the end of this plan. The intent of this framework is to build a consensus around SRWD CIP projects that address the goals identified in the SRCWMP so that those goals can be implemented without unnecessary delays, burden, or costs.

The framework outlines selecting project team members and the responsibilities for organizations, staff, and committees involved in the framework. The planning checklist describes the expected participation levels and necessary actions of partners throughout the process. The project development table lists each project development step and the specific roles and responsibilities for the project team, the SRWD, and the Policy Committee. Criteria for evaluating projects were identified, but the metrics and thresholds for each criterion that help inform the Policy Committee's decision of support have not yet been established. The Policy Committee committed to completing the development of these framework elements upon approval and adoption of the plan and establishment of the joint powers collaborative agreement.

Capital Improvement Projects

- A project that exceeds $500,000 in cost and has an expected life greater than 20 years. Some capital projects may be slightly less than the $500,000 cost threshold but meet the other requirements.
- Have a regional footprint instead of individual, field-scale projects. An easement and/or land acquisition are feasible components of capital improvement projects.
- Require operation and maintenance (O&M) plans for the life of the project, including inspection plans to ensure the project's effectiveness.
- Often may be completed in cooperation with multiple entities and are good candidates for state or federal grant funding.

CAPITAL IMPROVEMENT PROJECT PRIORITIES

Initial priorities to pursue for capital improvement projects are listed below by resource category. The measurable outcomes of these projects will be determined on a case-by-case basis during the feasibility study of each individual project.

Mitigating ALTERED HYDROLOGY

- Implementing regional wetland restorations and flood-reduction projects
- Acquiring lands in floodway/floodplain areas with low-agricultural value and reconnecting the floodplain to the river
- Restoring stream channels and stream banks
- Restoring Crooked Lake in the Osakis Management District
- Working with drainage authorities to implement projects related to Minnesota Statutes 103D and 103E drainage systems to minimize the need for future maintenance on the drainage system, restore natural-stream features, and increase ecological health.

Reducing EXCESS SEDIMENT AND NUTRIENTS

- Expanding the JD2 sediment ponds in the Osakis Management District
- Implementing the stormwater management plans that the SRWD has created for ten cities within the watershed
- Coordinating with county and state highway road and bridge reconstruction projects to improve stormwater treatment and address connectivity and altered hydrology concerns
- Addressing internal loading in lakes by implementing projects that lock phosphorus.

Protecting AND PRESERVING GROUNDWATER QUANTITY AND QUALITY

- Installing cluster septic systems where needed
- Restoring wetlands in areas that have high-infiltration rates
- Permanently protecting land within highly vulnerable DWSMAs and converting the land to permanent cover.

Improving AND PROTECTING HABITAT

- Improving habitat in Cold Spring Creek by diverting stormwater from the creek, improving habitat cover, and removing a sheet-pile structure that limits fish movement in the lower portions of the stream
- Improving habitat and reducing internal loading in lakes through comprehensive management of invasive carp and other invasive species, including fish barriers, harvesting, and bluegill stocking and comprehensive lake management
- Enrolling land in permanent easement programs
- Removing or modifying dams and culverts to provide for fish passage.

OPERATION AND MAINTENANCE PLANS

After BMP and capital improvement construction projects have been completed, regular inspections and maintenance will be important to keep the project functioning at its design capacity and life expectancy. Operation and maintenance (O&M) plans must be prepared before construction. The plans should include the expected activities, timing of activities, and an inspection schedule. Information should also be developed on the procedure to be followed if the inspection determines maintenance is required or if required maintenance has not been performed, including potential penalties or enforcement actions. Minnesota State Rules 8400.1700 and 8400.1750 outline the program requirements for projects funded through state cost-share programs.

Inspections should be conducted on a regular basis and after significant weather events throughout the life of the practice to confirm that the O&M plan is being followed and that the practice is still performing as designed. Site inspections should include a written record, photographs, and a report regarding the status of the practice and an outline of repairs or maintenance required. Inspection records should be kept throughout the life of the practice to verify maintenance activities. The BWSR's recommended inspection plans are as follows:

Recommended Inspection Plans:

- Conservation practice with a minimum effective life of 10 years: the end of Years 1, 3, and 9 following the certified completion
- Capital improvement projects with a minimum effective life of 25 years: the end of Years 1, 8, 17, and 24 following certified completion is the recommended minimum.

If easement encroachments or maintenance requirements are not corrected within the designated time frame, the authorities vested in local government units as well as state and funding agencies will be used to compel compliance.

OUTREACH AND EDUCATION PROGRAM

The Sauk River CWMP partners have been conducting outreach and education programs for at least 20 years. Many of the current activities are listed in the strategies table that accompanies each priority issue; however, the Policy Committee identified the lack of a unified watershed ethic as a critical barrier to effective watershed management and protection. The traditional approach of relying on highly motivated individuals (early adopters) to voluntarily implement BMPs will not sufficiently achieve Sauk River CWMP goals. The planning partnership assessed current outreach and education activities. It was determined that effective watershed management activity implementation that delivers meaningful progress toward plan goals will require developing two programs: (1) watershed citizenship and (2) targeted civic engagement and outreach. These two programs are described in more detail below. The partnership may wish to engage professional outreach and education consultants who design, deliver, and evaluate outreach and educational programs as well as identify and resolve barriers to successful implementation. The outreach and education program results will be regularly provided to governmental officials and community groups within the SRW to provide clarity on messaging and outcomes and to seek assistance in delivering the programs.

Requirements

- Watershed citizenship
- Targeted civic engagement and outreach

ACTION ITEMS FROM THE PRIORITY AND GOALS SECTION INCLUDE:

- Continued monitoring of hydrologic and meteorological conditions
- Establishing baseline hydrographs for public drainage systems and streams to evaluate changes over time
- Modeling climate change impacts to hydrology and water quality using the Climate Change Module in the HSPF-SAM model and using the resulting information to improve and refine implementation strategies and programs.
- Identify priority farmland protection areas and encourage working land easements and other farmland protection tools.
- Increase education efforts focused on smart growth, green infrastructure, and sustainability tools for land use decision making authorities, developers, planners, and interested stakeholders.
- Prioritize forest management and protection programs in growth areas and especially subwatersheds of high-water quality lakes.
- Increase participation in drug take-back programs. Make a simple online map of where drop-off points are located.
- Increase education efforts by teaching SRW residents proper handling and disposal of laboratory-created compounds, including personal care products and pharmaceuticals.
- Increase awareness of HABs and reducing pet and livestock exposure.
- Increase awareness of arsenic in private wells.

WATERSHED CITIZENSHIP PROGRAM

Funding will not be sufficient to implement all of the actions needed to restore and protect all of the SRW's natural resources. Therefore, encouraging landowners to become responsible citizens of the watershed will be a cost-effective, broad-based approach to civic engagement. The partnership will develop an intentional program to increase citizenship awareness, engagement, and stewardship of natural resources and systematically evaluate changes in residents' attitudes toward watershed citizenship. Six steps are involved in developing and implementing the watershed citizenship program and are described as follows:

1

DEFINING WATERSHED CITIZENSHIP NORMS:
Working together, the governing officials and their staff will develop a watershed citizenship standard that defines broadly accepted expectations of watershed information and should be known by all those who live within the SRW.

2

PRE-CITIZENSHIP FRAMEWORK ASSESSMENT:
Pre-program knowledge will be assessed using a statistically valid system. The information obtained will be the basis for developing content, messaging, and activities that increase knowledge and lead to behavioral change.

3

IMPLEMENTING THE CITIZENSHIP INITIATIVE:
Developing and implementing a plan to increase knowledge and enhance awareness will include determining how the programs will be delivered and who will deliver them. Specific groups that may have a larger influence on watershed outcomes (e.g., homeowners around lakes, agricultural producers that own land in the riparian zone, and benefited landowners within a drainage system) will be targeted.

4

POST-CITIZENSHIP ENGAGEMENT ASSESSMENT:
Monitoring for change will allow the planning partnership to determine the effectiveness of its education and civic engagement programming. The assessment should use the same framework that was used in Step 2 to ensure the results are comparable.

5

ASSESS AND MEASURE CHANGE:
Pre- and post- survey results will be assessed to identify measurable changes to the watershed citizenship norm and evaluate education and engagement programming delivery. Working with the social-science organization should provide the planning partnership with some evidence for what techniques worked well, what had a good return on investment, and what should be discarded.

6

REPROGRAM AND DELIVERY:
Programming will be updated to address any issues that were identified in the assessment, enhance messaging, and improve program delivery.

CIVIC ENGAGEMENT AND TARGETED OUTREACH

The Sauk River CWMP requires installing a suite of BMPs and land use changes to achieve the plan goals. Outreach to landowners will follow the prioritize, target, and measure framework. This outreach effort should be designed for delivery over a period of 3 to 5 years. During the 3-to-5-year outreach programming, the implementation partnership should adopt an adaptive management approach to evaluate the effectiveness of its efforts.

Targeted Management Approach

LANDOWNER IDENTIFICATION AND ANALYSIS

- Partnering landowners needed to implement the priority practices in targeted locations will be identified and informed of program opportunities.
- Program interest will be assessed and barriers to implementation will be determined using qualitative and quantitative tools such as surveys, focus groups, and individual landowner interviews.

PROGRAM OUTREACH AND DELIVERY

- Outreach efforts that address identified barriers and reach targeted audiences according to their preferences will be developed and delivered. Program delivery strategies include mailings, regional promotions (e.g., billboards, radio, and cable access), social media, field days, and direct contact with individual landowners.
- Follow-up outreach to participating landowners will be provided to demonstrate the commitment that the partnership has in supporting implementers.
- A landowner success story portfolio will be developed to add credibility to the programs and increase landowner participation. In-depth case studies that document relevant data such as management practices, economics, and landowner efforts could be used to demonstrate the reality of installing the project within the work area.
- Agents from the University of Minnesota Extension will be involved in this effort as the extension agents have access to the appropriate technology, data processing, and name recognition that would lead to more credibility in delivering the information.

PROJECT CONTINUATION AND TERMINATION

- The time frame for targeted outreach and education efforts should align with the implementation schedule to foster increased adoption rates.
- When implementation efforts within the targeted area have been achieved or are exhausted, outreach activities should transition to the next targeted geography. Successes should be celebrated and highlight the efforts of the project area's landowners in engaging in conservation activities. This celebration effort serves as a transition period but also recognizes the local efforts and concludes the efforts on a positive note.

Watershed Partners in Action!

CENTRAL MINNESOTA WATER EDUCATION ALLIANCE

The Central Minnesota Water Education Alliance (CMWEA) is a coalition of central Minnesota cities, counties, townships, and other organizations that provide educational outreach to promote water quality stewardship. The mission of CMWEA is to develop and implement educational programs that encourage individuals in central Minnesota to protect water resources by increasing their knowledge and encouraging simple behavior changes. By working in concert, the members of CMWEA can provide a consistent water quality message.

Starting in 2006 with 7 members, CMWEA now has 32 members. Education and outreach initiatives are focused locally, primarily on stormwater education and tips people can do in their everyday lives to help keep our water drinkable, fishable and swimmable. CMWEA is an irreplaceable partnership for stormwater education. Within the past 5 years, CMWEA has engaged with over 8,000 local residents at events using the aquarium photobooth, and over 650 people have taken the Clean Water Pledge. Along with effective advertising and marketing techniques, CMWEA continues spread the word that *Clean Water Starts with You.*

REGULATORY CONTROLS AND ENFORCEMENT

Implementing the projects outlined in the targeted implementation plan will advance the effort to restore already-degraded watershed resources; however, the most effective way to reduce the impacts of future development and land use changes is by mitigating these through land use and regulatory controls. Implementing smart development and land use controls increases the resiliency of the watershed by reducing vulnerabilities caused by climate change. Land use controls are an important tool for protecting against decline in the quality of the SRW resources. This plan recommends evaluating existing land use controls and exploring ways to improve and harmonize regulatory programs that result in reduced impacts from shoreland development, increased groundwater demands, and harmful land management practices.

Opportunities exist for land use authorities to manage planning for the long-term protection of SRW resources in a way that balances economic growth with ecological and environmental concerns. A key aspect of a successful land use program is obtaining consistent requirements and enforcement of land use management controls across the watershed.

RECOMMENDATIONS

Opportunities exist for the regulatory authorities that oversee land use to manage land use conversion, development, and drainage systems in a way that balances agricultural and economic needs with ecological and environmental needs. A successful regulatory program includes consistency in regulatory requirements throughout jurisdictions, as well as consistently enforcing those controls.

To achieve greater consistency in standards that correct and mitigate land use and drainage impacts, a coordinated effort will be undertaken to evaluate existing standards and identify gaps. The partnership will explore the most appropriate standards when consensus is achieved, and authorities will adopt newly defined and consistent standards throughout the SRW. The partnership will explore regulatory options to be implemented when land management actions continue to degrade and threaten resources after exhausting all of the incentive programs. The partnership will explore providing incentives to permit applicants to reduce impacts over and above regulatory controls, particularly in targeted geographies, as part of their approval process.

Groundwater is a highly sensitive resource in that if contaminated, its impact is likely permanent. Groundwater availability is also dependent on aquifer levels and has limited-recharge capacity. Regulatory control measures that seek to reduce pollution potential and reduce withdrawals are the best protection against these threats. Land use controls that limit land uses to only those that are suitable in areas that have high and very high groundwater vulnerability should also be considered.

The watershed portions that are the most forested and have the least amount of altered hydrology are generally where the highest water quality resources can be found. Protecting these resources from degradation requires land management policies that limit forest conversion, forest fragmentation, and increased runoff. Resource zoning tools, such as Stearns County's Natural Resource Overlay District, can be useful for identifying unique and sensitive resources and conducting a more rigorous review of proposed land use activities to ensure compatibility with resource goals.

Table 7-2. Summary of Current Regulatory Controls

RegulatoryConcern	Douglas County	Pope County	Stearns County	Todd County	Douglas SWCD	Pope SWCD	Stearns County SWCD	Todd SWCD	SRWD
Wetland Management	Not Applicable	Exceeds	Exceeds	Exceeds	Meets	Meets	Not Applicable	Meets	Not Applicable
Floodplain Management	Meets	Meets	Meets	Meets	Not Applicable	Not Applicable	Not Applicable	Meets	Not Applicable
Shoreland Management	Exceeds	Exceeds	Exceeds	Exceeds	Not Applicable	Not Applicable	Not Applicable	Meets	Not Applicable
Buffer Compliance	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Meets	Meets	Meets	Meets	Meets
Subsurface Sewage Treatment Systems	Exceeds	Exceeds	Exceeds	Exceeds	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Groundwater/Surface-Water Use	Not Applicable	Meets	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Meets	Meets
Buffer Enforcement	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Meets	Meets	Not Applicable	Meets	Not Applicable
Terrestrial Invasive Species	Not Applicable	Meets	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Feedlots	Exceeds	Meets	Exceeds	Exceeds	Not Applicable	Not Applicable	Not Applicable	Exceeds	Not Applicable
Extraction	Not Applicable	Meets	Exceeds	Meets	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Soil Loss	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Meets
Agricultural Land Protection	Exceeds	Meets	Exceeds	Meets	Not Applicable	Not Applicable	Not Applicable	Meets	Not Applicable
Stormwater Runoff	Meets	Meets	Exceeds	Meets	Not Applicable	Not Applicable	Not Applicable	Meets	Meets
Urban Expansion/Annexation	Meets	Not Applicable	Exceeds	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Comprehensive Land use Plan	Exceeds	Exceeds	Exceeds	Exceeds	Not Applicable			Meets	Not Applicable
Other			Protection of Biological Survey Sites				Deed Restriction on Shoreline Naturalization Projects		

= Exceeds = Meets = Not Applicable

INFLUENCING STATE POLICY

The SRCWMP partners belong to their respective associations: the Minnesota Association of Watershed Districts (MAWD), Minnesota Association of Soil and Water Conservation Districts (MASWCD), and Association of Minnesota Counties (AMC). Each association has a resolution and policy process and platform. The partners will review significantly important issues and brainstorm potential policies to improve regulatory support on an annual basis. State Certification of Water Quality is covered under Section 401 of the Clean Water Act and is a part of a larger water quality protection effort that is an integral part of the federal Clean Water Act.

EXISTING REGULATORY CONTROLS

Local government units, including counties, cities, and townships, are responsible for regulating land use controls and implementing various state programs, such as the Minnesota Shoreland Management Program. The SRWD also has permitting and regulatory authorities that can compel compliance to established standards. Although watershed districts in Minnesota do not implement land use controls, the districts do have the ability to "control the use and development of land in the floodplain and the greenbelt and open space areas of the watershed district" (Minnesota Statutes 103D.335, Subd. 19). Table 7-2 provides a summary of current local regulatory controls and whether they meet or exceed state regulatory standards. In addition to the local controls, federal and state laws, regulations, and rules are in place related to watershed and natural-resource management. A summary of the regulatory controls most related to watershed management is provided in the following descriptions.

Wetland Management

Wetlands have regulatory controls regarding the discharge of dredged or fill materials into waters of the US, including wetlands. The US Army Corps of Engineers (USACE) and US Environmental Protection Agency (EPA) share responsibilities for implementing Section 404 of the Clean Water Act, which requires certifying water quality compliance measures. This certification is a requirement of various federal permit programs and is implemented at the state level by the MPCA. The USDA implements the federal Farm Bill policies regarding draining or filling wetlands for farm-program participation. Minnesota also has the WCA, which is intended to result in no net loss of wetlands through various mitigation, replacement, and permitting activities. The BWSR administers the program; however, the program is implemented through local government.

Regulations

Minnesota Statute portions of 103B and 103G; Minnesota State Rule Chapter 8420

Floodplain Management

The Federal Emergency Management Agency (FEMA) administers federal floodplain management, mapping, insurance, and flood-assistance programs. At the state level, the MNDNR oversees the state program and administers the National Flood Insurance Program for the state. Local zoning regulations identify permitted land use in the floodway, flood fringe, and floodplain. At the time of the plan's development, Digital Flood Insurance Rate Maps (DFRIMs) have been completed for Douglas, Todd, and Stearns Counties. A paper map completed in 1987 exists for Pope County, but modern digital maps are expected to become available in 2020.

Regulations

Minnesota Statutes 103A

Shoreland Management

Minnesota has shoreland management standards that are identified in rules and overseen by the MNDNR. Local governments are required to adopt land use controls that protect shorelands along rivers and lakes. Ordinances may be more restrictive depending on the local government units. Douglas, Todd, and Stearns Counties have shoreland ordinances that are more restrictive than the state minimum; however, the requirements of the ordinances for these counties are not consistent.

Regulations

Minnesota Statute 103F and Minnesota Rules 6120.2500–3900

Buffer Management

Buffers are required on public waters and drainage systems. According to legislation enacted in 2015, buffers of perennial vegetation are required to an average of 50 feet with a minimum of 30 feet on public waters and 16.5 feet for public-drainage systems. Flexibility is allowed if other practices provide the same water quality benefit as a buffer. Exceptions are made for areas that are covered by roads, buildings, or other structures; areas that are enrolled in the Environmental Quality Incentives Program (EQIP); public-water accesses; and municipalities that follow federal and state stormwater requirements. The BWSR is the regulatory authority of this program, which is operated at the county level. The Douglas, Pope, Todd SWCDs and the SRWD have approved buffer ordinances.

Regulations

Minnesota Statutes 103B and 103F.48, Subd. 4

Point-Source Pollution Regulations

Mandates regulating point sources of pollution were a major component of the Clean Water Act, which was passed in 1972. The EPA is responsible for regulating point sources through the National Pollutant Discharge Elimination System (NPDES). The MPCA implements this program, which includes municipal sewage treatment plants, industrial discharges, concentrated animal feeding operations (CAFOs), and stormwater at the state level. Minnesota has general permits that govern activities such as CAFOs, and the standards are outlined in state rules. MS4s also have significant regulatory controls (city, county, townships, MN DOT, etc.) related to post construction stormwater management and construction site erosion prevention/sediment control.

Regulations

Minnesota Statutes 115 and 116, as amended; Minnesota Rules Chapters 7001, 7050, 7052, 7060 and 7090

Subsurface Sewage Treatment Systems (SSTS)

The goal of the SSTS program is to protect public health and the environment by adequately dispersing and treating domestic sewage from dwellings or other establishments that generate volumes of less than 10,000 gallons per day. SSTS requirements are adopted and enforced locally. Requests for assistance or complaints should first be directed to the local government unit (e.g., county, city, and township). Counties in the SRCWMP planning area may have grants available for SSTS upgrades for individuals that meet limited-income qualifications.

Regulations

Minnesota Statutes 115.55 and 115.56; Minnesota Rules Chapters 7080, 7081, 7082, 7083

Waste Management

Waste management permitting and regulatory programs are implemented by the MPCA. These programs include hazardous waste, storage tanks, and solid waste. Local land use and zoning controls may regulate whether waste storage and handling facilities are a compatible use. Waste from areas within the SRW is disposed of at several landfills in Douglas, Todd, and Sherburne Counties. Household hazardous-waste facility locations for each county are as follows: Pope/Douglas Counties, Pope/Douglas Solid Waste Management in Alexandria, Minnesota; Stearns County, Stearns County Household Hazardous Waste Facility in Waite Park, Minnesota; Todd County, Todd County Transfer Station in Browerville, Minnesota. Demolition debris landfills are located in Benton County and Sherburne County.

Regulations

Minnesota Statute 115.55; Minnesota Rules Chapters 7001, 7035, 7045, 7150, 7151, 9215, and 9220

Groundwater/Surface-Water Use (siting wells)

A water-use (appropriation) permit from the MNDNR Ecological and Water Resources Division is required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons of water per year. The MNDNR is required to manage water resources to ensure an adequate supply to meet long-range seasonal requirements for domestic, agricultural, fish and wildlife, recreational, power, navigation, and quality-control purposes. SWCDs and planning and zoning offices are offered the opportunity to comment on these permit applications.

Regulations

Minnesota Statutes 103G (for appropriation) and 103H; Minnesota 1989 Groundwater Act

Invasive Species

The MNDNR has regulatory authority over aquatic plants and animals and terrestrial vertebrates. The MDA has regulatory authority over terrestrial plants (noxious weeds) and plant pests. Each county has an agriculture inspector whose responsibility is to ensure that all of the laws and rules related to noxious weeds are carried out. Although the DNR has AIS specialists and aquatic plant managers that regulate the use of chemical or physical methods for removing invasive vegetation, no local counterpart role exists for aquatic plants and animals or terrestrial vertebrates.

Regulations

Minnesota Statutes 84D

Feedlots

The MPCA administers the feedlot regulations in Minnesota. Counties in the state may be delegated by the MPCA to administer the program for feedlots that are not required to have state or federal permits (see "Point Source Pollution Regulations" in Section 17.6.3.5). Each county in the Sauk River 1W1P area is a delegated county and, as such, manages its own program. Each program must include permitting, inspection, and registration. Each county will maintain delegated authority during the plan implementation.

Regulations

Minnesota Rules Chapter 7020

Public Waters

The MNDNR administers the Public Waters Work Permit Program, which regulates activities below the Ordinary High-Water Level (OHWL) in public waters and wetlands. Many activities are required to be permitted before work begins. These activities may include excavation, dredging, filling, installing structures, and shore-protection measures.

Regulations

Minnesota Statute 103G.245

Public Drainage Systems

Artificial drainage (subsurface-drainage tile and open ditches) was historically used to increase the amount of arable land. Over the past several decades, more extensive tiling (pattern tiling) has been used to optimize crop production by ensuring soil moisture does not prevent planting at the optimal time or create undesired crop stress because of excess soil/surface moisture. Public drainage systems are publicly managed drainage systems that provide outlets for private tile and ditches. Drainage authorities work with landowners to ensure adequate drainage and enforcement of relevant regulations. A list of all public drainage systems in the SRW is included in Table 7-3.

Regulations

Minnesota Statutes 103D and 103E.

Table 7-3. Drainage Authorities and the Drainage Systems in the SRW Under Their Management

Ditch Name	Authority	Total System Length (mi)	Management District
Stearns CD 33	Stearns County	4.9	Adley Creek
Todd CD 6	Todd County	5.6	Adley Creek
Todd CD 38	Todd County	18.1	Adley Creek
Todd CD 42	Todd County	3.6	Adley Creek
Todd CD 44	Todd County	5.9	Adley Creek
Stearns CD 9	SRWD	10.8	Centre Sauk
Stearns CD 11	SRWD	5.3	Centre Sauk
Stearns CD 19	SRWD	1.8	Chain of Lakes
Stearns CD 24	SRWD	2	Chain of Lakes
Stearns CD 15	SRWD	9	GUS Plus
Stearns CD 26	SRWD	20	GUS Plus
Stearns CD 17	SRWD	7.5	Mini Metro
Douglas CD 98	Douglas County	9.78	Osakis Lake
Douglas/Todd JD2 (Crooked Lake Creek)	Douglas County	37.29	Osakis Lake
Todd CD 2/33	Todd County	1.6	Osakis Lake
Todd CD 3	Todd County	2.1	Osakis Lake
Todd CD 33	Todd County	2.5	Osakis Lake
Todd CD 43 (Boss Creek)	Todd County	2	Osakis Lake
Pope CD 6	SRWD	8.7	Sauk Lake
Pope CD 11	SRWD	3	Sauk Lake
Pope CD 17	Pope County	6.1	Sauk Lake
Pope/Stearns JD1	SRWD	7.5	Sauk Lake
Stearns CD 35	Stearns County	1.4	Sauk Lake
Stearns CD 51	SRWD	7	Sauk Lake
Todd CD 12	Todd County	6.4	Sauk Lake
Stearns Zion Munson	SRWD	3	Saint Roscoe

Extraction/Extractive Use

Extractive use means using land for removing surface or subsurface sand, gravel, rock, industrial minerals, a nonmetallic mineral, or peat not regulated by Minn. Stat. §§ 93.44—93.51 and amendments thereto. Extractive-use mining may include construction sand and gravel that are used in concrete, aggregates, concrete products, asphalt, road base, fill, snow and ice control, and for other miscellaneous uses. Peat, black dirt, rock, and other soils are used extensively for landscaping.

Regulations

Minnesota Statute 88.0895Minnesota Statute 93.44 – 93.51

Soil Loss

The Minnesota Legislature amended Minn. Stat. §§ 103B—103F in 2015, in response to which the BWSR adopted draft guidance and initiated rulemaking. This guidance was rescinded by a later resolution that directs staff to continue to seek input from counties, SWCDs, and other stakeholders to address excessive soil loss. The BWSR also requested that the Buffers, Soils, and Drainage Committee review said outreach and considerations and report back to the Board.

Regulations

Minnesota Statute 103B—103F

Endangered and threatened species

Minn. Stat. §§ 88.0895 governs threatened and endangered species protection and defines species with special protection, as follows: endangered species are those threatened with extinction throughout all or a significant portion of their range; threatened species are those likely to become endangered within the foreseeable future throughout all or a significant portion of their range; and species of special concern are those that are not endangered or threatened but are extremely uncommon in Minnesota or have unique or highly specific habitat requirements and deserve careful monitoring. The MNDNR is required to adopt rules designating species as endangered, threatened, or species of special concern. Species are also protected at the federal level, and their protection status is determined by the USFWS. Species with protection statuses at the federal level (as listed by the USFWS) are shown in Table 7-4.

With respect to the northern long-eared bat (NLEB), the USFWS may regulate tree removal or other activities, if conducted:

- Within ¼ mile of an entrance to a known NLEB hibernaculum (a cave, mine, or other feature in which NLEBs have been documented to overwinter)

» Within 150 feet of a known NLEB maternity roost tree (a tree in which a female NLEB has been documented to roost).

A summary of the MNDNR number of species by type and state-designated protection status in the SRW is listed in Table 7-5.

Regulations

Minnesota Statute 88.0895

Table 7-4. List of Federal Species Within Counties Wholly or Partially Within the SRW (USFWS, 2019)

Species	Status	Location (Counties)
Northern long-eared bat	Threatened	All; a hibernaculum has been located in Waite Park Township (T124N R28W)
Dakota skipper	Threatened	Douglas
Poweshiek skipperling	Endangered	Pope
Bald eagle	Protected	All

Table 7-5. Number of MNDNR-Designated Species by Species Type and Protection Status (MNDNR, 2020a)

Species Type	Endangered	Threatened	Special Concern	Total
Amphibian	0	0	1	**1**
Bird	1	1	7	**9**
Fish	0	1	1	**2**
Insect	2	0	4	**6**
Mammal	0	0	1	**1**
Mussel	0	0	2	**2**
Reptile	0	1	0	**1**
Spider	0	0	1	**1**
Vascular Plant	4	0	5	**9**
Total	**7**	**3**	**22**	**32**

Cultural Resources

The National Historic Preservation Act of 1966 governs the protection of cultural resources and requires federal agencies to consider the effect of their activities on historical properties. In practice, protection is achieved in partnership with State/Tribal Historic Preservation offices. Minn. Stat. §§ 138 designates the commissioner of the Department of Administration as the Historic Preservation Officer and assigns responsibility for the program to the State Historic Preservation Office (SHPO). The Minnesota Field Archaeology Act, which regulates licensing for archaeologic work on nonfederal public land, requires state agencies to coordinate with the Office of the State Archaeologist, SHPO, and Minnesota Indian Affairs Council for review when working in areas of known or suspected archaeological sites. The Minnesota Historic Sites Act establishes the state historic sites network and state register of historic places and requires state agencies to consult with the SHPO before undertaking or licensing projects that may affect listed properties. Other pertinent regulations come from the Minnesota Private Cemeteries Act, which protects all human remains on public or private land in Minnesota; the Minnesota Environmental Rights Act; and the Minnesota Environmental Quality Board rules regarding Environmental Assessment Worksheets and Environmental Impact Statements.

Regulations

Minnesota Statutes 138

DATA, INFORMATION, AND ANALYSIS

An important component of watershed management is understanding watershed conditions and trends. Gaining knowledge about lesser-understood resources in the SRW is also important. Data obtained through research and monitoring programs provide the information that allows implementation actions to be adapted and tailored to meet changing conditions. This section of the plan presents information about current monitoring and data-gathering efforts, identifies potential future data-gathering and research efforts, and provides information about the organizations and programs that are involved in monitoring and research activities.

Surface Water(a)

STREAMS

- Eight long-term monitoring sites are on the mainstem of the Sauk River and six long-term monitoring sites are on primary tributaries to the Sauk River. Two of the sites on the mainstem of the Sauk River are part of the MPCA's Watershed Pollutant Load Monitoring Network.
- Continuous water levels are recorded and water samples are taken every 2 weeks from snowmelt through September 30.
- Flow measurements are taken once per month on established sites and twice per month on new sites. Additional flow measurements are collected as needed to better understand the river system.
- The USGS maintains a long-term, flow-monitoring station on the Sauk River upstream of the confluence with the Mississippi River in St. Cloud.
- Water samples are tested for total and ortho phosphorus, nitrate + nitrite, total Kjeldahl nitrogen, and TSS using a certified laboratory. Instantaneous readings for pH, conductivity, DO, and temperature are also recorded.
- Starting in 2020, chloride and hardness will be sampled at each site twice per year.
- The MPCA conducts stream monitoring every 10 years as part of the intensive watershed approach. The SRW was first assessed in 2008 and again in 2018/2019.

LAKES

- The SRWD monitors 20 lakes using a rotational-monitoring schedule that averages four lakes per year, with some lakes having more than one sampling location.
- The lakes are sampled eight times per year: once in May and September and twice in June, July, and August.
- Water samples are tested for chlorophyll-a, total and ortho phosphorus, and total Kjeldahl nitrogen using a certified laboratory. Instantaneous readings throughout the lake profile are obtained for pH, conductivity, DO, and temperature.
- When provided data indicate a significant drop in temperature and DO between the surface water and bottom of the lake, bottom samples are collected and analyzed for total and ortho phosphorus and total Kjeldahl nitrogen using a certified laboratory.
- The MPCA conducts lake monitoring every 10 years as part of the intensive watershed approach. The SRW was first assessed in 2008 and again in 2018/2019

VOLUNTEER MONITORING

- The SRWD works closely with the MPCA to support lake associations and volunteers in their monitoring efforts.
- Volunteer training and some of the equipment are provided by the MPCA and SRWD at no cost.
- Volunteers also assist the SRWD and the SWCDs in recording daily rainfall amounts. These records are forwarded to the State Climatology Office.

(a) water monitoring, unless otherwise noted.

Groundwater

Numerous organizations are involved in monitoring quality and quantity. Figure 7-1 provides a graphical overview of the state agencies involved in monitoring groundwater. Additional monitoring is provided at the local level by the SWCDs.

- The MPCA monitors water quality conditions at 24 wells in the SRW.
- The MNDNR in partnership with the SWCDs in the SRW monitors groundwater levels at 22 wells in the SRW.
- The MDA's township testing program is focused on testing private wells for nitrate. This program has been implemented in 18 townships in the SRW.
- The MDA also monitors 8 groundwater wells in the Sauk River Watershed. These wells are monitored for nitrate and pesticides, not for bacteria and arsenic.
- The SWCDs in the SRW provide nitrate testing in well water for residents.

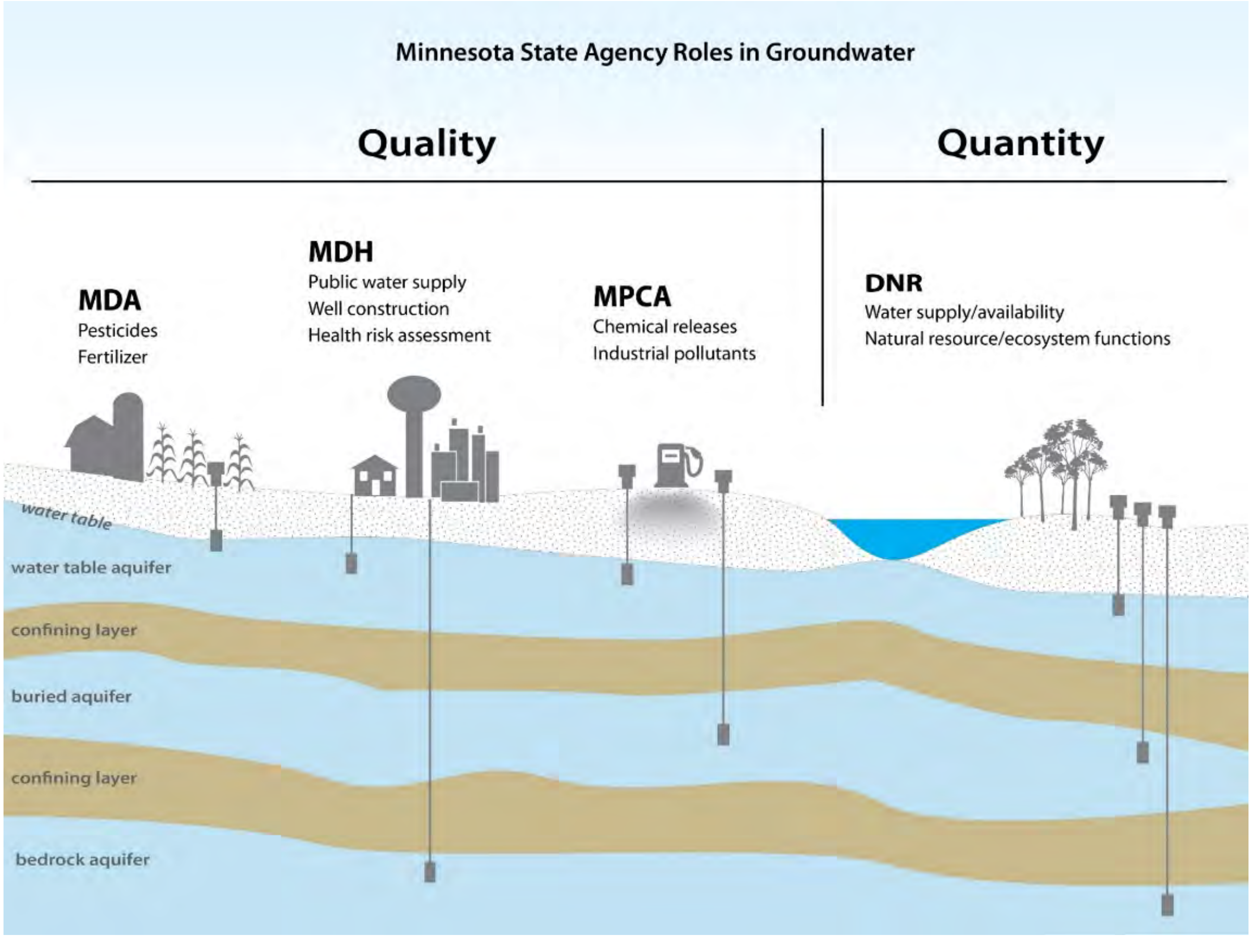


Figure 7-1. Schematic of Agencies Involved in Groundwater Monitoring (Courtesy of MNDNR, https://www.pca.state.mn.us/sites/default/files/wq-am1-10.pdf)

Habitat

- As part of the MPCA's Intensive Watershed Monitoring Program, rivers and select lakes are tested for fish and invertebrate population abundance and diversity. The resulting assessment is an index of biologic integrity. If the biological populations are impaired, streams and lakes are assessed to determine what is causing the stress to the biologic community. Stressors include a loss of habitat, low DO, excessive sediment, altered hydrology, or a lack of stream connectivity.
- Bird populations are monitored by the Minnesota Biological Survey. Audubon Minnesota IBA inventories exist, and some inventories are species-specific; however, no summary assessment is available.
- The MNDNR fisheries conduct fish-population surveys on most lakes on a 3- to 6-year rotation depending on lake size; public access; and fisheries management goals, objectives, and projects.

Critical Indicators

- Central Minnesota Agricultural Weather Network
- Periodic summaries of recent and long-term weather-reporting station data may be helpful in modifying monitoring activities and interpreting data to reflect weather variability. Data summaries are available from the Minnesota Climatology Office (http://climate.umn.edu) and the Midwestern Regional Climate Center (http://mrcc.isws.illinois.edu/CLIMATE) with local reporting stations at Melrose and Collegeville.

FUTURE MONITORING, PLANNING, AND STUDY PRIORITIES

The monitoring plan is aligned with the 1W1P and will be utilized to maintain long-term records. The SRWD monitoring plan has been developed and edited through partnership with the MPCA Brainerd Office based on the WMDs, and feedback/information learned over the years. While the program is adjusted as needed (for example, chloride sampling was added in 2020 as a result of increased knowledge on chloride impacts and content/significance within the 1W1P), the overall plan is kept consistent to ensure long term trend data area available for tracking purposes and to avoid data gaps. To better assess watershed conditions, detect trends, and plan for watershed implementation projects, additional data, information, and studies will need to be conducted. A summary of key initiatives is provided below.

Assessing connectivity and surface water storage

Hydro-conditioning of DEMs is a priority for the planning partnership. A culvert inventory is necessary to complete the development of the hydro-conditioned DEMs. After the inventory has been completed, these data combined with hydrologic and water quality models will be used to more effectively target, plan, and design transportation, fish passage, and water quality projects.

Targeting Wetland restorations

Two initiatives are underway that the SRCWMP partners will support and intend to leverage for targeting wetland restoration once these initiatives are complete. These initiatives include TNC's wetland restoration effectiveness tool and BWSR's Compensation Planning Framework (CPF). The TNC's tool will predict the benefits of restored wetlands for nitrogen and phosphorus removal as well as carbon storage, which can be used to help prioritize or rank wetland-restoration projects for the TNC and partners, using a combination of GIS, modeling, and field-data collection. The project will use a partnership with University of Minnesota staff in the Department of Bioproducts and Biosystems Engineering to carry out the study. BWSR's CPF is being developed as a requirement of their in-lieu-fee mitigation (ILF), which is an alternative wetland banking mechanism. The CPF uses GIS data to document baseline conditions which will be used to evaluate and identify wetland restoration opportunities The SRW partners will use these tools to assess and target wetland restorations.

Geologic atlas update

Geologic atlas studies for each county provide essential information for managing and protecting groundwater resources. The study contains two parts: Part A provides geology information with mapping completed by the Minnesota Geological Survey and Part B provides the hydrogeology that is completed by the MNDNR. The data and information obtained through these studies can be used to develop recommendations that inform land use decisions and prioritize monitoring, permitting, easement locations, well sealing, and well-construction activities. The Stearns County geologic atlas needs to be updated, as it was last completed in 1998. The geologic atlas was last completed for Pope County in 2006, in Todd County in 2010, in Meeker County in 2019, and Part A of the update is in progress in Douglas County.

Transportation and chloride use

Chloride is persistent in the environment, which means that once chloride is in our surface waters it can only be removed by industrial processes such as reverse osmosis. Chloride can be harmful to aquatic life and lead to impairments. An impact assessment of chloride in the SRW, particularly as that impact may change with transportation corridor expansion, as well as the use of chloride to control dust in rural areas should be undertaken to develop appropriate management actions.

Septic-System Compliance Surveys and Inspections

SSTSs, or septic systems, can pose a threat to surface water and groundwater. To determine compliance and the potential risk of septic systems, lake associations and other entities may seek funding to undergo SSTS compliance surveys and inspections. GIS mapping or other data sources could be used to determine the most vulnerable groundwater and surface-water resources. These areas should be the priorities for inspections. By completing these activities, implementation funding can be prioritized to those systems that pose the biggest threat.

8 PLAN ADMINISTRATION AND COORDINATION

This chapter describes how the plan will be administered, the roles of the planning partners, funding levels and options, and the process for amending the plan. The Sauk River CWMP will be administered through a joint powers collaborative (JPC) agreement between Douglas County, the Douglas County SWCD, Pope County, the Pope County SWCD, Stearns County, the Stearns County SWCD, Todd County, the Todd County SWCD, and the SRWD. The JPC will contain many of the provisions that were included in the MOA to develop the plan. The Stearns County attorney is responsible for developing the JPC, which will be provided to each entity to review before adoption. The probable provisions of the agreement are outlined below.

DECISION-MAKING AND STAFFING

The successful implementation of the Sauk River CWMP will require increased coordination, capacity, and funding within the partnership. The planning partnership will address this increased demand by formalizing committees, roles, and responsibilities to ensure accountability to the partnership, SRW citizens, stakeholders, and funders. The probable functions and roles at the time of plan development are provided in Table 8-1 and may potentially change throughout the 10-year plan.

Table 8-1. Roles and Responsibilities for Implementing the Sauk River CWMP

Role	Responsibilities
POLICY COMMITTEE One board member from each JPC entity	» Meet quarterly. » Review and approve the biennial work plan and associated budget for partner activities. » Conduct an annual meeting to review progress and determine if changes are needed in priorities, actions, and responsibilities.
FISCAL AGENT Stearns County	» Prepare and submit grant applications and funding requests on behalf of the partnership. » Submit required financial reports to funders and provide regular updates to the Policy Committee.
PLAN COORDINATOR Sauk River Watershed District	» Coordinate and convene meetings. » Collaborate with and provide support to JPC entities to implement plan activities. » Collaborate with the fiscal agent to develop biennial workplans and status reports.
IMPLEMENTATION TEAM One staff member from each JPC entity.	» Meet quarterly, or more frequently if necessary. » Implement the targeted implementation schedule. » Identify opportunities to coordinate shared services, streamline processes, and eliminate program overlap or duplication of effort. » Review progress on the implementation plan; identify and work to address issues. » Conduct an evaluation of progress toward goals at least biennially; make recommendations to the Policy Committee on needed changes.
TECHNICAL COMMITTEE* State agency representatives as well as technical experts on an as-needed basis *Serves as the required advisory committee	» Meet at the call of the Implementation Team, but at least annually. » Made up of the Implementation Team, state agency representatives, and technical experts on an as needed basis. » Provide technical support on CWMP implementation to the Implementation Team. » Advise the Implementation Team on new programs, funding opportunities, and emerging issues. » Provide feedback and input to the Implementation Team on projects and issues.

COORDINATION OF SHARED SERVICES

The partners recognize the benefit of obtaining efficiencies through shared-service delivery. Throughout the implementation of the plan, and particularly at the biennial planning and 5-year evaluation benchmarks, the Policy Committee will assess appropriate use of shared services to ensure goals are achieved.

COLLABORATION WITH OTHER UNITS OF GOVERNMENT

The Sauk River CWMP Policy Committee and Implementation Team will actively seek opportunities for early coordination and collaboration with other units of government, including cities, townships, federal agencies, and special-purpose joint powers boards. Governmental units that are not part of the formal JPC will be invited to participate in implementation activities where those activities are relevant to their own goals or implementation measures. Collaboration with state agencies such as the BWSR, MPCA, and MNDNR are critical for executing the programs and goals of the plan. Federal government partners, including the USFWS, US Army Corp of Engineers (USACE), USGS, NRCS, and Farm Service Agency (FSA), are not required participants, but their programs and staff expertise are necessary components to fulfilling plan goals.

COLLABORATION WITH NONGOVERNMENTAL PARTNERS

Successfully obtaining the Sauk River CWMP goals will depend to a large degree on the local support that drives the plan's implementation. The Sauk River CWMP partners are committed to working with nongovernmental entities, including individual and coalitions of lake associations, civic groups, nonprofit entities, private businesses, volunteers, individuals, and foundations, many of which are already involved in protecting and improving the SRW's resources. To utilize the opportunities these nongovernmental entities can offer, the Sauk River CWMP calls for committing the resources necessary to establish a Sauk River CWMP coordinator role. Through establishing this role, a concerted effort will be made to engage with these entities on all of the activities related to the goals and programs in this plan. Potential partners will be invited to the annual Advisory Committee meeting with the Policy Committee and will be sought out for build relationships, programs, and projects that support the plan initiatives.

WORK PLANNING

Work plans and associated budgets will be developed by the Implementation Team, with input from the Technical Committee, on a biennial basis, with annual adjustments made as needed to accommodate unforeseen or opportunistic situations. The Plan Coordinator will organize the plan development process. The process for developing the biennial work plan will begin with a review of the "State of the Watershed" report or similar reports as well as evaluation tools to develop a list of focus areas for the biennial work plan. The Implementation Team will determine the content and focus of the biennial work plan through consensus. The Implementation Team will consider progress made toward goals, new initiatives aimed at either maintaining or accelerating progress in targeted watersheds, and opportunities for shared services or collaborative efforts that are needed to reach goals. The biennial work plan will encompass multiple funding sources, including local sources, and will easily be translatable to submission to BWSR for the biennial Watershed Based Implementation Funding request. Each biennial work plan will be recommended for approval by the Policy Committee before implementation. The biennial work plan will be adopted and implemented separately by each local government. Adoption of the biennial work plan demonstrates the commitment to implement the plan for a 2-year period, with annual adjustments as needed based on consensus agreement by the Implementation Team.

ASSESSMENT AND EVALUATION

The biennial workplan will serve as the foundation for all of the reporting directly related to implementing the plan. Information on annual accomplishments will be gathered with eLINK. This information will be supplemented by program accomplishments that were not contained in the 1W1P funding but that address or move forward the Sauk River CWMP measurable outcomes. This may include activities from collaborators or initiatives undertaken by the JPC entities but are not explicitly identified in the biennial work plan. A "state of the watershed" or similar report will be created for each biennial budget cycle and updated each year of that biennial budget cycle. This report's purpose is to provide transparent accountability and demonstrate outcomes. The Policy Committee will approve all reports before submission, publication, or distribution.

Every 5 years, the JPC entities will conduct an evaluation of overall progress toward the 10-year and long-term goals. The evaluation will begin with an assessment of new data, information, and trends that may require a shift in the focus of implementation efforts. An assessment will be made as to whether the 10-year goals will be met with the current pace of progress, if additional resources are needed, or if the delivery of services should be adjusted to strengthen implementation efforts. If these changes are deemed necessary, the Policy Committee will initiate a plan-amendment process.

PLAN AMENDMENTS

The Sauk River CWMP is in effect through 2030. The activities described in this plan are not prescriptive and are meant to allow flexibility in implementation. Therefore, an amendment will not be required for addition, substitution, or deletion of any of the actions, initiatives, and projects if those changes will still produce outcomes consistent with achieving the plan goals. This requirement includes changes to activities, except for activities in capital-improvement projects.

During the time that this plan is in effect, new data will be generated that provide a better understanding of watershed issues and solutions. 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 revisions and updates to the plan if major policies or a significant shift in the focus of implementation activities are planned. If revisions are required or requested, the Sauk River CWMP Policy Committee members will initiate a plan amendment process consistent with Minnesota Statute 103B.314, Subd. 6.

FUNDING

The following sections discuss current local funding, funding needs, and potential funding sources. The extent to which the Sauk River CWMP implementation plan and goals can be accomplished is dependent on the level of funding that is available. The variance between current and needed revenue is expected to be filled with local, state, and federal funds, grants, and innovative funding programs such as investments made to offset water quality or flooding impacts or to improve watershed resiliency.

CURRENT LOCAL FUNDING, ANNUAL SRCWMP COST, AND TOTAL PLAN COST

The current local funding, the estimated annual cost to implement the SRCWMP, and the estimated total plan cost are outlined in Table 8-2. Each agency will be using this plan as its primary guidance for the work that agency plans to complete; therefore, the intent of the project partners is to shift the average annual expenditure to the anticipated local contributions. The current funding level is based on the annual revenue and expenditures for the planning partners combined and allocated to the SRW based on the percentage of county land area in the SRW and SRWD or in the case of Stearns County, the total area within the county's jurisdiction that is in the SRW. The current level of investment by each local government unit is expected to remain the same during the SRCWMP time period. The current expenditure includes all of the state program and conservation delivery grants, including the Natural Resources Block Grant and SWCD Local Capacity building grants.

The estimated annual cost to implement is an average of all 10 years of the plan implementation; however, the actual amount needed to implement the plan will vary year to year. The figures are rounded up to simplify funding estimates. Details on programs activities, timelines, and outcomes are provided in Chapters 5 and 6, of the Targeted Implementation Plan.

Table 8-2. Summary of the Current Local Funding, Estimated Annual Cost, and Total Cost to Fund the Sauk River CWMP

Program	Average Annual Current Expenditure ($)	Estimated Annual Plan Cost ($)	Estimated 10 Year Plan Cost ($)
On-the-Ground Implementation	2,895,784	6,336,716	63,367,164
Land Use Management	1,333,770	25,000	250,000
Monitoring and Data Acquisition	86,922	141,500	1,415,000
Outreach and Education	299,504	31,000 [a]	310,000 [a]
Other (Drainage, Water Planning)	576,914 [b]	NA [b]	NA [b]
Totals	**$4,710,263**	**$6,534,216**	**$65,342,164**

(a) Does not include the cost of education and outreach programming that will be developed as a result of the yet-to-be-developed prioritized, targeted, and measured education and outreach program.

(b) "Other" programs represent expenditures at the time of plan development that did not align with the SRCWMP program categories.

POTENTIAL LOCAL FUNDING

The current local funding levels provided above will not be adequate to implement the plan. Therefore, additional local money will be needed for successful plan implementation. Various state laws have provisions for counties and watershed districts to generate additional revenue under the provisions of Minnesota Statutes 103B and 103D, as outlined below and listed in Table 8-3.

County

Water Planning Authority for Special Projects (Minnesota Statute 103B.355): Counties have the authority to levy funds for priority projects and assist SWCDS and watershed districts with program implementation.

Road Authorities: Counties can provide limited local funding to assist with the local share of road retention and other floodwater-retention projects.

Watershed District

Basic Water Management Projects (Minnesota Statutes 103D.605 and 103D.611):

These projects are initiated by the watershed district board or petitioned, and special projects are also petitioned or board initiated. Watershed districts may bond and incur debt.

Watershed District Special-Purpose Project (Minnesota Statute 103D.601): Watershed districts can set up special taxing districts to conduct larger capital improvement projects. The costs to affected parties must be less than $750,000. In the plan, special-purpose district(s) can be identified where CIPs are anticipated to be implemented within the next 10 years.

General Fund (Minnesota Statute 103D.905, Subd. 3): This fund pays for the general administrative expenses and construction or implementation of projects that provide for a common benefit shared by all of the property owners in the watershed. The general fund levy may not exceed 0.048 percent of the taxable market value or $250,000, whichever is less. In addition, in 2005 the Legislature amended the state statute (Chapter 152, Section 37) to allow the SRWD to levy 0.01 percent of the estimated market value. In 2019 taxable market value for the SRWD was over $8.6 billion, making the levy capacity over $860,00.

Survey and Data Acquisition Fund (Minnesota Statute 103D.905, Subd. 8): The purpose of this fund is to pay for the costs of making necessary surveys and acquiring data. This fund is collected with an *ad valorem* levy that can only be collected once every 5 years and is set at 0.02418 percent of the taxable market value or $50,000, whichever is less. This fund's balance cannot exceed $50,000, and the fund may only be established by the watershed district if other funds are not available to the watershed district for these purposes.

Drainage Authorities

Drainage System Costs (Minnesota Statute 103E.601): Funding for costs related to construction, maintenance, and improvement of drainage systems is apportioned to property owners within the drainage system based on the benefits received from the improved drainage.

External Sources of Funding (Minnesota Statute 103E.011, Subd. 5): A drainage authority can accept and use funds from sources other than assessments from benefitted landowners for the purposes of flood control, wetland restoration, or water quality improvements. Minnesota Statute 103E.015, Subd. 1a requires drainage authorities to investigate the potential use of external funding for the purposes identified in Minnesota Statute 103E.011, Subd. 5.

Cities

Stormwater Utility Fee (Minnesota Statute 444.075): Municipalities (a home-rule charter or statutory city that is not in an orderly annexation process) are authorized to collect stormwater utility fees to build, repair, operate, and maintain stormwater management systems. Stormwater utility fees must be set using reasonable calculations based on runoff volume or pollution quantities, property classification, or an equitable basis.

Table 8-3. Minnesota Statutes 103B and 103D Water Management Revenue Options

103 Fiscal Authorities and Programmatic Activities	County, City, Township 103B.331, 103B.335 Special Taxing District and Tax Levy Authority	Additional for Watershed Districts					Drainage Authorities
		103D.729, 103D.730, 444.075 (Subd. a) Water Management District/Stormwater Utility	103D.905 (Subd. 3) General Fund (Capped at $250,000)	103D.905 (Subd. 3) Basic Water Management Project	103D.905 (Subd. 8) Survey and Data Acquisition	103D.345 Permits	103E.011 (Subd. 5) External Funding
Administration		X	X				
Management Plans	X		X				
Monitoring and Data Collection		X	X		X		
Special Studies and Research		X	X		X		
Regulation and Permits			X			X	
Projects and Programs	X	X	X	X			X
Capital Improvements in Plan	X	X	X	X			X

STATE FUNDING

The State of Minnesota has the responsibility to fund watershed management programs through various capacities, programs, and agencies. The Nonpoint Priority Funding Plan (NPFP) outlines a criteria-based process to prioritize Clean Water Fund investments. These high-level state priority criteria include:

Priority Criteria

- Restore the waters that are closest to meeting state water quality standards
- Protect the high-quality, unimpaired waters at greatest risk of becoming impaired
- Restore and protect water resources for public use and public health, including drinking water.

Funding for CIPs may be obtained directly through legislative appropriations or through state agency programs that have bond funds available, such as Reinvest in Minnesota (RIM). Grants are also available from the BWSR, MPCA, MNDNR, MDH, and MDA to fund programs, practices, and projects, as well as through legislative commissions such as the LSOHC, which funds habitat projects, and the Legislative-Citizen Commission on Minnesota Resources Environmental Trust Fund, which provides research and innovation funds. State revolving fund loans can be obtained from the MPCA and MDA. Potential state-funding sources according to the Sauk River CWMP program are outlined in Table 8-4.

FEDERAL FUNDING

Federal agencies expected to partner with, and from which funds will be sought include the USFWS, USGS, Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA), and EPA. Dam improvement programs that address habitat and connectivity concerns may involve partnering with USACE. The USGS will likely provide support for data acquisition and monitoring programs, while the USFWS may provide land retirement program funds.

NONREGULATORY ECOSYSTEM SERVICE PROGRAMS

Most ecosystem service-trading programs are currently facilitated through regulatory permits and programs such as wetland banking and water quality trading; however, demand is increasing to provide ecosystem service grants that are not regulatory in scope. Funding initiatives that may be available could focus on increasing or protecting habitat for particular species, such as endangered or threatened species, or a particular ecosystem, such as pollinators. Program funders could include federal or state agencies, nonprofit organizations, or foundations.

OTHER FUNDING SOURCES

Foundation, nonprofit organization, and private contributions, including from landowners and corporate entities, will be sought for plan implementation activities. Local foundations may fund education, civic engagement, and other local priority efforts. Conservation organizations currently active in the SRW include TNC, Pheasants Forever, and Minnesota Land Trust, while others could be sought out for more engagement. These organizations acquire their own funding and may have project dollars and technical assistance that can be used. Finally, major cooperators and funding sources include private landowners who typically contribute 25 percent of project costs and may donate land, services, or equipment for projects or programs.

COLLABORATIVE GRANTS

The Implementation Team will develop grant applications and seek funding from various governmental and nongovernmental agencies based on the biennial plan. Individual entities will continue to submit grant applications for their existing programs and activities; however, grants that focus exclusively on implementing the activities of this plan will be developed by the Implementation Team and submitted by the fiscal agent of the JPC.

Innovative funding

TO ACCELERATE IMPLEMENTATION EFFORTS

When it comes to productive lands, healthy soils, clean water, abundant wildlife and feeding future generations, there is no one-size fits all approach. All Acres for Our Water brings together technical expertise and financial resources in a holistic approach to assess and address the unique needs of individual farm operations in central Stearns County while simultaneously taking steps to improve water quality and agricultural productivity at the watershed scale.

We are all in this together. With an emphasis on best management practices that yield benefits not only to our natural resources but each farm's bottom line, All Acres for Our Water works with landowners, their team of agronomists, and farm advisors to improve returns on productive acres, protect or enhance non-productive land and sensitive areas, maximize eligibility for financial assistance, and increase resiliency for entire farm operations.

Table 8-4. Potential Funding Sources for the SRCWMP Activities

Source	Organization	Program/fund name	Type of assistance	Form of Assistance	Programs: On the Ground Implementation	Programs: Land Use Management	Programs: Monitoring, Data Acquisition, Studies	Programs: Education and Outreach
State Funding	BWSR	Clean Water Fund	Financial	Grant	X			
	BWSR	RIM	Financial	Easement	X			
	BWSR	NRBG	Financial	Grant		X	X	X
	BWSR	SWCD Local Capacity Service Grants	Financial	Grant	X	X	X	X
	BWSR	Erosion Control and Management Program	Financial	Grant	X			
	MNDNR	Conservation Partners Legacy	Financial	Grant	X			
	MNDNR	AIS Control	Financial/ Technical	Grant				
	MNDNR	Forest Stewardship Program	Technical	Cost Share	X			
	MNDNR	Aquatic Management Area, WMA, SNA	Financial	Fee Title Acquisition	X			
	MNDNR/ Revenue	Sustainable Forest Incentive Act	Financial	Tax Incentive	X			
	MPCA	Clean Water Partnership	Financial	Grant	X			
	MPCA	State Revolving Fund	Financial	Loan	X			
	MPCA	SWAG	Financial	Grant			X	
	MDH	Source Water Protection Grant	Financial	Grant	X			
	MDH	Nitrate Testing	Technical	Monitoring			X	
	MDA	Agricultural BMP Loan Program	Financial	Loan	X			
	MDA	Minnesota Ag Water Quality Certification Program	Financial	Grant	X			X
	MDA	Nutrient Management Initiative	Financial	Grant	X			X
	LSOHC	Outdoor Heritage Funds	Financial	Grant	X			
	LCCMR	Environmental Trust Fund	Financial	Grant	X		X	X
	Legislature	Bonding	Financial	Bond	X			

Source	Organization	Program/fund name	Type of assistance	Form of Assistance	Programs			
					On the Ground Implementation	Land Use Management	Monitoring, Data Acquisition, Studies	Education and Outreach
Federal Funding	FSA	CRP	Financial	Cost Share	X			
	FSA	Grassland Reserve Program	Financial	Cost Share	X			
	NRCS	Conservation Innovation Grant	Financial	Grant	X		X	X
	NRCS	EQIP	Financial	Cost Share	X			
	NRCS	Conservation Stewardship Program	Financial	Cost Share	X			
	NRCS	Agricultural Conservation Easement Program	Financial	Cost Share	X			
	NRCS	Regional Conservation Partnership Program	Financial	Cost Share	X			
	USGS	Stream Gaging Network	Technical	Monitoring			X	
	USACE	Planning Assistance	Technical	Planning			X	
	EPA	Section 319	Financial	Grant			X	X
	EPA	State Revolving Fund	Financial	Loan	X			
Other Funding	Pheasants Forever		Financial/ Technical	Easement/ Cost Share	X			
	Ducks Unlimited		Financial/ Technical	Easement/ Cost Share	X			
	TNC		Financial/Techn ical	Easement/Cost Share	X			
	Minnesota Land Trust		Financial	Easement	X			
	Trout Unlimited		Financial/ Technical	Easement/ Cost Share	X			

NRGB = Natural Resources Block Grant
CRP = Conservation Reserve Program
SWAG = Surface Water Assessment Grant.

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Appendix A

PRIORITIZING AND TARGETING IMPAIRED AND UNIMPAIRED STREAMS AND LAKES

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APPENDIX A: PRIORITIZING AND TARGETING IMPAIRED STREAMS AND LAKES

This appendix explains the process and results for prioritizing and targeting surface waters with nutrient and sediment impairments. The process included streams and lakes because pollutant loading into lakes that are on the main stem of the Sauk River was one of the primary metrics used to prioritize lakes. Therefore, the entire prioritization process for impaired lakes and streams is presented together.

A.1 STREAMS

The Advisory Committee surface water team developed a draft prioritization scheme for impaired streams. The scheme directed the focus to the main stem of the Sauk River before addressing the tributaries. To evaluate restoration potential for the main stem reaches, an HSPF-SAM analysis was conducted to identify the subwatersheds (also referred to as reaches) with the highest sediment (total suspended solids [TSS]), total phosphorus (TP), and total nitrogen (TN) immediately upstream from impaired main-stem reaches or lakes. The main stem of the Sauk River was split into eight segments (see Figures A-1 and A-2) to evaluate the load fate of each subwatershed to each segment endpoint. The load fate identifies how much of the pollutant load from each subwatershed contributes to the downstream impairment. Subwatershed shade in Figure A-1 corresponds to the subwatershed's contribution for a particular pollutant, with darker colors indicating a larger contribution.

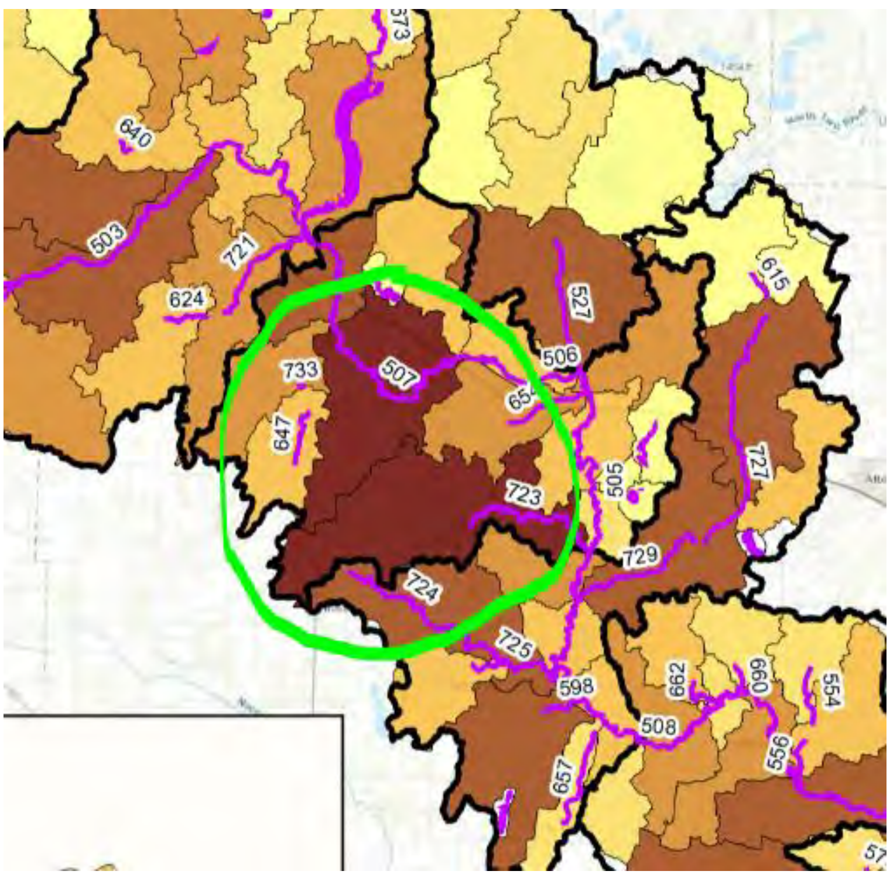

Figure A-1. Example of Two Subwatersheds With a High TSS Load Fate to the Downstream Reach A490.

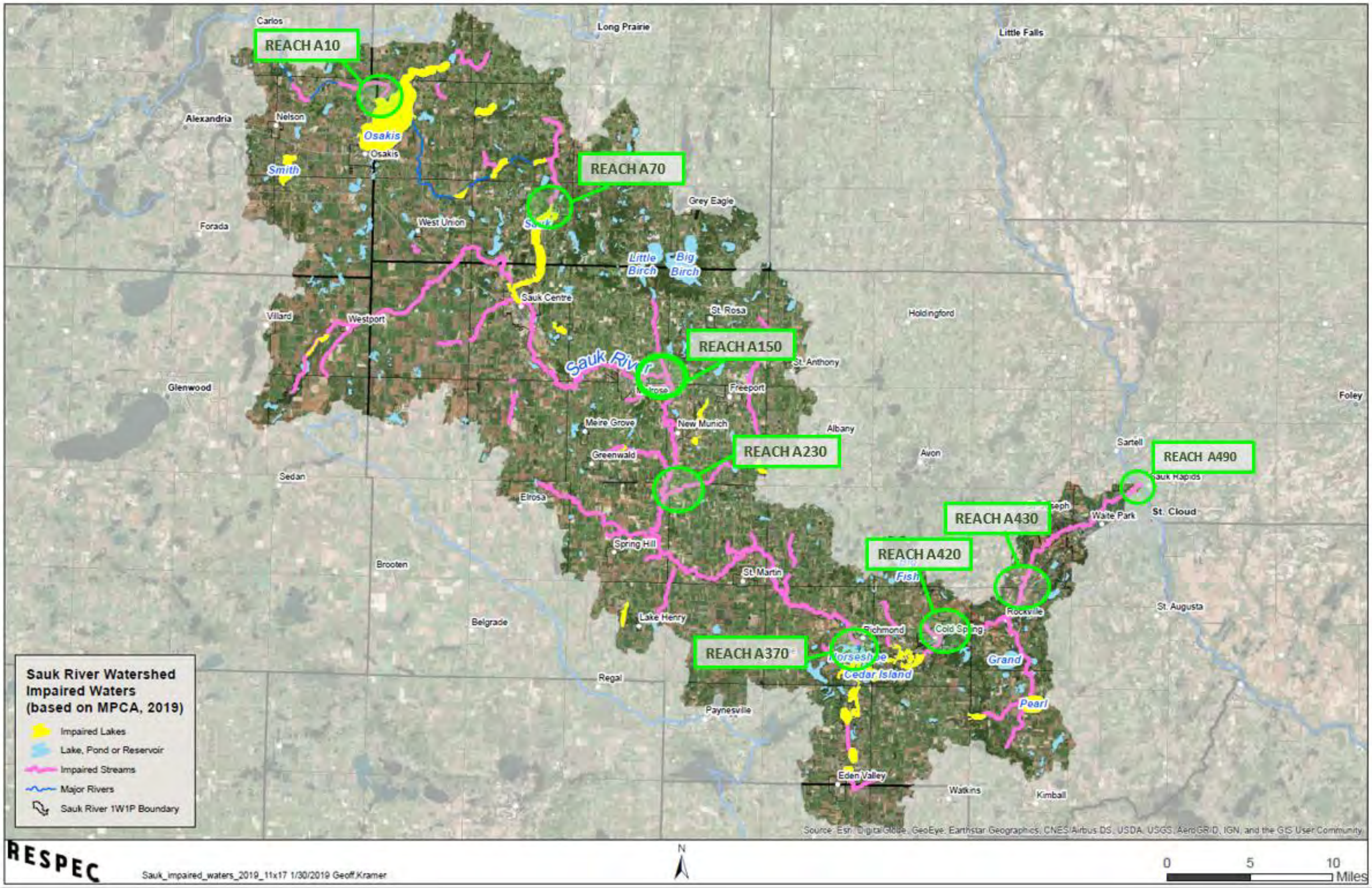

Figure A-2. Priority Stream Reaches Along the Main Stem of the Sauk River.

A.2 SELECTION OF PRIORITIZATION METRICS

Eleven members of the Advisory Committee provided feedback on the selection and ranking metrics to be used for prioritizing the Sauk River main-stem target endpoints. No consensus was reached regarding which prioritization metrics were valued more than others, so no weighting factor was applied to the metric scores. Table A-1 defines the prioritization metrics that apply to the target endpoints as well as each HSPF subwatershed. The metrics for target endpoints are only applied to the subwatersheds in between each target endpoint, meaning that this analysis excludes the subwatersheds above the upstream target endpoint. The prioritization for the individual subwatersheds is based on the ability to affect a target endpoint and, therefore, all of the subwatersheds that drain to each target endpoint are evaluated for the identified metrics.

Table A-1. Scale at Which Each Prioritization Metric Is Evaluated

Prioritization Metric	Applicable Metric Scale	
	HSPF Subwatersheds	Main-Stem Target Endpoints
Directly Connected to Impaired Streams	X	
Pollutant Fate Load Contribution	X	
Altered Hydrology	X	X
Number of Impairments	X	X
Achievability		X
Direct Tributary to Impaired Lakes	X	X
Drinking Water Impact	X	
Disturbed Area	X	X

A.2.1 DESCRIPTION OF EACH METRIC

A summary of each metric is outlined below, and the scoring breakpoints are provided in Table A-2. The source for the data for altered hydrology, number of impairments, directly tributary to an impaired lake, and disturbed area are geographic information system (GIS) layers provided by the State's geospatial commons website. The achievability metric is based on a SAM analysis evaluating the cost benefit of reducing TSS and TP in the entire drainage area of each breakpoint. Two scenarios were run at each breakpoint to determine the cost of reducing sediment and TP by 10 percent using a suite of common best management practices (BMPs). The default pollutant reductions and costs were applied to the BMPs used in the scenarios. The result of the scenarios is the cost of reductions per year, or dollar per ton per year ($/ton/year) for TSS and dollar per pound per year ($/lb/year) for TP reduced. The values for each metric were normalized to a score of 0–1 to value each metric equally with the metric scores summarized in Table A-2.

- Directly Contributing to Impaired Stream
  - What – HSPF subwatersheds that are directly draining to impaired reaches.
  - Why – Reducing pollutant loads directly contributing to impaired streams, both tributaries and land-based loads, targets the most immediate source of pollutants leading to the stream's impairment.

- Subwatershed Fate Loading to Sauk River Target Breakpoints
  - What – The fate load, or load that originates in a subwatershed that makes it to the target endpoint.
  - Why – While local loads are targeted in headwater reaches, impaired waters further downstream in the watershed receive pollutants from many areas. Using the HSPF model to identify which areas contribute the highest pollutant loads to impaired reaches allows for targeted restoration efforts. These loads account for attenuation and other natural processes throughout the watershed.
- Altered Hydrology
  - What – Percent of the total stream length that is altered based upon the Minnesota Pollution Control Agency's (MPCA's) altered streams GIS layer [MPCA, 2019d].
  - Why – Altered hydrology is a large stressor to local biota throughout the Sauk River Watershed (SRW). Identifying the areas with altered streams aids targeting of restoration efforts.
- Impairments per Impaired Reach
  - What – A count of the total number of individual impairments on a stream reach, excluding mercury and polychlorinated biphenyls (PCBs). For the targeted endpoints, the impairments located in the drainage area for each breakpoint are summed.
  - Why – Working to restore stream reaches with multiple impairments provides a cost-effective way to address multiple impairments at once.
- Achievability
  - What – An HSPF-SAM analysis to determine which breakpoint has the best cost benefit for restoration efforts.
  - Why – With limited resources, it is important that restoration efforts are targeted in locations that provide the most return on investment.
- Directly Contributing to Impaired Lakes on the Main Stem of the Sauk River
  - What – The outlet of the priority reach (target endpoints or individual HSPF reaches) flowing into impaired lakes.
  - Why – These impaired lakes provide numerous benefits to the region, which makes their restoration a priority. Restoring the Sauk River flowing into these lakes will improve these impaired lakes by addressing a major source of pollutants.
- Impacts on the Drinking Water Supply
  - What – Impaired streams located in wellhead protection areas and immediately upstream of St. Cloud.
  - Why – Wellhead protection areas are areas located around a public water supply well or wellfield that feeds a public water system. These areas are sensitive to contamination, which can result in contaminating the local drinking supply. Addressing the water quality impairments located in these areas to minimize the risk of contaminating the drinking water supply is important.

/ Subwatersheds With High Amounts of Disturbed Area

- What – Percentage of area in the drainage area to each breakpoint that is disturbed. Disturbed land use is defined as the National Land Cover Database (NLCD) land covers "developed," "cultivated crops," and "pasture/hay."
- Why – Land cover is an important factor in determining the health of downstream waterbodies. Typically, the greater the area that has been disturbed from its native land use or perennial cover, the greater the impact on downstream waters. Managing the disturbed land or restoring it to native land cover in watersheds that have a high percentage of disturbance may be an important tool for improving water quality in downstream waterbodies.

Table A-2. Summary of Impaired Stream Prioritization Criteria and Breakpoints

Priority Value Metric	HSPF Subwatershed Scoring/Breakpoints	Target Endpoints Scoring/Breakpoints
Directly Contributing to Impaired Stream	Yes = 1	N/A
	No = 0	
Subwatershed Fate Loading to Sauk River Target Breakpoints	Subwatersheds with largest load contribution are assigned a value of 1; all other values are calculated by dividing the fate load of the subwatershed by the largest individual subwatershed fate load	N/A
Altered Hydrology	75%–100% = 1 50%–75% = 0.75 25%–50% = 0.5 0%–25% = 0.25	75%–100% = 1 50%–75% = 0.75 25%–50% = 0.5 0%–25% = 0.25
Number of Impairments	4 = 1	>15 = 1
	3 = 0.75	10–15 = 0.75
	2 = 0.5	5–10 = 0.5
	1 = 0.25	
	0 = 0	0–5 = 0.25
Achievability (TSS and TP)	N/A	Normalized percentile based on the difference of the most cost-effective and least cost-effective location (most cost-effective = 1, least cost-effective = 0)
Directly Contributing to Impaired Lakes on the Main Stem of the Sauk River	Yes = 1	Yes = 1
	No = 0	No = 0
Impacts to the Drinking Water Supply	Yes = 1	N/A
	No = 0	
Disturbed Area	>90% = 1	90%–100% = 1
	80%–90% = 0.75	80%–90% = 0.75
	70%–80% = 0.5	70%–80% = 0.5
	<70% = 0.25	60%–70% = 0.25

A.2.2 RESULTS

Prioritization results for the main-stem targeted endpoints resulted with Endpoint 370, which flows into Horseshoe Lake, being a clear outlier as the highest priority along the Sauk River. The remaining targeted endpoints are relatively evenly distributed with Endpoints 150, 230, and 10 resulting in higher priority than the remaining target endpoints. The prioritization metric scores and overall priority scores are summarized in Table A-3.

Table A-3. Individual Metric and Ranking for Main-Steam Sauk River Priority Breakpoints

Target Endpoints	Altered Hydrology	Number of Impairments	Achievability (TSS)	Achievability (TP)	Connected to Impaired Lakes	Disturbed Area	Total Score	Total Ranking
370	0.5	1	0.83	0.99	1	1	5.32	1
150	0.5	1	0.91	0.93	0	0.75	4.09	2
230	0.5	0.75	1.00	1.00	0	0.5	3.75	3
10	1	0.25	0.02	0.30	1	0.75	3.32	4
420	0.5	0.5	0.35	0.94	0	0.5	2.78	5
70	0.5	0.5	0.00	0.00	1	0.5	2.50	5
430	0.25	0.25	0.37	0.88	0	0.5	2.24	7
490	0.25	0.5	0.33	0.85	0	0.25	2.18	8

A.3 LAKES

The Advisory Committee determined that two categories and approaches would be used for prioritizing impaired lakes. One category considered the lakes that were on the main stem of the Sauk River and were prioritized based on their location immediately downstream from a priority endpoint (discussed above). The second category was for lakes that are located “in the watershed,” which means not on the main stem of the Sauk River. The Advisory Committee developed a process of selecting metrics to evaluate the lakes and ranked lakes according to those metrics. Figure A-3 provides the location, mean TP, and deep and shallow lake classification information for the lakes under consideration for this resource category.

A.3.1 METHODS AND DETAILED RESULTS

Four metrics were used to prioritize the impaired lakes. A summary of each metric and the scoring breakpoints is outlined below. The source for all of the data is the 2019 LPSS, lake benefit-cost assessment (LBCA), LOBS spreadsheet provided by the MPCA, which evaluates data collected through 2018, GIS analysis of Minnesota Department of Natural Resources (MN DNR) public access locations, MPCA GIS data of lake-surface and lakeshed drainage areas, and MPCA GIS data of impaired lake locations within the watershed. The metric value breakpoints are provided in Table A-4 and values for each lake and the total priority score are provided in Table A-5.

- Nearly/Barely
  - What – How close a lake is to the achieving the water quality standard based on the calculated percent change of the average TP concentration relative to the water quality standard.

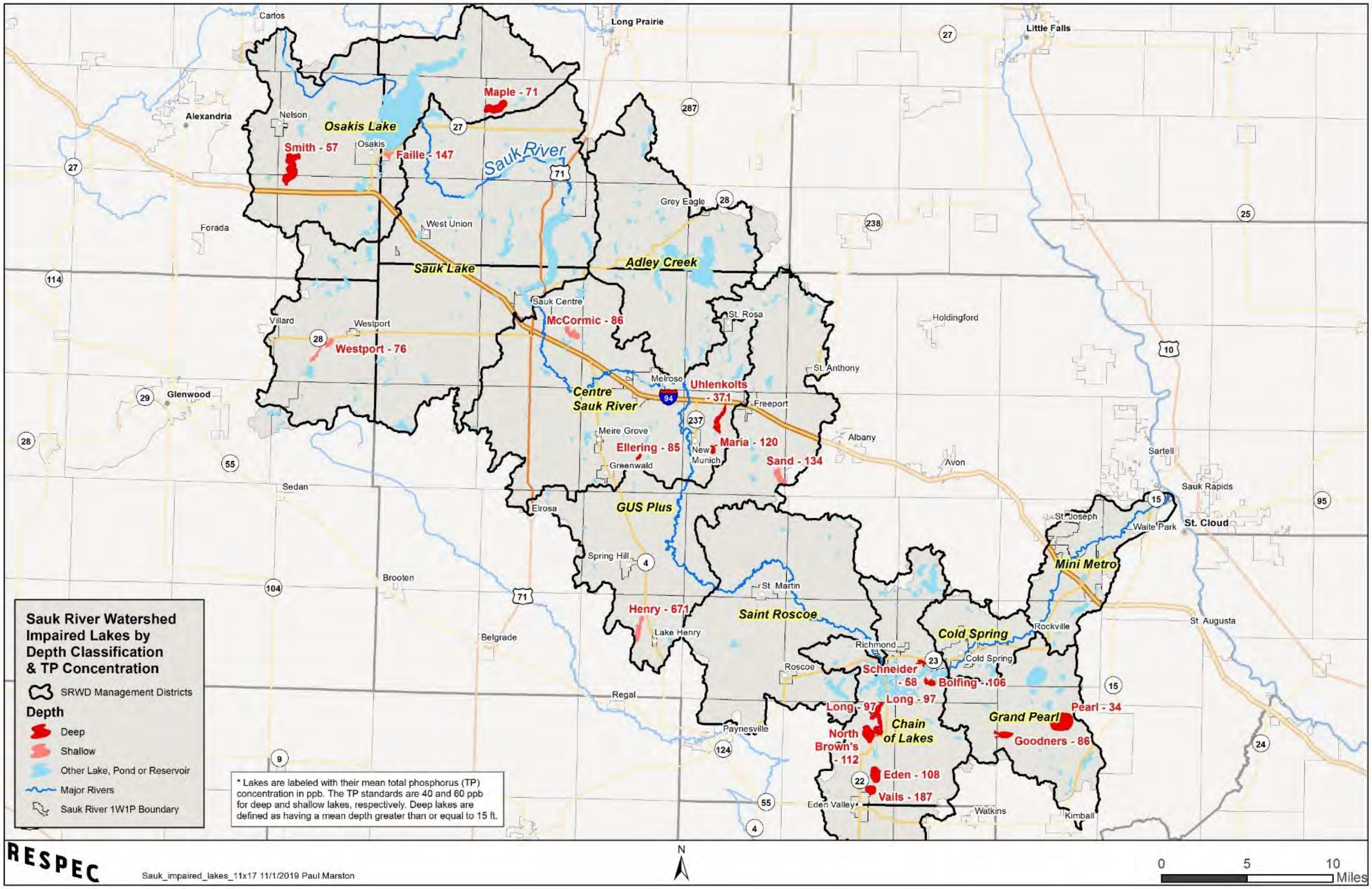

Figure A-3. Sauk River Watershed Impaired Lakes By Depth Classification and Total Phosphorus Concentration.

» Why – Focusing efforts on lakes close to the water quality standard will require less time and resources for the lake to meet the water quality standard.

/ Public Access

» What – Lakes with public access.

» Why – Lakes with public access are lakes that will be used by the public and provide a proxy for highlighting lakes that bring recreational, financial, and overall importance to the public.

/ Lake Size to Drainage Ratio

» What – The characteristics of the lake and a rough estimate of residence time, which can indicate how upstream land uses versus in-lake processes influence lake-water quality.

» Why – Lakes with larger lake to watershed ratios may require more restoration effort and a longer period of time for restoration efforts to result in lake-water quality improvements.

/ Immediate Impact on Priority Downstream Waters

» What – Impaired lakes that outlet to priority high-quality downstream lakes and streams.

» Why – Outflow from an impaired lake contains high levels of pollutants and is detrimental to immediate downstream high-quality lakes and streams. To ensure future protection of high-quality lakes and streams, restoring the impaired lakes flowing to these waterbodies is important.

Table A-4. Summary of Impaired Lake Prioritization Criteria and Breakpoints

Priority Value Metric	Scoring/Breakpoints
Nearly/Barely (Percent Change From Water Quality Standard)	Within 25% of Standard = 1
	Within 26%–50% of Standard = 0.75
	Within 51%–75% of Standard = 0.5
	Within 76%–100% of Standard = 0.25
	More than 100% From Standard = 0
Public Access	Yes = 1
	No = 0
Lake Size to Drainage Ratio	1:1–10:1 = 1.0
	11:1–25:1 = 0.75
	26:1–50:1 = 0.5
	51:1–100:1 = 0.25
	> 100:1 = 0
Immediate Impact on Priority Downstream Waters	Yes = 1
	No = 0
Presence of Water Clarity Trend	Increasing trend
	Decreasing trend
	No evidence of trend
	Blank: No Data

Table A-5. Individual Metric and Ranking for Impaired Lakes in the Sauk River Watershed

Lake Name	MN DNR I.D.	Depth Class	Nearly/ Barely	Public Access (number)	Watershed to Lake Area Ratio	Immediate Impact on Priority Downstream Waters	Total Score	Presence of Water Clarity Trend	Total Ranking
Pearl	73003700	deep	1	1	0.75	1	3.75	No evidence of trend	1
Bolfing	73008800	deep	0	1	1	1	3	Increasing trend	2
Goodners	73007600	deep	0	1	0.75	1	2.75		3
Schneider	73008200	deep	0.75	1	0	1	2.75	Increasing trend	4
McCormic	73027300	shallow	0.75	1	1	0	2.75	No evidence of trend	5
Smith	21001600	deep	0.75	1	0.75	0	2.5	Increasing trend	6
Long	73013900	deep	0	1	0.25	1	2.25	Increasing trend	7
North Brown's	73014700	deep	0	1	0.25	1	2.25	Decreasing trend	8
Eden	73015000	deep	0	1	0.25	1	2.25	Decreasing trend	9
Westport	61002900	shallow	0.75	1	0.5	0	2.25	Increasing trend	10
Sand	73019900	shallow	0	1	1	0	2	Increasing trend	11
Maple	77018100	deep	0.25	1	0.75	0	2	Increasing trend	12
Vails	73015100	deep	0	1	0	1	2	No evidence of trend	13
Uhlenkolts	73020800	deep	0	1	0.75	0	1.75	NA	14
Maria	73021500	deep	0	0	1	0	1	Increasing trend	15
Henry	73023700	shallow	0	0	1	0	1	NA	16
Faille	77019500	shallow	0	0	0	1	1	NA	17
Ellering	73024400	deep	0	0	0	0	0	NA	18

A.3.2 SUMMARY RESULTS

Prioritization of the impaired lakes indicated that Pearl and Bolfing Lakes were the priorities because of high scoring in many of the metrics. The next clear breakpoint is for the remaining lakes with a public access, including Goodners, Schneider, McCormic, Smith, Long, North Brown's, Eden, Westport, Sand, Maple, Vails, and Uhlenkolts Lakes.

MPCA water clarity trend information is included in Table A-5 to help guide restoration efforts but was not included as a metric in the prioritization scoring as all of the lakes do not have trend information; however, this information can be used for lakes that score similarly to prioritize one lake over another. The results are reported as Increasing Trend, Decreasing Trend, and No Evidence of Trend. Lakes that have an increasing water clarity trend indicate that water quality is improving and lakes with a decreasing water clarity trend indicate that water quality is declining. Targeting impaired lakes with increasing water clarity trends may provide better results than targeting a lake with a decreasing trend. Lakes with no evidence of trend show no statistically significant trend based on the water clarity data collected.

A.4 PRIORITIZING AND TARGETING HIGH WATER QUALITY LAKES

Eleven members of the Advisory Committee provided feedback on the selection and ranking metrics to be used for prioritizing lakes with high water quality, which are shown in Figure A-4. Based on these results, analysis was conducted using seven of the top eight metrics selected by the Advisory Committee; the future stress metric was not assessed as no analyses or information are readily available for this metric. However, the future stress metric can be accomplished in the future or evaluated using the best professional judgement of the Advisory Committee members. Additionally, because some concern existed about using the benefit to cost ratio, results are provided that both include and exclude the benefit to cost ratio as a criterion. Finally, some uncertainty existed regarding whether upward or downward transparency trends should be prioritized. Therefore, the results were provided for both trends.

A.4.1 METHODS AND DETAILED RESULTS

Seven metrics were used to prioritize high-quality lakes. A summary of each metric and the scoring breakpoints are outlined below and summarized in Table A-6. The source for all of the data is the 2019 LPSS, LBCA, LOBS spreadsheet provided by the MPCA, which evaluates data collected through 2018. The values for each lake metric were summed and are provided in Tables A-7 through A-9. The summary of all of the scores and rankings from Tables A-7 through A-10 is provided in Table A-11.

- Lake Size to Drainage Area Ratio
  - What – The characteristics of the lake and a rough estimate of residence time, which can indicate how upstream land uses versus in-lake processes influence lake-water quality.
  - Why – Lakes with a larger lake to watershed ratio may require more restoration effort and a longer period of time for restoration efforts to result in lake-water quality improvements.
- Lakeshed Land-Use Disturbance Percent
  - What – The percentage of land use that has changed from its original condition or been converted to agricultural or urban land uses.

    - » Why – Land cover is an important factor in determining the health of downstream waterbodies. Typically, the greater the area that has been converted from its native land use or perennial cover, the greater the impact on downstream waters. Protecting existing, native land cover in watersheds that have a low percentage of disturbance may be an important tool for maintaining high water quality lakes and streams.
- / Nearly/Barely
    - » What – Lakes that are within 10 percent of the water quality standard (deep or shallow).
    - » Why – Addressing lakes that are close to the water quality standard provides some assurances that these lakes will not decline into an impaired state.
- / Phosphorus Sensitivity
    - » What – Phosphorus sensitivity was estimated by the MPCA for lakes in Minnesota by predicting how much water clarity would be reduced with additional phosphorus loading to the lake. A phosphorus sensitivity significance index was formulated to prioritize lakes as they relate to the MPCA policy objective of focusing on high quality, unimpaired lakes at the greatest risk of becoming impaired. The phosphorus sensitivity significance index, which is a function of the phosphorus sensitivity, lake size, lake TP concentration, proximity to the MPCA's phosphorus impairment thresholds, and watershed disturbance, was used to determine the lake's Priority Class (MPCA).
    - » Why – The SRW has some lakes with high water quality, and understanding which lakes are at the greatest risk of continued, or increased, phosphorus input is important. Understanding which lakes are most sensitive to phosphorus pollution allows managers to initially focus efforts on the lakes with the highest risk.
- / Water Clarity Trend
    - » What – The MPCA monitors water clarity data in lakes to evaluate historical and current conditions. From these data, trends are identified that reflect historical management successes and inform the continuing challenge of controlling the more diffuse nonpoint-polluted runoff sources and the impacts of increased water volumes from artificial drainage practices.
    - » Why – Understanding which resources are experiencing an improving or declining trend in water quality allows stakeholders to initially focus efforts on these lakes, particularly as related to how close the lake is to meeting water quality standards.
- / Lakes of Biological Significance
    - » What – The MN DNR’s Lake of Biological Significance classification system identifies lakes that meet the objective criteria for four community types (e.g., aquatic plants, fish, amphibians, and birds). The goal of this list was to identify lakes that exhibit the highest-quality features within any of the four assessed biological communities (as opposed to identification of lakes that exhibit diversity across communities). Unique plant or animal presence was the primary measure of a lake's biological significance. Lakes were assigned one of three biological significance classes (e.g., outstanding, high, or moderate). Note that many SRW lakes have not been sampled for plants and/or animals, so this list of lakes will be periodically revised by the MN DNR as additional biological data become available.

- Why – Considering the risk of impacts to the SRW's aquatic plant, fish, amphibian, and bird communities was necessary to identify needs for protection. Careful development planning can mitigate impacts to these lake areas to preserve the biologically rich SRW.

- Lake Benefit-Cost Assessment
  - What – Grouping of waterbodies was based on the lake benefit-cost assessment priority score, which is a function of phosphorus sensitivity, lake size, and catchment disturbance.
  - Why – Classes relate to the State's priority of focusing on "high quality, highvalue lakes that likely provide the greatest return on investment."

Table A-6. Summary of High-Water Quality Lake Prioritization Criteria and Breakpoints

Priority Value Metric	Scoring/Breakpoints
Lake Size to Drainage Area Ratio	Ratio <10 = 1.0 Ratio 11–25 = 0.66 Ratio 26–50 = .033 Ratio > 50 = 0.0
Lakeshed Land-Use Disturbance Percent	<25 % = 1.0 25–40% = 0.5 >40% = 0.0
Nearly/Barely	Within 10% of water quality standard = 1.0 More than 10% lower than water quality standards = 0.66 More than 10% exceeding water quality standards = 0.33
P-Sensitivity	Highest = 1.0 Higher = 0.66 High = 0.33
Water Clarity Trend (evaluated using both improving and declining trend)	*Improving = 1.0* No Trend = 0.66 Declining = 0.33
	Declining = 1.0 No Trend = 0.66 Improving = 0.33
Lakes of Biological Significance	Outstanding = 1 High = 0.66 Moderate = 0.33
Lake Benefit-Cost Assessment Priority Score	Highest = 1 Higher = 0.66 High = 0.33

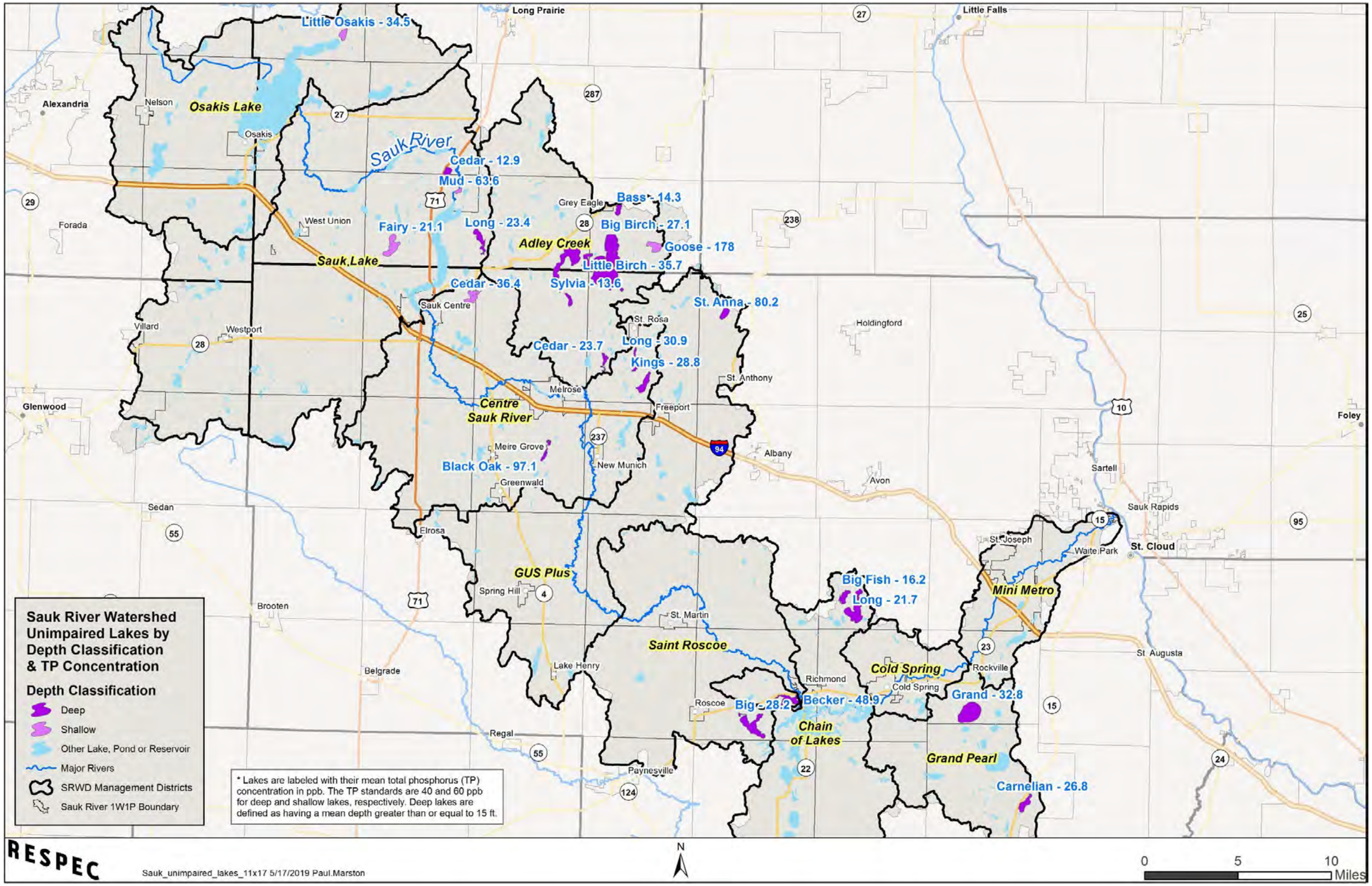

Figure A-4. Map of the Sauk River Deep and Shallow Unimpaired Lakes With Their Mean Total Phosphorus Concentrations.

Table A-7. Individual Metric and Ranking for High-Quality Lakes in the Sauk River Watershed – WATER QUALITY TREND PRIORITIZED = DOWNWARD; NO LBCA

Lake Name	MNDNR Lake Number	MPCA Lake I.D.	Lake Size to Drainage Area Ratio	Land-Use Disturbance	Nearly/ Barely	WQ Trend Score Downward Trend Prioritized	Phosphorus Sensitivity	Biological Significance	Total Score	Total Ranking
Big Birch	77008400	77008402	1	0.5	0.66	0.5	1	1	4.66	1
Big Fish	73010600	73010600	1	1	0.66	0	1	0.66	4.32	2
Long (Todd County)	77014900	77014901	1	1	0.66	0	1	0.66	4.32	2
Long (by Big Fish)	73010700	73010700	1	1	0.66	0	0.66	1	4.32	2
Kings	73023300	73023300	1	0	0.66	1	1	0	3.66	5
Bass	77001000	77001000	1	0	0.66	0	1	0.66	3.32	6
Carnelian	73003800	73003800	0.66	0	0.66	1	1	0	3.32	6
Pleasant	73005100	73005100	1	0	0.66	0.5	1	0	3.16	8
Cedar (North of Sauk Lake)	77016000	77016000	1	0	0.66	0	1	0.33	2.99	9
St. Anna	73018300	73018300	0.66	0	0.33	1	1	0	2.99	9
Fairy	77015400	77015400	0.66	0	0.66	0	1	0.66	2.98	11
Big	73015900	73015900	0.66	0	0.66	0	1	0.66	2.98	11
Cedar (East of Sauk Centre)	73025500	73025500	1	0.5	0.66	0	0.66	0	2.82	13
Black Oak	73024100	73024100	1	0.5	0.33	0.5	0.33	0	2.66	14
Grand	73005500	73005500	0.66	0	0.66	0	1	0.33	2.65	15
Cedar (by Freeport)	73022600	73022600	0.66	0.5	0.66	0	0.66	0	2.48	16
Goose	77001800	77001800	0.66	0.5	0.33	0	0.33	0	1.82	17
Sylvia	73024900	73024900	0	0	0.66	0.5	0.33	0.33	1.82	18
Long (by St. Rosa)	73023100	73023100	0.33	0	0.66	0	0.66	0	1.65	19
Little Birch	77008900	77008900	0	0	0.66	0	0.33	0.66	1.65	19
Little Osakis	77020100	77020100	0	0.5	0.66	0	0.33	0	1.49	21
Mud	77015100	77015100	0	0	1.0	0	0.33	0	1.33	22
Becker	73015600	73015600	0	0	0.33	0.5	0.33	0	1.16	23

Table A-8. Individual Metric and Ranking for High-Quality Lakes in the Sauk River Watershed – WATER QUALITY TREND PRIORITIZED = UPWARD; NO LBCA

Lake Name	MNDNR Lake Number	MPCA Lake I.D.	Lake Size to Drainage Area Ratio	Land-Use Disturbance	Nearly/ Barely	WQ Trend Score Downward Trend Prioritized	Phosphorus Sensitivity	Biological Significance	Total Score	Total Ranking
Big Birch	77008400	77008402	1	0.5	0.66	1	1	1	5.32	1
Big Fish	73010600	73010600	1	1	0.66	1	1	0.66	5.32	1
Long (Todd County)	77014900	77014901	1	1	0.66	1	1	0.66	5.32	1
Long (by Big Fish)	73010700	73010700	1	1	0.66	0.5	0.66	1	4.66	4
Kings	73023300	73023300	1	0	0.66	1	1	0	3.98	5
Bass	77001000	77001000	1	0	0.66	1	1	0.66	3.98	5
Carnelian	73003800	73003800	0.66	0	0.66	1	1	0	3.65	7
Pleasant	73005100	73005100	1	0	0.66	0	1	0	3.32	8
Cedar (North of Sauk Lake)	77016000	77016000	1	0	0.66	0.5	1	0.33	3.16	9
St. Anna	73018300	73018300	0.66	0	0.33	0	1	0	2.99	10
Fairy	77015400	77015400	0.66	0	0.66	0	1	0.66	2.82	11
Big	73015900	73015900	0.66	0	0.66	0	1	0.66	2.66	12
Cedar (East of Sauk Centre)	73025500	73025500	1	0.5	0.66	0.5	0.66	0	2.66	12
Black Oak	73024100	73024100	1	0.5	0.33	1	0.33	0	2.65	14
Grand	73005500	73005500	0.66	0	0.66	0	1	0.33	2.48	15
Cedar (by Freeport)	73022600	73022600	0.66	0.5	0.66	0	0.66	0	2.32	16
Goose	77001800	77001800	0.66	0.5	0.33	0	0.33	0	1.99	17
Sylvia	73024900	73024900	0	0	0.66	0	0.33	0.33	1.82	18
Long (by St. Rosa)	73023100	73023100	0.33	0	0.66	0.5	0.66	0	1.82	19
Little Birch	77008900	77008900	0	0	0.66	0	0.33	0.66	1.65	20
Little Osakis	77020100	77020100	0	0.5	0.66	0	0.33	0	1.49	21
Mud	77015100	77015100	0	0	1.0	0	0.33	0	1.33	22
Becker	73015600	73015600	0	0	0.33	0.5	0.33	0	1.16	23

Table A-9. Individual Metric and Ranking for High-Quality Lakes in the Sauk River Watershed – WATER QUALITY TREND PRIORITIZED = DOWNWARD; LBCA INCLUDED

Lake Name	MN DNR Lake Number	MPCA Lake I.D.	Lake Size to Drainage Area Ratio	Land-Use Disturbance	Nearly/ Barely	WQ Trend Score Downward Trend Prioritized	Phosphorus Sensitivity	Biological Significance	Cost Benefit	Total Score	Total Ranking
Big Birch	77008400	77008402	1	0.5	0.66	0.5	1	1	1.00	5.66	1
Big Fish	73010600	73010600	1	1	0.66	0	1	0.66	1.00	5.32	2
Long (Todd County)	77014900	77014901	1	1	0.66	0	1	0.66	0.66	4.98	3
Long (by Big Fish)	73010700	73010700	1	1	0.66	0	0.66	1	0.33	4.65	4
Kings	73023300	73023300	1	0	0.66	1	1	0	1.00	4.32	5
Bass	77001000	77001000	1	0	0.66	0	1	0.66	0.66	4.32	5
Carnelian	73003800	73003800	0.66	0	0.66	1	1	0	1.00	3.99	7
Pleasant	73005100	73005100	1	0	0.66	0.5	1	0	0.66	3.98	8
Cedar (North of Sauk Lake)	77016000	77016000	1	0	0.66	0	1	0.33	0.66	3.82	9
St. Anna	73018300	73018300	0.66	0	0.33	1	1	0	0.66	3.64	10
Fairy	77015400	77015400	0.66	0	0.66	0	1	0.66	0.66	3.64	10
Big	73015900	73015900	0.66	0	0.66	0	1	0.66	0.66	3.48	12
Cedar (East of Sauk Centre)	73025500	73025500	1	0.5	0.66	0	0.66	0	0.33	3.32	13
Black Oak	73024100	73024100	1	0.5	0.33	0.5	0.33	0	0.66	3.31	14
Grand	73005500	73005500	0.66	0	0.66	0	1	0.33	0.33	2.99	15
Cedar (by Freeport)	73022600	73022600	0.66	0.5	0.66	0	0.66	0	0.33	2.81	16
Goose	77001800	77001800	0.66	0.5	0.33	0	0.33	0	0.33	2.15	17
Sylvia	73024900	73024900	0	0	0.66	0.5	0.33	0.33	0.33	2.15	18
Long (by St. Rosa)	73023100	73023100	0.33	0	0.66	0	0.66	0	0.33	1.98	19
Little Birch	77008900	77008900	0	0	0.66	0	0.33	0.66	0.33	1.98	19
Little Osakis	77020100	77020100	0	0.5	0.66	0	0.33	0	0.33	1.82	21
Mud	77015100	77015100	0	0	1.0	0	0.33	0	0.33	1.66	22
Becker	73015600	73015600	0	0	0.33	0.5	0.33	0	0.33	1.49	23

Table A-10. Individual Metric and Ranking for High-Quality Lakes in the Sauk River Watershed – WATER QUALITY TREND PRIORITIZED = UPWARD; LBCA INCLUDED

Lake Name	MN DNR Lake Number	MPCA Lake I.D.	Lake Size to Drainage Area Ratio	Land-Use Disturbance	Nearly/ Barely	WQ Trend Score Downward Trend Prioritized	Phosphorus Sensitivity	Biological Significance	Cost Benefit	Total Score	Total Ranking
Big Birch	77008400	77008402	1	0.5	0.66	1	1	1	1.00	6.32	1
Big Fish	73010600	73010600	1	1	0.66	1	1	0.66	1.00	5.98	2
Long (Todd County)	77014900	77014901	1	1	0.66	1	1	0.66	0.66	5.66	3
Long (by Big Fish)	73010700	73010700	1	1	0.66	0.5	0.66	1	0.33	5.65	4
Kings	73023300	73023300	1	0	0.66	1	1	0	1.00	4.64	5
Bass	77001000	77001000	1	0	0.66	1	1	0.66	0.66	4.64	5
Carnelian	73003800	73003800	0.66	0	0.66	1	1	0	1.00	4.32	7
Pleasant	73005100	73005100	1	0	0.66	0	1	0	0.66	4.31	8
Cedar (North of Sauk Lake)	77016000	77016000	1	0	0.66	0.5	1	0.33	0.66	3.99	9
St. Anna	73018300	73018300	0.66	0	0.33	0	1	0	0.66	3.82	10
Fairy	77015400	77015400	0.66	0	0.66	0	1	0.66	0.66	3.48	11
Big	73015900	73015900	0.66	0	0.66	0	1	0.66	0.66	3.32	12
Cedar (East of Sauk Centre)	73025500	73025500	1	0.5	0.66	0.5	0.66	0	0.33	2.99	13
Black Oak	73024100	73024100	1	0.5	0.33	1	0.33	0	0.66	2.98	14
Grand	73005500	73005500	0.66	0	0.66	0	1	0.33	0.33	2.98	15
Cedar (by Freeport)	73022600	73022600	0.66	0.5	0.66	0	0.66	0	0.33	2.81	16
Goose	77001800	77001800	0.66	0.5	0.33	0	0.33	0	0.33	2.32	17
Sylvia	73024900	73024900	0	0	0.66	0	0.33	0.33	0.33	2.15	18
Long (by St. Rosa)	73023100	73023100	0.33	0	0.66	0.5	0.66	0	0.33	2.15	19
Little Birch	77008900	77008900	0	0	0.66	0	0.33	0.66	0.33	1.98	20
Little Osakis	77020100	77020100	0	0.5	0.66	0	0.33	0	0.33	1.82	21
Mud	77015100	77015100	0	0	1.0	0	0.33	0	0.33	1.66	22
Becker	73015600	73015600	0	0	0.33	0.5	0.33	0	0.33	1.49	23

Table A-11. Overall Prioritization Results

Lake Name	Composite Scores				Ranking			
	With LCBA		*Without LCBA*		*With LCBA*		*Without LCBA*	
	Prioritized for Upward WQ Trend	Prioritized for Downward WQ Trend	Prioritized for Upward WQ Trend	Prioritized for Downward WQ Trend	Prioritized for Upward WQ Trend	Prioritized for Downward WQ Trend	Prioritized for Upward WQ Trend	Prioritized for Downward WQ Trend
Big Fish	5.32	5.32	6.32	4.32	1	2	1	2
Big Birch	4.66	5.66	5.66	4.66	4	1	3	1
Long (Todd County)	5.32	4.98	5.98	4.32	1	3	2	2
Long (by Big Fish)	5.32	4.65	5.65	4.32	1	4	4	2
Bass	3.32	4.32	4.32	3.32	8	5	7	6
Grand	3.65	3.31	4.31	2.65	7	14	8	15
Kings	2.66	4.32	3.32	3.66	12	5	12	5
Cedar (North of Sauk Lake)	2.99	3.99	3.99	2.99	10	7	9	9
Big	3.98	3.64	4.64	2.98	5	10	5	11
Fairy	3.98	3.64	4.64	2.98	5	10	5	11
Pleasant	3.16	3.82	3.82	3.16	9	9	10	8
Carnelian	2.32	3.98	2.98	3.32	16	8	14	6
Black Oak (97 mg/l = 57 over deep lake standard)	2.66	2.99	2.99	2.66	12	15	13	14
St. Anna (80 mg/l = 40 over deep lake standard)	1.99	3.32	2.32	2.99	17	13	17	9
Cedar (East of Sauk Centre)	2.82	3.48	3.48	2.82	11	12	11	13
Little Birch	2.65	1.98	2.98	1.65	14	19	15	19
Cedar (by Freeport)	2.48	2.81	2.81	2.48	15	16	16	16
Goose (178 mg/l = 118 over shallow lake standard)	1.82	2.15	2.15	1.82	18	17	18	17
Sylvia	1.82	2.15	2.15	1.82	19	18	19	18
Long (by St. Rosa)	1.65	1.98	1.98	1.65	20	19	20	19
Little Osakis	1.49	1.82	1.82	1.49	21	21	21	21
Becker	1.16	1.49	1.49	1.16	23	23	23	23
Mud	1.33	1.66	1.66	1.33	22	22	22	22

A.4.2 RESULTS

First Tier: The four lakes that are prioritized under any scenario are listed below.

- Big Fish Lake
- Big Birch Lake
- Long Lake (in Todd County)
- Long Lake (by Big Fish Lake).

Second Tier: Nine lakes generally score as the 5th through 13th ranks, depending on if water clarity is trending downward or upward and whether the LBCA ratio is applied.

- Improving Transparency Trend:
  - Big Lake
  - Fairly Lake
  - Grand Lake
  - Pleasant Lake
- Declining Transparency Trend:
  - Bass Lake
  - Kings Lake
  - Cedar Lake (North of Sauk Lake)
  - Carnelian Lake
  - Cedar Lake (East of Sauk Lake).

Third Tier: Eleven lakes remain after the first two tiers identified above. Additionally, Black Oak, St. Anna, and Goose Lakes are recommended to be removed from the high water quality lakes list because they have TP levels that are more than double their lake standard and should be reevaluated for impairment status, which would result in seven third-tier lakes:

- Little Birch Lake
- Cedar Lake (by Freeport)
- Sylvia Lake
- Long Lake (by St. Rosa)
- Little Osakis Lake
- Becker Lake
- Mud Lake.

Appendix B

EMERGING ISSUES—CLIMATE

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APPENDIX B: CLIMATE

Data indicate there are increasing temperatures and changing precipitation patterns in the Sauk River Watershed (SRW). Changes in precipitation include intensity, frequency, and duration of precipitation events as well as increasing length between precipitation events. These changes will influence how surface and groundwater are used to support agriculture, the major industry and land use of the SRW.

B.1 TEMPERATURE DATA

Long-term average annual temperature data (1895–2018) for the National Oceanic and Atmospheric Administration's (NOAA's) Minnesota Climate Division 5 illustrate a trend of increasing temperatures over the last century, with an increase of 0.2°Fahrenheit (°F) per decade (Figure B-1) [NOAA, 2019]. Average minimum temperatures (Figure B-2) have increased at a higher rate (0.3°F per decade) than maximum temperatures (Figure B-3), which have increased at a rate of 0.1°F per decade. Historical average temperature trends for winter (December-February) and summer (June-August) are shown in Figures B-4 and B-5, respectively. Increase in average temperature during the winter months (0.4°F per decade) have been higher than summer months (0.1°F per decade).

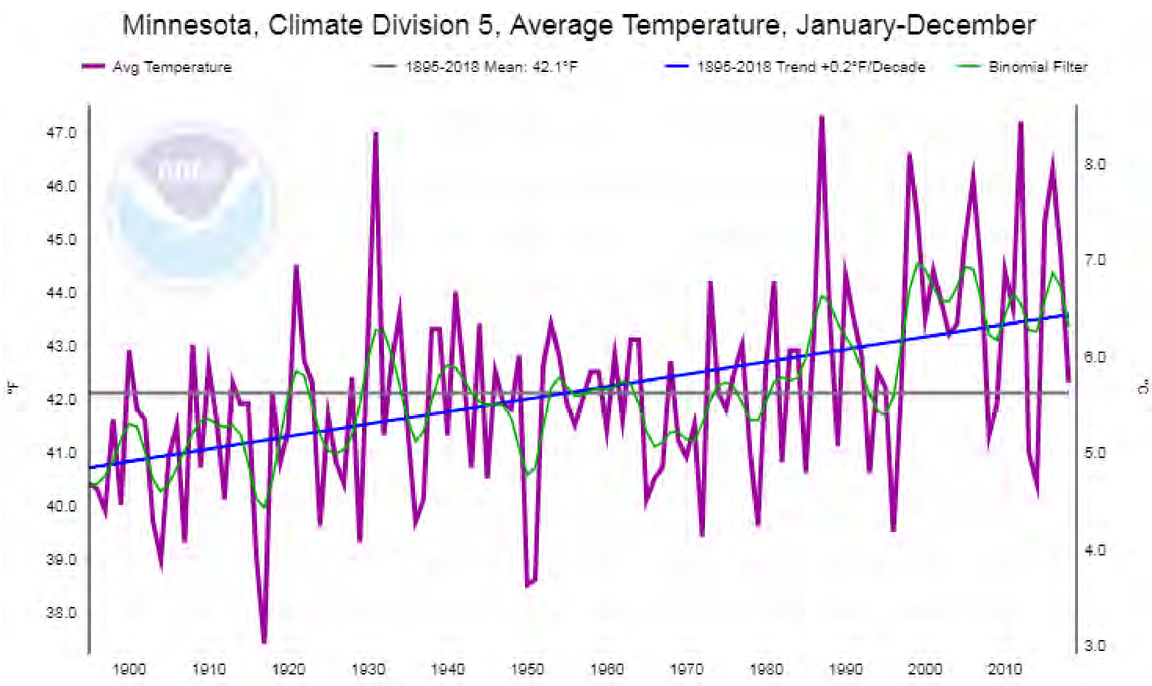


Figure B-1. Average Annual Temperature for 1895–2018 From NOAA Climate Division 5 [NOAA, 2019].

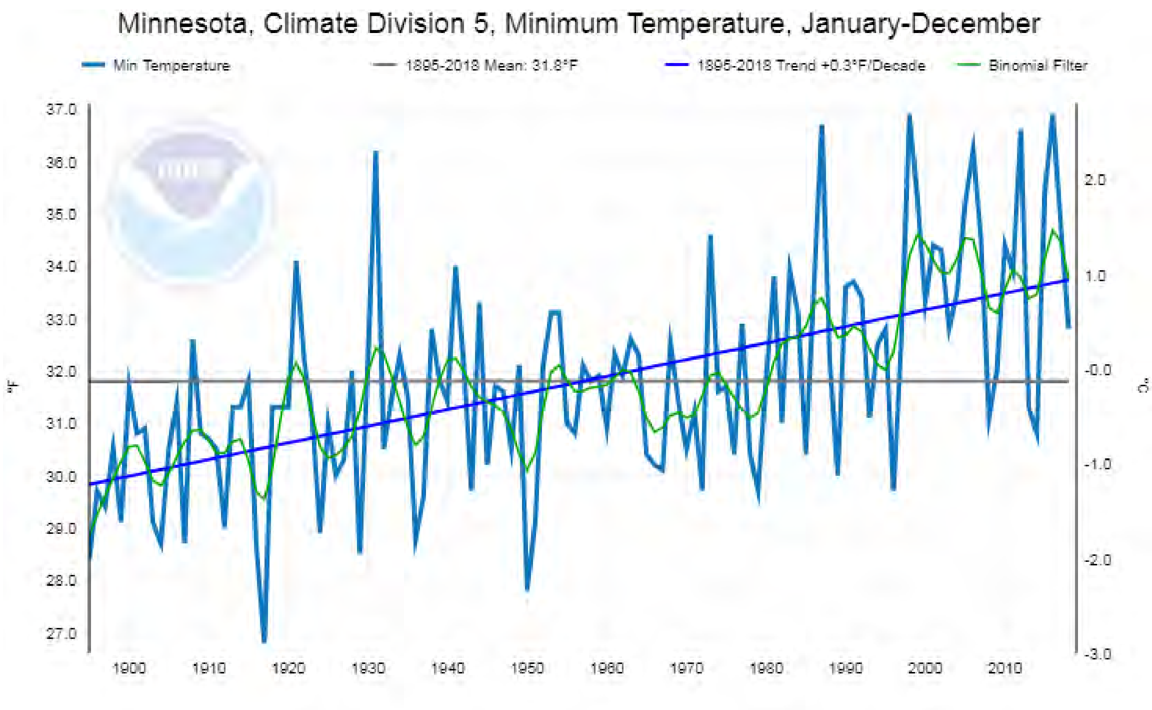


Figure B-2. Minimum Annual Temperature for 1895–2018 From NOAA Climate Division 5 [NOAA, 2019].

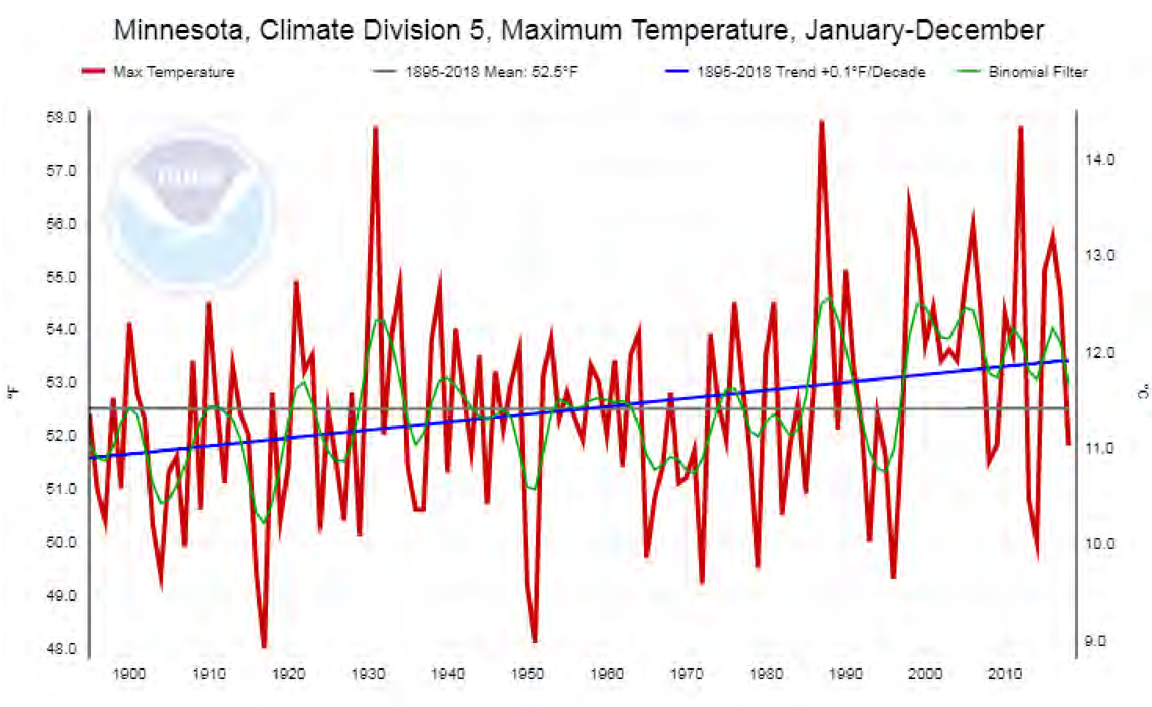


Figure B-3. Maximum Annual Temperature for 1895–2018 From NOAA Climate Division 5 [NOAA, 2019].

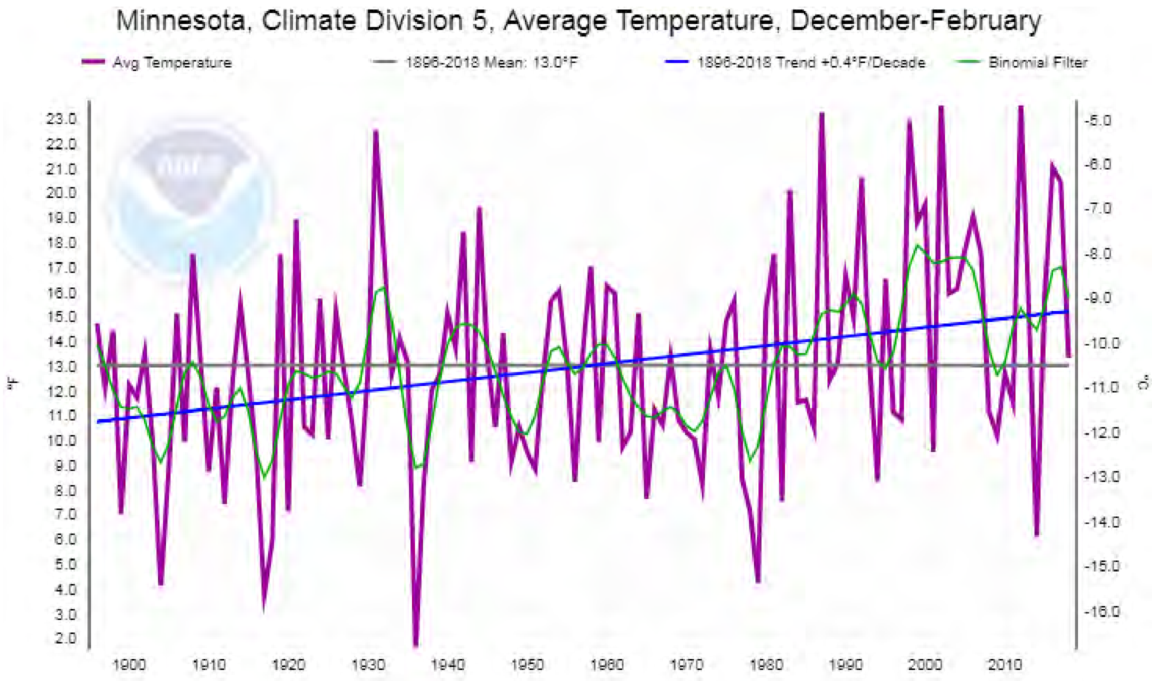


Figure B-4. Three-Month Average Temperature (December–February) for 1895–2018 From NOAA Climate Division 5 [NOAA, 2019].

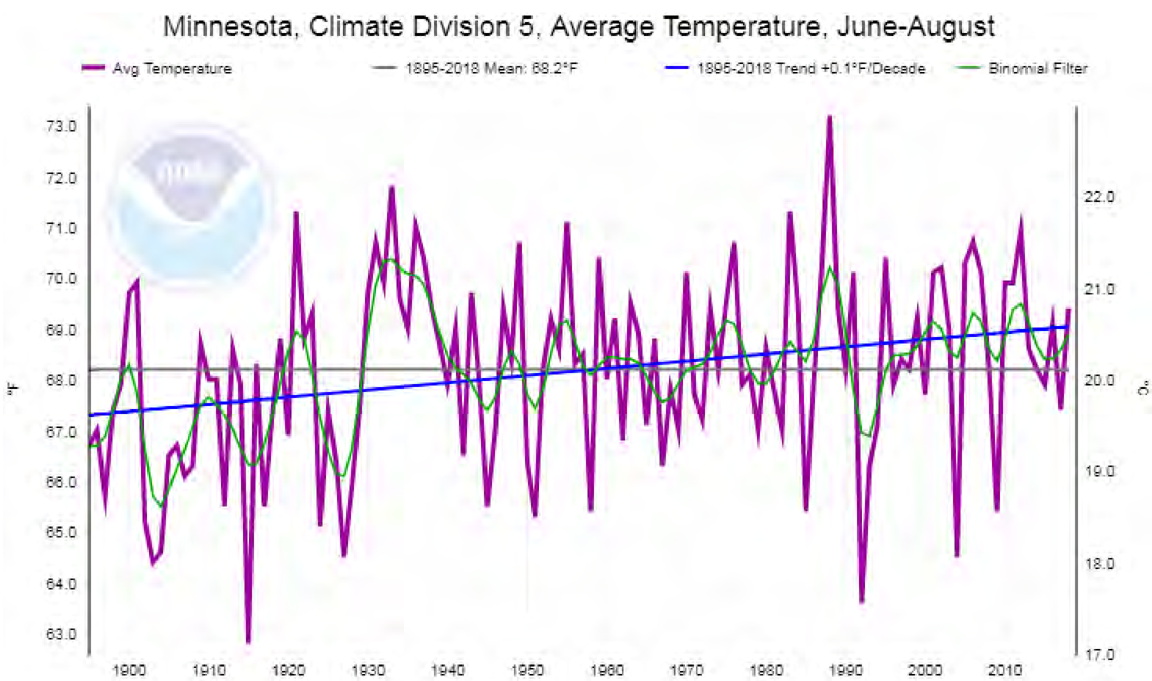


Figure B-5. Three-Month Average Temperature (June–August) for 1895–2018 From NOAA Climate Division 5 [NOAA, 2019].

B.2 PRECIPITATION DATA

Long-term annual precipitation data (1895 to 2018) were also obtained for Climate Division 5 [NOAA, 2019] and are shown in Figure B-6. The mean annual precipitation for the period 1895 to 2018 was 26.85 inches and an annual precipitation increased by 0.42 inch per decade over the period. By smoothing the time series with a binomial filter, multi-year dry and wet periods are shown in the red line in Figure B-6. Mean annual pan evaporation in the Sauk River Watershed (SRW) is approximately 36 inches [Farnsworth and Thompson, 1982], which exceeds the mean annual precipitation by 9 inches. The increasing trend in annual precipitation should be accounted for during planning.

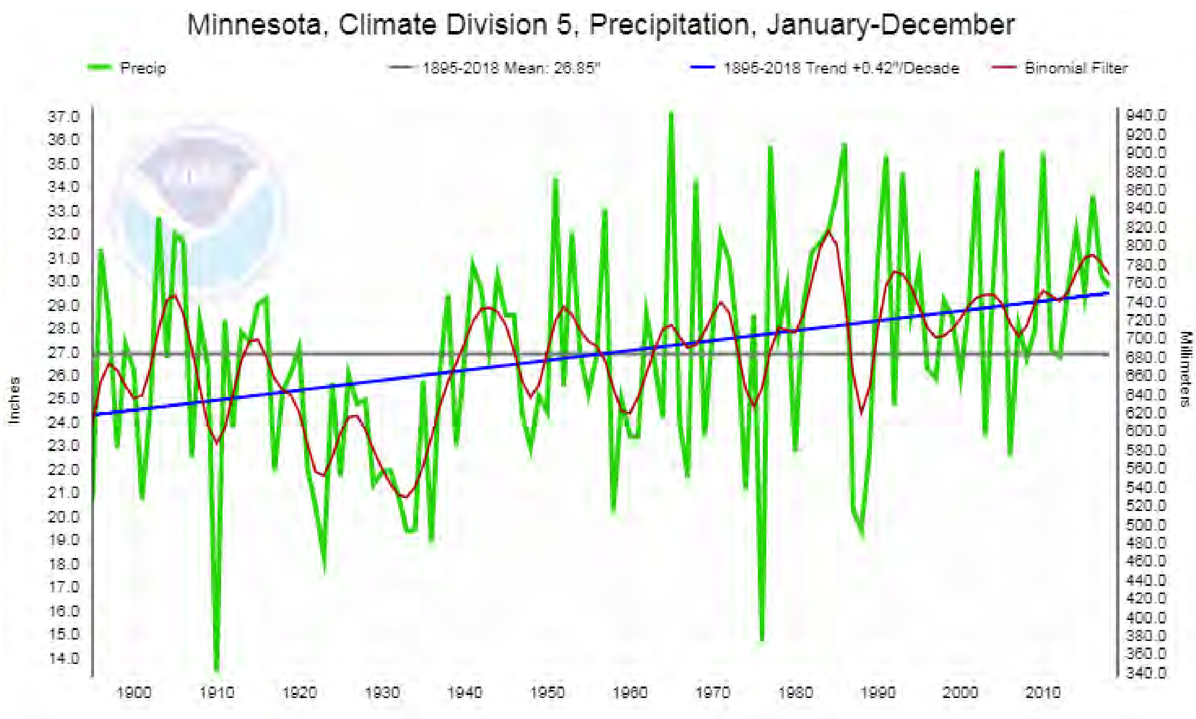


Figure B-6. Annual Precipitation for 1895–2018 From NOAA Climate Division 5 [NOAA, 2019].

B.3 MONTHLY AND SEASONAL TEMPERATURE AND PRECIPITATION

Mean monthly temperature and precipitation (monthly normals) from 1981 to 2010 were obtained from the Midwestern Regional Climate Center (MRCC) for Collegeville, Minnesota (Station USC00211691) and are shown in Figure B-7. Mean monthly temperatures follow a sinusoidal pattern with peaks in the summer and lows in the winter. Average daily maximum temperature range from about 25°F in January to just above 80°F in July; mean daily minimum temperatures tend to be approximate 20°F lower than mean daily maximum temperatures throughout the year. Mean monthly precipitation increases from February to June and remains high through September before dropping through the fall and winter.

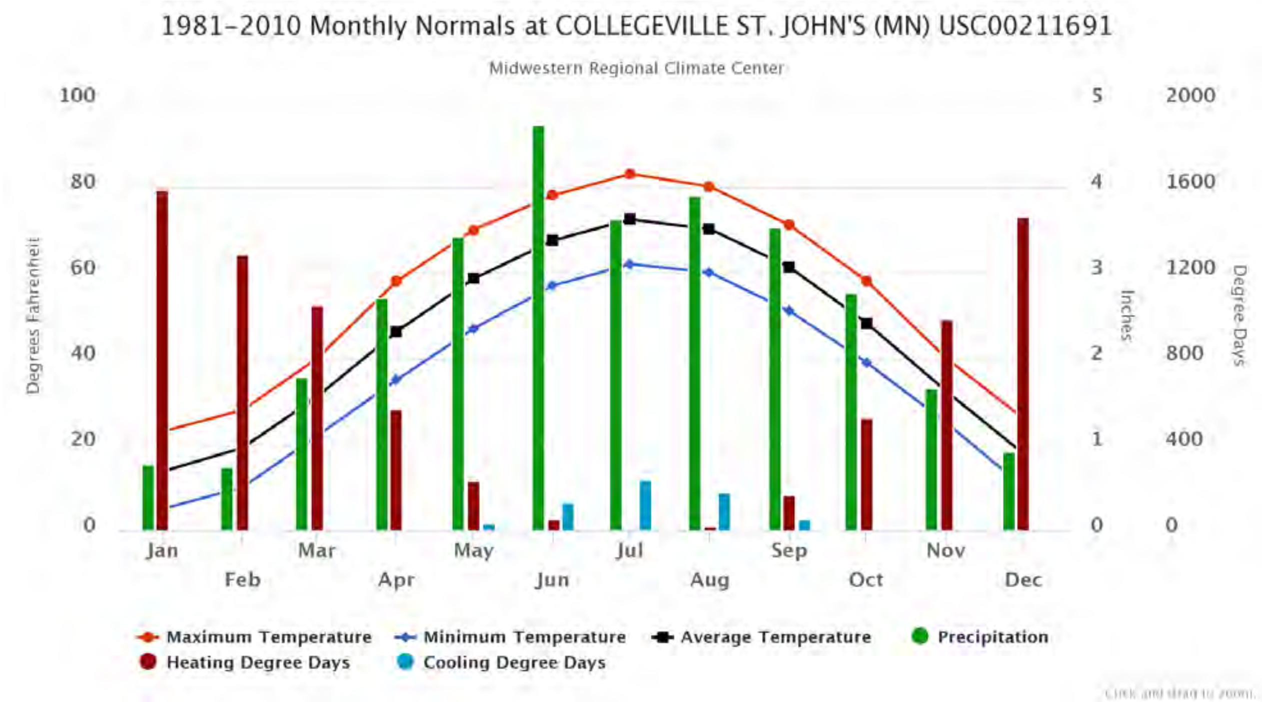


Figure B-7. Monthly Climate Average Precipitation, Maximum, Mean, and Minimum Temperature for 1981–2010 From MRCC [2019].

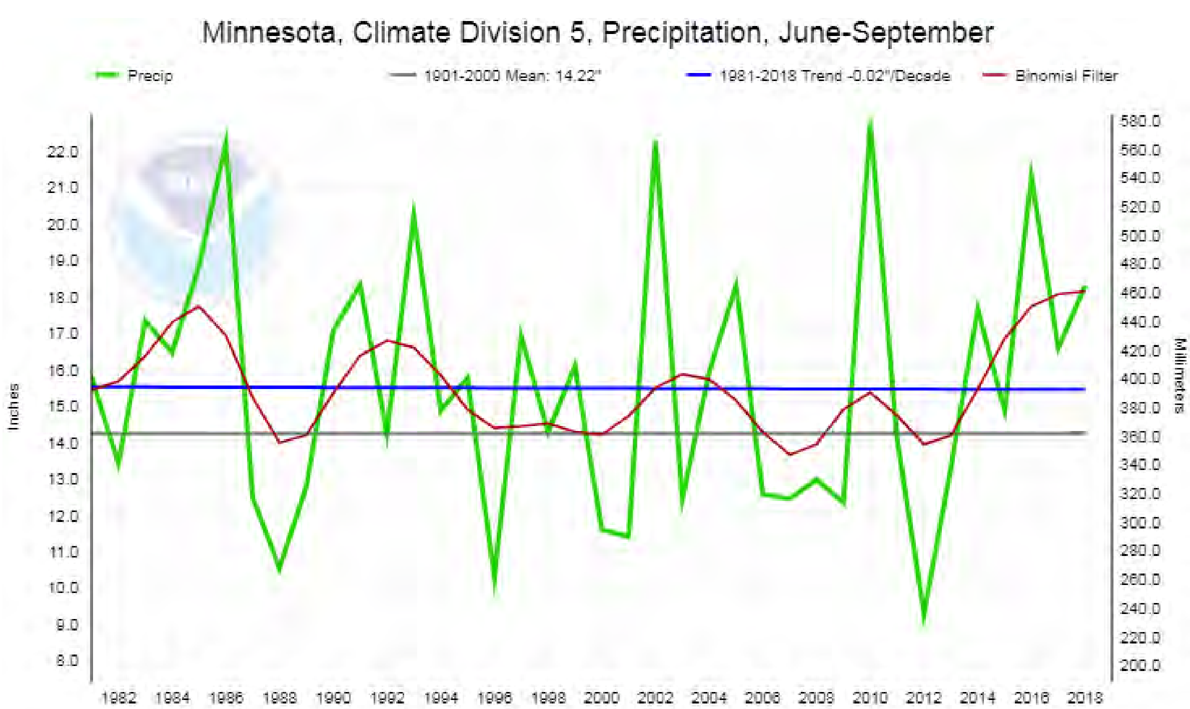


Figure B-8. Growing Season Precipitation Trend for 1981–2018 From NOAA Climate Division 5 [NOAA, 2019].

Mean growing season (June through September) precipitation has remained relatively constant (–0.02 inches per decade) recently, as shown for the period 1981 to 2018 in Figure B-8. Monthly precipitation values by year were obtained from the Minnesota Department of Natural Resources (MNDNR) Precipitation Data Retrieval from a Gridded Database [MNDNR, 2019c] for Avon, Minnesota and are shown in Table B-1. Color-coding is used to show dry periods (precipitation less than the 30th percentile precipitation) in red and wet periods (greater than 70th percentile) for each year, growing season, and growing season month. These data highlight the variability of wet and dry months during the growing season, but also show that the last eleven years have not had any dry (below 30th percentile) growing seasons and have tended to have more wet growing seasons than would be expected. Figure B-9 shows the growing season and annual precipitation for 1981 to 2018 for Avon, Minnesota. There is a slight increase in annual precipitation over this period (0.03 inches per year), while the change in growing season precipitation is negligible. These fluctuations in dry and wet periods, seasonally and inter-annually, will influence runoff rates and crop stress, potentially impacting the agriculture industry.

Table B- 1 Monthly Precipitation by Year for Avon, Minnesota [MNDNR, 2019c]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
30%	0.41	0.34	0.87	1.49	2.17	3.02	2.15	2.31	1.70	1.06	0.59	0.33	14.11	23.16	22.50
70%	0.91	0.99	1.54	2.72	3.98	5.11	3.89	4.69	3.44	2.54	1.51	1.05	19.92	29.04	30.07
mean	0.75	0.75	1.36	2.22	3.34	4.24	3.37	3.51	2.79	2.03	1.23	0.77	17.25	26.36	26.38
1981-2010 Normals															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
normal	0.75	0.73	1.74	2.55	3.31	4.57	3.55	3.80	3.43	2.68	1.54	0.88	18.65	29.52	29.32
Year-to-Year Data															
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
2018	0.13	1.03	1.31	1.85	1.21	3.14	4.78	3.92	3.39	3.47	0.85	1.03	16.44	26.11	26.15
2017	0.50	0.54	0.86	3.26	4.80	2.17	1.73	6.12	3.65	3.99	1.01	0.39	18.47	29.02	29.14
2016	0.68	0.81	1.46	1.24	2.21	4.58	8.13	3.48	4.87	2.13	2.02	1.36	23.27	32.97	33.13
2015	0.13	0.25	0.51	1.15	5.90	6.21	5.52	2.93	0.77	1.67	2.70	1.30	21.33	29.04	26.70
2014	1.14	1.20	1.20	4.47	5.86	6.82	1.34	5.42	1.84	0.49	1.95	0.89	21.28	32.62	35.55
2013	0.33	1.28	2.04	3.29	5.08	6.12	1.46	0.79	2.68	4.76	0.15	1.35	16.13	29.33	26.40
2012	0.52	1.11	1.41	2.81	7.94	4.68	2.44	1.50	0.11	0.92	0.91	1.50	16.67	25.85	23.77
2011	1.11	0.98	1.74	2.47	5.22	4.56	7.61	5.63	0.65	0.99	0.07	0.19	23.67	31.22	37.33
2010	0.78	0.79	1.45	1.50	2.42	5.57	3.47	8.69	3.96	3.94	1.12	2.30	24.11	35.99	37.52
2009	0.63	1.08	4.88	1.13	0.73	4.38	3.05	5.58	1.93	6.67	0.35	1.87	15.67	32.28	30.90
2008	0.02	0.57	1.56	3.76	3.77	5.12	2.02	3.14	2.91	3.49	2.10	1.92	16.96	30.38	29.21
2007	0.24	1.69	3.70	2.53	1.78	1.87	1.09	5.04	3.31	5.03	0.04	1.27	13.09	27.59	23.69
2006	0.34	0.31	1.24	4.05	1.47	2.94	1.13	5.35	4.50	0.53	0.47	1.44	15.39	23.77	31.20
2005	1.86	0.97	1.02	2.67	3.71	5.71	1.66	3.07	6.22	5.30	3.32	1.25	20.37	36.76	31.33
2004	0.71	1.21	1.25	0.99	6.79	3.76	3.99	1.60	6.20	3.28	0.70	0.46	22.34	30.94	29.29
2003	0.26	0.54	0.71	3.27	3.39	5.40	4.56	0.21	3.15	1.25	1.21	0.33	16.71	24.28	25.31
2002	0.18	1.69	2.01	3.49	2.35	4.79	10.07	7.29	2.58	3.43	0.19	0.20	27.08	38.27	40.15
2001	1.11	1.62	0.90	7.97	3.29	3.71	2.07	1.98	2.32	1.14	4.18	0.38	13.37	30.67	31.79
2000	0.67	1.73	1.56	0.86	3.33	3.82	6.26	1.48	0.77	1.57	4.13	1.12	15.66	27.30	22.07
1999	1.42	0.11	1.28	2.54	5.85	4.49	3.64	2.38	2.00	1.16	0.13	0.30	18.36	25.30	29.09
1998	1.24	0.95	2.66	1.43	5.35	5.49	3.71	5.11	1.64	2.82	2.04	0.52	21.30	32.96	30.29
1997	2.10	0.35	1.14	0.71	1.69	2.97	5.93	4.89	2.28	1.43	0.94	0.34	17.76	24.77	30.76
1996	1.38	0.44	0.95	0.76	3.54	2.61	2.12	1.00	2.23	3.88	3.70	1.12	11.50	23.73	19.75
1995	0.48	0.40	2.10	2.17	2.76	5.72	4.09	5.09	3.35	2.85	0.34	1.53	21.01	30.88	32.11
1994	1.22	0.70	0.95	4.71	1.65	4.53	3.96	3.88	3.19	4.05	1.54	0.36	17.21	30.74	29.02
1993	1.18	0.21	1.54	1.97	7.20	6.66	4.13	5.50	2.40	1.23	2.43	0.57	25.89	35.02	34.65
1992	0.70	0.19	1.90	2.29	2.05	4.02	3.24	3.52	1.28	1.28	1.93	0.65	14.11	23.05	22.51
1991	0.25	1.32	2.24	4.40	5.07	5.93	4.14	3.18	4.84	1.12	1.87	0.33	23.16	34.69	34.79
1990	0.03	0.74	3.24	2.85	3.77	6.39	3.26	1.89	2.45	2.79	0.20	0.43	17.76	28.04	26.95
1989	0.81	0.62	1.34	2.16	3.63	2.43	2.29	4.24	3.22	1.11	1.01	0.21	15.81	23.07	24.36
1988	0.57	0.15	1.69	0.68	1.99	0.14	1.31	5.07	3.01	0.57	2.38	0.67	11.52	18.23	17.14
1987	0.41	0.07	1.07	0.05	2.17	0.91	4.01	2.61	2.38	0.64	1.24	0.65	12.08	16.21	15.61
1986	0.62	0.84	1.00	6.23	5.07	5.71	6.71	6.18	7.81	0.57	1.16	0.20	31.48	42.10	43.81
1985	0.41	0.20	2.28	2.85	3.34	5.92	2.13	3.49	6.63	1.30	1.65	0.69	21.51	30.89	34.27
1984	0.68	1.01	0.78	2.94	2.86	7.97	2.90	2.98	4.36	5.43	0.15	1.44	21.07	33.50	33.10
1983	0.61	0.11	2.56	1.21	2.19	8.40	3.26	3.37	4.95	2.50	3.07	1.05	22.17	33.28	35.34
1982	1.41	0.21	1.96	1.55	4.16	2.99	3.47	3.03	5.42	4.67	2.15	1.86	19.07	32.88	30.96
1981	0.20	1.08	1.18	2.87	1.82	6.65	2.96	3.04	1.46	5.48	0.37	0.91	15.93	28.02	22.77

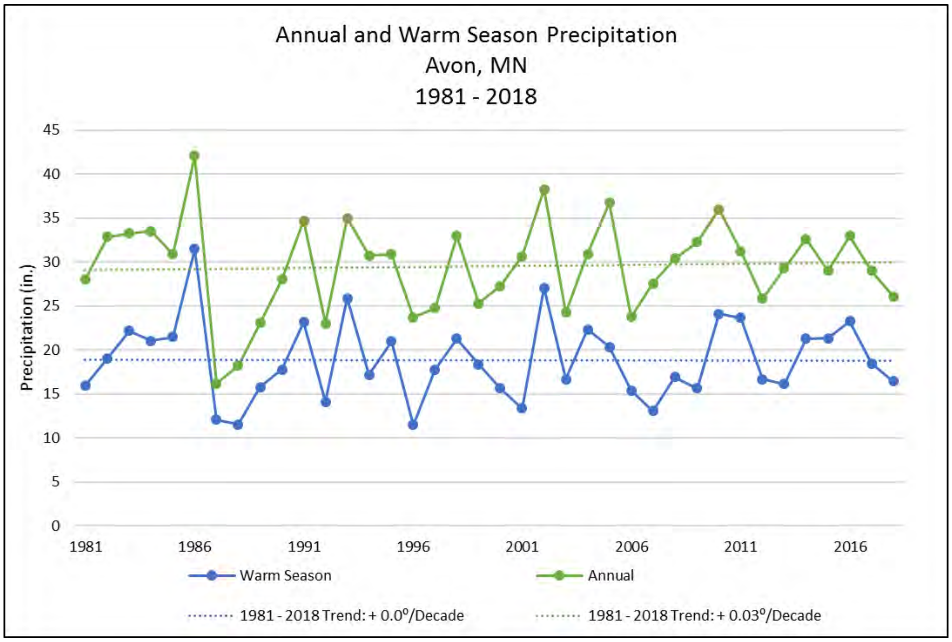


Figure B-9. Annual and Warm Season Precipitation for 1981–2018 from MNDNR's Precipitation Data Retrieval from a Gridded Database [2019c].

B.4 LAKE ICE OUT DATES

Lake ice out data were obtained from MNDNR [2019a] for Osakis Lake for the period 1867 to 2019. Ice out dates were converted to ordinal day (days since beginning of each year) to determine a trend over the period of record. In years with multiple ice out dates reported, an average of all dates was used; results are shown by year in Figure B-10. Results shows that the mean ice out date is trending earlier by about 4.8 days per century, or approximately a week over the period of record.

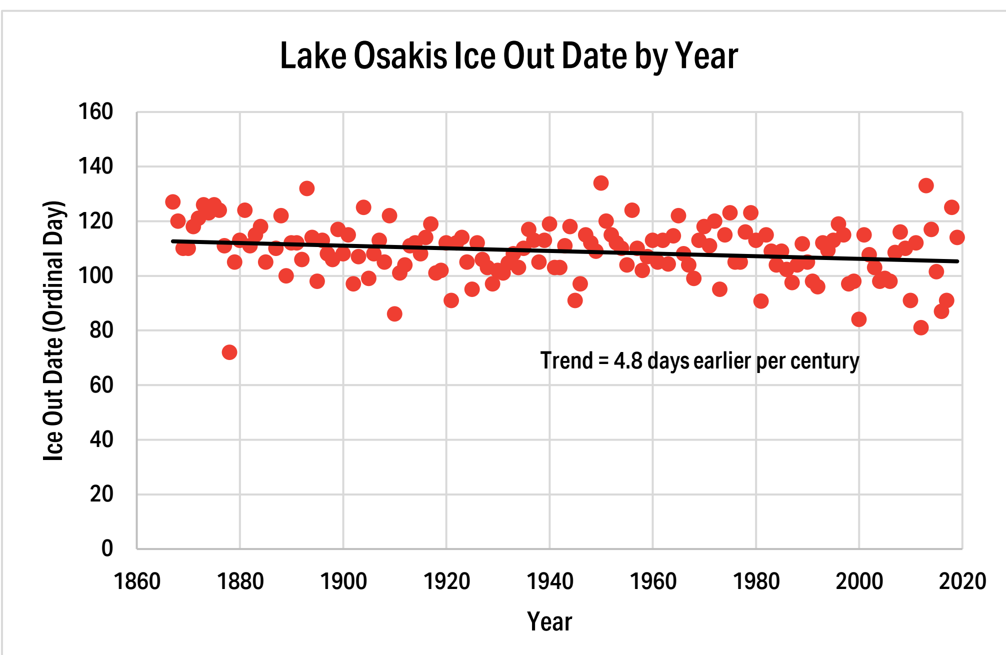


Figure B-10. Annual Lake Osakis Ice Out Date for 1867–2019 [MNDNR, 2019a].

B.5 EXTREME PRECIPITATION EVENTS

Historically, rainfall depths from Technical Paper No. 40 (TP-40) [Hershfield, 1961] have been used for precipitation-duration-frequency estimates for the purposes of engineering design. NOAA recently published Atlas 14 Volume 8 for Minnesota, which provides updated precipitation-duration-frequency estimates based on higher gridded resolution (scale of 1 km), incorporation of geographic features, 50 years more data than TP-40, and data from more weather stations. A comparison of TP-40 and Atlas 14 24-hour rainfall depths for Collegeville, MN is given in Table B-2 for recurrence intervals ranging from 2 years to 100 years. Rainfall depths are relatively unchanged for high frequency (2- to 10-year) events. For recurrence intervals of 50 to 100 years, Atlas 14 rainfall depths are 10 and 13 percent higher than TP-40 rainfall depths, respectively. Atlas 14 rainfall depths should be utilized in the future to ensure that BMPs are designed based on the most up-to-date information to provide the appropriate level of protection.

Table B-2. Comparison of Technical Paper No. 40 (1961) to Atlas 14 (2013) for Collegeville, Minnesota

Comparing TP-40 to Atlas 14 (24-hour storms)			
Recurrence Intervals (Years)	TP 40 (in)[a]	Atlas 14 (in)	Percent Change
Collegeville, MN			
2	2.6	2.66	2.3
5	3.4	3.33	-2.1
10	4.0	3.94	-1.5
50	5.1	5.61	10.0
100	5.7	6.42	12.6

(a) Interpolated values from isopleths.

Appendix C

POLICY-PLAN DEVELOPMENT AGREEMENT

SAUK RIVER WATERSHED POLICY/PLAN DEVELOPMENT AGREEMENT

This Agreement is made and entered into by and between:

The Counties of Douglas, Pope, Todd, and Stearns by and through their respective County Board of Commissioners, and
The Douglas, Pope, Todd, and Stearns Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and
The Sauk River Watershed District by and through their respective Board of Managers,
Collectively referred to as the "Parties."

WHEREAS, the Counties of this Agreement are political subdivisions of the State of Minnesota, with authority to carry out environmental programs and land use controls, pursuant to Minnesota Statutes Chapter 375 and as otherwise provided by law; and

WHEREAS, the Soil and Water Conservation Districts (SWCDs) of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out erosion control and other soil and water conservation programs, pursuant to Minnesota Statutes Chapter 103C and as otherwise provided by law; and

WHEREAS, the Watershed District of this Agreement is a political subdivision of the State of Minnesota, with statutory authority to carry out conservation of the natural resources of the state by land use controls, flood control, and other conservation projects for the protection of the public health and welfare and the provident use of the natural resources, pursuant to Minnesota Statutes Chapters 103B, 103D and as otherwise provided by law; and

WHEREAS, the parties to this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in Sauk River Watershed to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

WHEREAS, with matters that relate to coordination of water management authorities pursuant to Minnesota Statutes Chapters 103B, 103C, and 103D, and with public drainage systems pursuant to Minnesota Statutes Chapter 103E, this Agreement does not change the rights or obligations of the public drainage system authorities.

WHEREAS, the Parties have formed this Agreement for the specific goal of developing a plan pursuant to Minnesota Statutes § 103B.801, Comprehensive Watershed Management Planning, also known as *One Watershed, One Plan*.

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the Sauk River Watershed as depicted in Attachment A, which is incorporated herein. The purpose of this Agreement is to collectively develop and adopt, as local

government units, a coordinated watershed management plan for implementation per the provisions of the Plan.

2. **Term:** This Agreement is effective upon signature of the Parties in consideration of the Board of Water and Soil Resources (BWSR) Operating Procedures for One Watershed, One Plan. Notwithstanding the date of the signature of the party, this Agreement will remain in effect during the term of the BWSR Grant Agreement, entitled by BWSR 2018 One Watershed, One Plan – Sauk River Watershed, unless otherwise extended by written agreement of the parties, canceled, or terminated in accordance with the provisions of this Agreement, or earlier terminated by law.

3. **Administration:**

    a. **Establishment of Committees for Development of the Plan.** The Parties agree to designate one representative, who must be an elected or appointed member of the governing board, to the Sauk River Watershed Policy Committee to decide on content of the watershed-based plan and shall appoint one or more technical representatives to an Advisory Committee for development of the plan in consideration of the BWSR Operating Procedures for One Watershed, One Plan.

        i. The Policy Committee will meet as needed to decide on the content of the watershed-based plan. Each member of the Policy Committee shall serve as a liaison to their respective board, and make recommendations to the Committee as well as their respective board.

        (1) Each governing board shall choose one alternate to serve on the Policy Committee as needed in the absence of the designated member.

        (2) The Policy Committee shall establish operating procedures (or bylaws) by <DATE>. Each member of the Policy Committee will have one vote during the planning process.

        ii. The Advisory Committee shall consist of those members appointed by the Parties to this Agreement and those other members approved by the Policy Committee or required by statute. The Advisory Committee shall meet monthly or as needed to assist and provide technical support and make recommendations to the Policy Committee on the content of the plan. Members of the Advisory Committee may not be a current board member of any of the Parties. Based on content input from the Policy Committee, the Advisory Committee will develop the plan.

        iii. Additional responsibilities of the Committees are detailed in the BWSR One Watershed One Plan operating procedure dated March 23, 2016 (http://www.bwsr.state.mn.us/planning/1W1P/Operating_Procedures_for_Program.pdf).

    b. **Submittal of the Plan.** The Advisory Committee with the assistance of the Policy Committee, will develop a watershed plan which includes the content required in Minnesota Statute 103B.801, Subd. 4.

i. The Policy Committee shall initiate a local review and comment process, which shall include properly noticed public hearings, and complies with the requirements of Minnesota Statutes, Chapters 103B and 103D.

ii. The Policy Committee will recommend the plan to the Parties of this agreement.

iii. Each Party will be responsible for initiating any further local review, comment process, and public hearings they deem necessary.

iv. Upon completion of local review and comment, and approval of the plan for submittal by each Party, the Policy Committee will submit the plan to BWSR for review and approval.

c. **Adoption of the Plan.** The Parties agree to adopt and begin implementation of the plan within 120 days of receiving notice of state approval, and provide notice of plan adoption pursuant to Minnesota Statutes Chapters 103B and 103D.

d. **Fiscal Agent:** Sauk River Watershed District will act as the fiscal agent for the purposes of this Agreement and agrees to:

1 Accept all responsibilities associated with the implementation of the BWSR grant agreement for developing a watershed-based plan.

2 Perform financial transactions as part of grant agreement and contract implementation.

3 Annually provide a full and complete audit report.

4 Provide the Policy Committee with the records necessary to describe the financial condition of the BWSR grant agreement.

5 Retain fiscal records consistent with the agent's records retention schedule.

e. **Grant Administration**: Sauk River Watershed District will act as the grant administrator for the purposes of this Agreement and agrees to provide the following services:

1. Accept all day-to-day responsibilities associated with the implementation of the BWSR grant agreement for developing a watershed-based plan, including being the primary BWSR contact for the *One Watershed, One Plan* Grant Agreement and being responsible for BWSR reporting requirements associated with the grant agreement.

2. Provide the Policy Committee with the records necessary to describe the planning condition of the BWSR grant agreement.

4. **General Provisions**:

a. **Additional Parties:** Other political subdivisions within the Sauk River Watershed may become a Party to this Agreement by indicating its qualifications and intent to become a Party to the Sauk

River Watershed Agreement in a resolution adopted by its governing board prior to <DATE> and submitted to the Policy Committee. The Policy Committee shall determine whether the plan development process will benefit from participation of the Party, and whether the Party has sufficient interest and legal authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan. If allowed to become a Party, the governing board of the Party must also execute the current version of this Agreement.

b. **Withdrawal of Party:** A Party desiring to terminate its' participation in this Agreement shall submit a resolution to that effect from its governing board and directed to the Policy Committee. Notice must be made at least 30 days in advance of termination of participation.

c. **Division of Resources Upon Withdrawal or Termination:** A withdrawing Party shall not be entitled to a refund of property or monies contributed under this Agreement prior to the effective date of withdrawal.

   After the effective date of termination of this Agreement, the Policy Committee shall exist for the limited purpose of discharging any outstanding debts, settlement of affairs and disposition of surplus property and monies, if any. Any surplus monies or property will be returned to the Parties in proportion to contributions of the Parties after the purposes of the Agreement have been completed.

d. **Compliance with Laws:** The Parties agree to abide by all federal, state, and local laws; statutes, ordinances, rules and regulations now in effect or hereafter adopted pertaining to this Agreement.

e. **Limitation of Liability:** Each Party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of any other Party, its officers, employees or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties.

   To the full extent permitted by law, actions by the Parties, their respective officers, employees, and agents pursuant to this Agreement are intended to be and shall be construed as a "cooperative activity." It is the intent of the Parties that they shall be deemed a "single governmental unit" for the purpose of liability, as set forth in Minnesota Statutes § 471.59, subd. 1a(a). For purposes of Minnesota Statutes § 471.59, subd. 1a(a) it is the intent of each Party that this Agreement does not create any liability or exposure of one Party for the acts or omissions of any other Party.

f. **Records Retention and Data Practices:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules as approved by the State in accordance with Minnesota Statutes § 138.17.

The Parties further agree that records prepared and maintained in furtherance of the agreement, with the exception of attorney-client work product and attorney-client privileged documents, shall be subject to the Minnesota Government Data Practices Act. Copies of each Party's records relating to this Agreement, with the exception of attorney-client work product and attorney-client privileged documents, shall be provided to the Sauk River Watershed District.

g. **Timeliness:** The Parties agree to perform obligations under this Agreement in a timely manner and keep each other informed about any delays that may occur.

h. **Extension:** The Parties may extend the termination date of this Agreement upon written agreement by all Parties.

i. **Entire Agreement:** This Agreement, including any and all attachments referenced herein, contains the entire understanding and agreement of the Parties and there have been no other promises, representations, agreements, warranties or undertakings by any of the Parties, either oral or written, of any character or nature.

j. **Amendments:** This Agreement may be altered, amended or modified only by an instrument in writing executed by the Parties to this Agreement and by no other means.

5. **Authorized Representatives:** The following persons will be the primary contacts for all matters concerning this Agreement:

Douglas County
Primary: Jerry Rapp
Secondary: Keith Englund
305 8th Avenue W
Alexandria, MN 56308
(320) 762-3033

Douglas County SWCD
Primary: Ken Rutten
Secondary: Bill Dropik
900 Robert Street, #102
Alexandria, MN 56308
(320) 763-3191

Pope County
Primary: Cody Rogahn
Secondary: Paul Gerde
130 E. Minnesota Avenue
Glenwood, MN 56334
(320) 634-7791

Pope County SWCD
Primary: D. Gary Reents
Secondary: Holly Kovarik
1680 Franklin Street North
Glenwood, MN 56334
(320) 634-5327

Todd County
Primary: Randy Neumann
Secondary: Dave Kircher
215 1st Avenue SE, #300
Long Prairie, MN 56347
(320) 732-6447

Todd County SWCD
Primary: Tom Williamson
Secondary: Lee Buchholz
215 1st Avenue SE, #104
Long Prairie, MN 56347
(320) 732-2644

Stearns County
Primary: Steve Notch
Secondary: Becky Schlorf
705 Courthouse Square, Room 121
St. Cloud, MN 56303
(320) 656-3601

Sauk River Watershed District
Primary: Tyler Carlson
Secondary: Dennis Ritter
524 4th Street South
Sauk Centre, MN 56378
(320) 352-2231

Stearns County SWCD
Primary: Chuck Uphoff
Secondary: Arlyn Lawrenz
110 2nd Street South, #128
Waite Park, MN 56387
(320) 251-7800

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTY: __**Douglas County, Minnesota**_

APPROVED:

BY: ______________________________

Owen G. Miller, Board Chair

Date 3/6/18

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTY: Douglas Soil + Water Conservation District

APPROVED: 3-12-18

BY: Paul Barnes 3-12-18

Vice-Board Chair Date

BY: 3-12-18

District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTY: Pope County

APPROVED:

BY: Larry Lindor 4-3-18
Board Chair Date

BY: ______________________
District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTY: Pope SWCD

APPROVED:

BY: [signature] 4-17-18

Board Chair **Date**

BY: [signature] 4/17/18

District Manager/Administrator **Date**

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTY: Todd County

APPROVED:

BY: Randy Neu 3/6/18
Board Chair Date

BY: Tim Stieber 3-8-18
District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTY: TODD COUNTY SWCD

APPROVED:

BY: 3-8-2018

Board Chair Date

BY: 3-8-18

District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTY: SAUK RIVER WATERSHED DISTRICT

APPROVED:

BY: [signature] 2-21-18

Board Chair Date

BY: [signature] 2/21/18

District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTY: STEARNS COUNTY

APPROVED:

BY: ______________________________ 3/13/18
Board Chair Date

BY: ______________________________ 3-15-18
~~District Manager~~/Administrator Date
Department Director

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

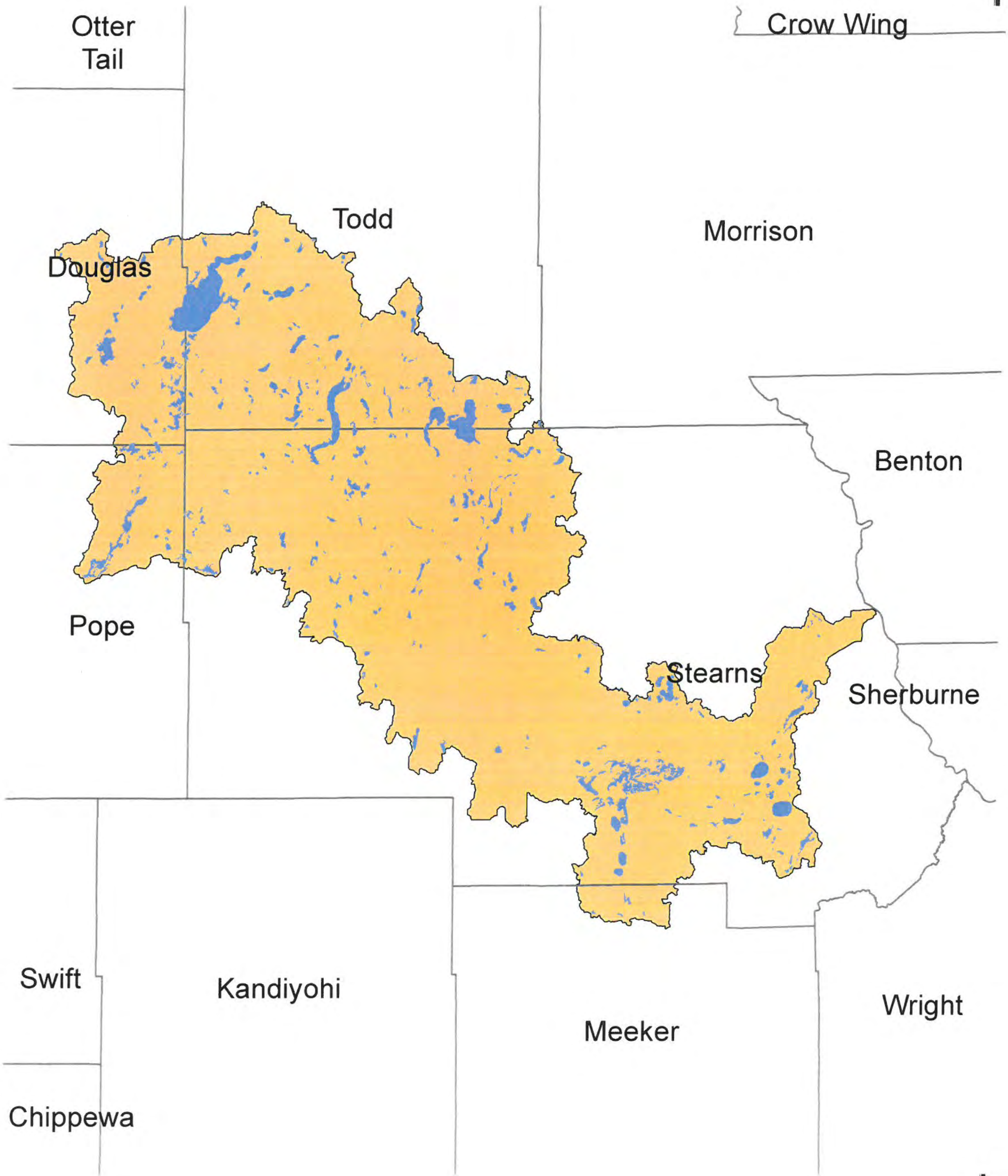
PARTY: Stearns County SWCD

APPROVED:

BY: Chuck Uphoff 3/23/18
Board Chair Date

BY: [signature] 3/23/18
District Manager/Administrator Date

Attachment A



Appendix D

BYLAWS

One Watershed One Plan

Policy Committee Bylaws of the

SAUK RIVER WATERSHED

Douglas County

Douglas County Soil and Water Conservation

Pope County

Pope County Soil and Water Conservation District

Sauk River Watershed District

Stearns County

Stearns County Soil and Water Conservation District

Todd County

Todd County Soil and Water Conservation District

ADOPTED April 25, 2018

These bylaws establish rules governing the conduct of business by the Policy Committee of the Sauk River Watershed 1 Watershed, 1 Plan.

ARTICLE I: PURPOSE

1. The purpose of the Policy Committee is to develop and adopt, as local government units, a coordinated watershed management plan for implementation pertaining to that area within the Sauk River watershed.

2. The Policy Committee operates under the Sauk River Watershed Policy/Plan Development Agreement (Agreement). The Member local units of government are Douglas County, Douglas County Soil and Water Conservation District (SWCD), Pope County, Pope County SWCD, Sauk River Watershed District, Stearns County, Stearns County SWCD, Todd County and Todd County SWCD.

ARTICLE II: MEMBERSHIP PROVISIONS

1. The membership of the Policy Committee shall be comprised of at least 9 members as designated by the governing board of each member local unit of government. The governing board may designate an alternate member from their respective governing board. It is the responsibility of the designated member to ensure that the alternate member is cognizant of agenda items that will be discussed and voted prior to attending a Policy Committee meeting.

2. Members of the Policy Committee shall serve until the expiration of the Agreement, to run concurrently with each Policy Committee member's term on his/her respective board.

3. In the event that a member of the Policy Committee resigns or is otherwise unable to complete his or her term, the member shall notify his or her appointing authority of the vacancy as soon as practicable. The local unit of government shall appoint a replacement member as soon as possible.

4. A Policy Committee member shall not take any action that may materially benefit the financial interest of that member, a member's family member, or a member's close associate, unless and until that member first discloses that interest for the record. The member who so discloses an interest may be present to answer questions related to that interest, but shall not advocate for nor vote on the action. If a Policy Committee member concludes that his or her interest does not create a conflict, but that there may

be an appearance of a conflict, he or she shall disclose the interest for the record before participating in discussion or voting on an action.

5. Membership may be extended to other political subdivisions within the Sauk River Watershed, as outlined in the Agreement, but not after July 31, 2018.

ARTICLE III: OFFICERS

1. The Officers of the Policy Committee shall consist of a Chairperson, Vice Chairperson, and a Secretary elected by members of the Policy Committee at their first meeting.
    a. The Chairperson shall:
        i. Serve as Chairperson for all meetings; and
        ii. Sign and deliver in the name of the Partnership any correspondence pertaining to the business of the Partnership.
    b. The Vice Chairperson shall:
        i. Discharge the Chairperson's duties in the event of the absence or disability of the Chairperson.
    c. The Secretary shall:
        i. Maintain records of the Partnership.
        ii. Certify records and proceedings of the Partnership.
        iii. Ensure that minutes of all Policy Committee meetings are recorded and made available in a timely manner to the Policy Committee, and maintain a file of all approved minutes including corrections and changes.
        iv. Provide for proper public notice of all meetings.
        v. The Secretary may delegate a representative to record the minutes and perform other duties of the Secretary. The elected Secretary will sign the official minutes of all meetings following approval by the Policy Committee.
2. An Officer will serve until replaced by the election of a successor. No Policy Committee member may hold more than one office at a time.
3. In the event that an Officer cannot complete his or her term of office, the Policy Committee shall immediately elect from among its members an individual to fill the vacant position. The individual to be elected may not already be serving as an officer of the Policy Committee.

4. The Policy Committee will request the respective local unit of government participant to replace their representative member if that representative member misses two (2) consecutive meetings without notice to the Chairperson.

ARTICLE IV: MEETINGS

1. All meetings of the Policy Committee will comply with statutes and rules requiring open and public meetings.
2. The conduct of all meetings of the Policy Committee shall be generally governed by the most recent edition of Robert's Rules of Parliamentary Law.
3. A quorum of the Policy Committee shall consist of a simple majority of the members.
4. All votes by Policy Committee members shall be made in person, and no member may appoint a proxy for any question coming before any meeting for a vote.
5. Notice of Policy Committee meetings and a proposed agenda shall be mailed to all Policy Committee members not less than 7 days prior to the scheduled meeting date of the Policy Committee.
6. The minutes of any meeting shall be made available to all Policy Committee members prior to the next meeting.

ARTICLE V – VOTING

1. A motion or resolution shall be approved by a favorable vote of a simple majority of the members present, provided enough members are present to make a quorum.
2. A supermajority vote of two-thirds (2/3 or 66%) of those members present, provided a quorum is met, shall be required for final plan approval for submittal to review.

ARTICLE VI – COMPENSATION

1. Policy Committee members may be compensated by the member local unit of government they represent for meetings and expenses incurred, according to the policies of the local unit of government.
2. Policy Committee members may not be compensated for meeting time and expenses using funds granted by the state for the purpose of developing the *One Watershed, One Plan*.

ARTICLE VII – SUBCOMMITTEES OF THE POLICY COMMITTEE AND OTHER COMMITTEES

1. The Policy Committee may appoint subcommittees for the purpose of assisting the Policy Committee in the performance of its duties. Except for a Policy Committee member appointed to a subcommittee, no other member of a subcommittee shall be able to make motions for consideration to the Policy Committee, or vote on matters put before the Policy Committee.

2. The Policy Committee shall appoint an Advisory Committee and act to approve all Advisory Committee members. The Advisory Committee will routinely advise the Policy Committee on the content and development of the *One Watershed, One Plan,* on plan implementation, and on issues of policy and administration related to the plan.

    a. A member of the Policy Committee or an alternate will be assigned by the Chairperson to meet with the Advisory Committee as an ex-officio member.

    b. Each Partnership member local government unit shall designate a representative to the Advisory Committee.

    c. The Advisory Committee shall also include representatives from Minnesota's principal water management or plan review state agencies (Board of Water and Soil Resources, Department of Agriculture, Department of Health, Department of Natural Resources, and Pollution Control Agency). Each agency will designate a lead contact person from its agency to participate on the Advisory Committee. Additional agency or other persons may participate as Advisory Committee members depending on the desire of the Policy Committee or the needs of the Advisory Committee.

    d. The term of membership of the Advisory Committee shall be the duration of the planning process.

    e. The members of the Advisory Committee shall elect a chairperson, a vice chairperson, and a recording secretary to serve for the duration of the Planning Phase.

    f. The Advisory Committee may form subcommittees to increase Advisory Committee effectiveness or to address specific topics or project areas. Each subcommittee shall report to the Advisory Committee.

ARTICLE VIII: MEETING LOCATION

1. All regular meetings of the Policy Committee will be held at a location within the Sauk River Watershed.

ARTICLE IX: MISCELLANEOUS

1. Portions of these bylaws may be suspended temporarily by a two-thirds vote of the Policy Committee.

2. Addition to, alteration, or repeal of any part of these bylaws by the Policy Committee may be made at any meeting by a majority of the full membership, provided that thirty (30) days advance written notice of the proposed change has been given to each member of the Policy Committee.

3. The Policy Committee's official records and the requirements of the BWSR grant agreement shall be maintained by the fiscal agent, Sauk River Watershed District. The maintenance and disposition of these records shall be in accordance with applicable laws.

4. All expenses incurred by the Policy Committee or the Advisory Committee must have prior approval of the Policy Committee, and include a signed claim form itemizing expenses that is submitted to the Policy Committee for approval at their next meeting. All claims must be submitted no more than thirty (30) days after the month in which they were incurred.

5. These bylaws are intended to be consistent with applicable provisions of Minnesota Statutes Chapters 103B, 103C, and 103D. In all cases of omission or error, Minnesota Statutes Chapters 103B, 103C, and 103D will govern.

ARTICLE X – CERTIFICATION

1. These By-laws were adopted by a vote of 9 ayes and 0 nays by the members of the Policy Committee on April 25, 2018.

Randy [signature] TODD COUNTY

(Secretary signature & organization)

Appendix E

CWMP Committee Members

Advisory Committee Members

Name	Title	Affiliation
Jason Weinerman	Board Conservationist	Board of Water and Soil Resources
Brad Wozney	Clean Water Specialist	Board of Water and Soil Resources
Noah Czech	Stormwater Compliance Specialist	City of St. Cloud
Lisa Vollbrecht	Asst. Public Utilities Director	City of St. Cloud
Dave Rush	Director	Douglas County (Land & Resource Management)
Danielle Anderson	Water Planner	Douglas SWCD
Matt Bruyette	Certified Crop Advisor	Integrated Crop Management
Ryan Lemickson	Pesticide & Rertilizer Management	Minnesota Department of Agriculture
Karen Voz	Principle Planner - Source Water Protection	Minnesota Department of Health
Craig Wills	Area Hydrologist	Minnesota Department of Natural Resources
Anna Bosch	Watershed Project Manager	Minnesota Pollution Control Agency
Aaron Janz	Soil Conservationist	Natural Resources Conservation Service
Eran Sandquist	State Coordinator - Minnesota	Pheasants Forever
Ralph Hanson	Land Use Specialist	Pope County (Land & Resource Management)
Holly Kovarik	District Manager	Pope SWCD
Scott Henderson	District Administrator	Sauk River Watershed District
Sarah Boser	Water Resource Manager	Sauk River Watershed District
Cole Loewen	Water Planner	Stearns County (Envirnomental Services Department)
Becky Schlorf	Supervisor	Stearns County (Envirnomental Services Department)
Dennis Fuchs	Administrator	Stearns County SWCD
James Bartelme	Citizen	Stearns Coalition of Lake Associations
Joe Gill	Secretary	Stearns County Dairy Advisory Committee
Leah Hall	Headwaters Project Coordinator	The Nature Conservancy
Adam Ossefoort	SWCD/Planning & Zoning Division Director	Todd County (Planning & Zoning)
Deja Anton	District Manager	Todd SWCD
Emily Wilmes	Extension Educator	University of Minnesota Extension

Policy Committee Members

Name	Title	Affiliation
Jerry Rapp	Commissioner	Douglas County
Ken Rutten	Supervisor	Douglas SWCD
Cody Rogahn	Commissioner	Pope County
Gary Reents	Supervisor	Pope SWCD
Tyler Carlson/Bill Becker	Manager	Sauk River Watershed District
Steve Notch	Commissioner	Stearns County
Chuck Uphoff	Supervisor	Stearns County SWCD
Randy Neumann	Commissioner	Todd County
Tom Williamson	Supervisor	Todd SWCD

Steering Committee Members

Name	Title	Affiliation
Dave Rush	Director	Douglas County (Land & Resource Management)
Danielle Anderson	Water Planner	Douglas SWCD
Ralph Hanson	Land Use Specialist	Pope County (Land & Resource Management)
Holly Kovarik	District Manager	Pope SWCD
Scott Henderson	District Administrator	Sauk River Watershed District
Becky Schlorf	Supervisor	Stearns County (Environmental Services Department)
Cole Loewen	Water Planner	Stearns County (Environmental Services Department)
Dennis Fuchs	Administrator	Stearns County SWCD
Deja Anton	District Manager	Toddy SWCD
Lisa Vollbrecht	Assistant Public Utilities Director	City of St. Cloud

Appendix F

COMMENT LETTERS

BOARD OF WATER AND SOIL RESOURCES

Brad Wozney and Jason Weinerman
110 Second Street South, Suite 307
Waite Park, MN 56387

June 15, 2018

Sauk River One Watershed One Plan Partnership
c/o Scott Henderson, Sauk River Watershed District
524 Fourth Street South
Sauk Centre, MN 56378

Dear Mr. Henderson and the Sauk River One Watershed One Plan Partnership,

Thank you for providing the opportunity to provide resource issues and plan expectations for the development of the Sauk River comprehensive watershed management plan under Minnesota Statutes section 103B.801. We hope that through this planning process the partnership will create a Comprehensive Watershed Management Plan that drives changes and improvements into the future. Strict adherence to the plan content requirements does not guarantee a good plan for all members. By working hard to acquire and consider input from all local stakeholders with state agency partnership and support, the Plan should become a living document and build the needed foundation for long-term implementation.

The Board of Water and Soil Resources (BWSR) has the following overarching expectations for the plan:

Process

The planning process must follow the requirements outlined in the *One Watershed, One Plan Operating Procedures*, adopted by the BWSR Board on March 23, 2016 and available on the BWSR website: www.bwsr.state.mn.us/planning/1W1P/index.html. More specifically, the planning process must:

- Involve a broad range of stakeholders to ensure an integrated approach to watershed management.
- Reassess the agreement established for planning purposes when finalizing the implementation schedule and programs in the plan, in consultation with the Minnesota Counties Intergovernmental Trust and/or legal counsel of the participating organizations, to ensure implementation can occur efficiently and with minimized risk. This step is critical if the plan proposes to share services and/or submit joint grant applications.

Plan Content

The plan must meet the requirements outlined in *One Watershed, One Plan – Plan Content Requirements*, adopted by the BWSR Board on March 23, 2016 and available on the BWSR website: www.bwsr.state.mn.us/planning/1W1P/index.html. More specifically, the plan must have:

- A thorough analysis of issues, using available science and data, in the selection of priority resource concerns.

- Sufficient measurable goals to indicate an intended pace of progress for addressing the priority issues.
- A targeted and comprehensive implementation schedule, sufficient for meeting the identified goals.
- A thorough description of the programs and activities required to administer, coordinate, and implement the actions in the schedule; including work planning (i.e. shared services, collaborative grant-making, decision making as a watershed group and not separate entities) and evaluation.

BWSR has the following specific resource issues:

- **Soil and Water Conservation Ethic** – The majority of land within the Sauk River Watershed is privately owned and the daily land management decisions of these thousands of landowners across the watershed will influence water quality and quantity. While there is funding from a variety of sources to assist landowners with the installation of best management practices, there will never be enough funding to pay for the implementation of enough conservation activities to meet state standards or the water quality vision of local governments or citizens. Therefore, it is important to reinforce the need for local responsibility when it comes to making land use decisions, which involves working within a common ethical system. There is not a uniformly agreed upon ethical framework among landowners within the watershed within which these land use decisions are made. Without the development of a consensus on a soil and water conservation ethical standard, individuals will have no benchmark against which to frame their land management decisions. With the Sauk River 1W1P planning partnership consisting of representatives from the counties, conservation districts, and the watershed district, the One Watershed One Plan process provides the opportunity for the elected leaders within their communities to develop and promote a soil and water conservation ethic that will ensure the continued sound management of the watershed's soil and water resources.
- **Development Pressure** – The MN Department of Transportation predicts that central Minnesota will be the region that sees the fastest population growth. These new residents will put pressure on the region's soil and water resources, housing, recreation, water supply for domestic and commercial uses, and overall quality of life. Many of the counties have identified preserving the agricultural nature of the landscape as important components of their county comprehensive plans. These comprehensive plans serve as drivers for the planning and zoning role of the counties and can identify critical areas for environmental protection, agricultural production, and residential development. Balancing the needs of the new residents with the capacity of the local soil and water resources, both surface and ground, will be an important feature in maintaining and improving the region's resources. Much of this population growth will likely occur around the existing cities and travel corridors and can be expected to consist of single family dwellings on lots of variable sizes. If this development pattern continues as expected, there is likely to be an increase in impervious surface, greater runoff, and potential degradation of surface water resources. County and local planning and zoning can help to minimize many of these negative impacts and ensure that development occurs in an orderly and environmentally sustainable fashion. In addition, the combining of a vision for healthy river systems with the need for habitat and trail corridors will provide multiple benefits at a reduced cost and minimize the negative interactions between humans and wildlife.
- **Soil Health** – Studies suggest that water quality goals will not be achieved via structural practices alone. That is why soil and nutrient management practices become critical. Soil that functions at its optimum biological potential provides many ecological benefits including holding nutrients, filtering and storing water, fixing carbon, and maintaining stability through severe weather events. Properly managing soils to achieve their biological potential is a critical component throughout all of the landscapes within the Sauk River Watershed including residential and heavily urbanized areas. The Sauk River One Watershed

One Plan partnership should strive to increase the biological capability of underperforming soils while protecting those soils that are at their optimum potential.

- **Altered Hydrology** – Water movement through the landscape is a critical feature within the Sauk River Watershed. Land use changes, drainage, tiling, and channel modification/realignment has altered the speed, timing, and intensity with which water moves through the landscape. This change in flow patterns can result in higher peaks and lower valleys that can destabilize channels, increase erosion rates, and damage wildlife habitat. The Sauk River Watershed partnership should seek to restore traditional flow regimes and mitigate the damage from areas in which land use and land management changes have significantly altered the historic hydrology. As part of this effort to restore historic hydrology patterns, the partnership should also identify and prioritize areas in which water storage activities could be implemented.
- **Animal Agriculture/Nutrient Management** – Livestock and farming and core components of the watersheds economic base. Livestock, including dairy and poultry operations, are important contributors to the overall water quality within the area. The proper design and management of these facilities and the local use of the manure and other generated wastes can minimize the negative influences on water quality. In addition, there are individuals and communities who have smaller and less intensive agricultural operations (hobby farms, Amish). All of these agricultural actors should be included in the planning process as targets for outreach and education to ensure their operations have minimal negative impacts on the region's water resources.
- **The Nonpoint Priority Funding Plan** (NPFP) – The NPFP outlines a criteria-based process to prioritize Clean Water Fund investments. Planning partners intending to pursue Clean Water Fund dollars are strongly encouraged to consider the high-level state priorities, keys to implementation, and criteria for evaluating proposed activities in the NPFP.
- **Drainage** - The drainage authorities within the planning boundary should be included as stakeholders in the plan development process. Additionally, the planning partners are strongly encouraged to include projects and activities consistent with multipurpose drainage criteria outlined in Minnesota Statutes §103E.011, Subd. 1a and §103E.015, Subd. 1. There is a benefit to conducting a systematic redetermination of benefits to properly assess the impact of drainage within the watershed and to better understand the costs of public drainage management and maintenance. The watershed district is the drainage authority for a significant portion of the watershed (Stearns, Meeker, Pope counties) and has chosen to consider a multi-purpose drainage management strategy for many of the ditches. Multi-purpose drainage management broadens the concept of drainage as one driven by agricultural production to a more holistic concept including water quality, wildlife habitat, and hydrology. Please refer to the attached document "103E Drainage System Considerations for 1W1P" for more details.
- **Wetlands** – BWSR is initiating a process to develop a compensation planning framework (CPF) that will guide wetland mitigation siting in the future. Work on the plan for the Middle Mississippi River bank service area, which the Sauk River is part of, will begin in the fall of 2018 and is expected to be completed in late 2019 or early 2020. The CPF will assess baseline conditions and cumulative impacts to wetlands, identify watershed scale trends, and, utilizing stakeholder input and other watershed information, formulate a strategy for identifying and prioritizing wetland restoration opportunities. The Sauk River 1W1P participants, through their planning process, have the opportunity to contribute to, and benefit from, the CPF development being initiated by BWSR by sharing data, coordinating baseline condition assessments, identifying watershed needs, and identifying opportunities in the watershed where wetland restoration meets the goals and objectives of each planning process.

- **The Conservation Reserve Enhancement Program (CREP) and Re-Invest in Minnesota (RIM) Reserve easement program** – The RIM reserve easement program considers several site specific and landscape scale factors when funding applications. Though it is dependent on specific program terms, the State considers local prioritization of areas for easement enrollment. The Sauk River Watershed area contains the following state resource priority areas within Minnesota's Conservation Reserve Enhancement (CREP) Project Area. The Sauk River Watershed Planning Partnership should consider CREP and other RIM Easement opportunities within the planning process.
    - Nitrogen and Phosphorous: High Priority Areas, Minnesota Nutrient Reduction Strategy
    - Minnesota Agricultural Water Quality Certification Pilot Watersheds
    - Bonanza Valley Groundwater Management Area
    - High or Very High Vulnerability, Drinking Water Supply Management Areas

- **GRAPS** - The Groundwater Restoration and Protection Strategies (GRAPS) for this region is currently in process. This strategy document should be finalized during the planning phase of the Sauk River 1W1P and findings should be included in the planning effort as they become available.
- **Bonanza Valley Groundwater Management Area Plan** – The Bonanza Valley Groundwater Area lies under a portion of the western Sauk River Watershed. The MN Department of Natural Resources has identified this area as being at risk for overuse and degraded quality. The Groundwater Management Area Plan has five objectives. The SRW planning partnership should consider these objectives as they identify management strategies for the protection of groundwater quality and quantity.
    - Groundwater use in the GWMA does not harm aquifers and ecosystems, and does not negatively impact surface waters.
    - Groundwater use in the GWMA is reasonable, efficient, and complies with water conservation requirements.
    - Groundwater use in the GWMA does not degrade water quality.
    - Groundwater use in the GWMA does not create unresolved well interferences or water use conflicts.
    - All groundwater users in the GWMA have the necessary permits to use groundwater.

- **WRAPS** - The Watershed Restoration and Protection Strategies (WRAPS) indicates a mixed trend in terms of river water quality with an improvement in the total phosphorous level but a declining trend in terms of nitrite/nitrate and chloride. The MPCA Stressor Identification report and other supporting information in the WRAPS should serve as a critical component to the scientific foundation in meeting state water quality goals.
- **Landscape Resiliency and Climate Adaption** – BWSR strongly encourages your planning partnership to consider the potential for more extreme weather events and their implications for the water and land resources of the watershed in the analysis and prioritization of issues. According to the State Climatologist, heavy rains are more common and more intense than any time on record. Long term observation sites have seen a 20% increase in the frequencies of one inch rains, 65% increase the frequencies of three inch rains, and 13% increase in the size of the heaviest rainfall of the year. In addition, rainfall events that would have occurred only 2% of the time in the region are becoming more common. State climate projection indicate these patterns will continue into the future.

Warming in the region has tended to occur during the time when it has been the coolest. Winter warming is 13 times faster than summer and nights have warmed 55% faster than days. The frequency of -25, -30, and -35F readings in the Sauk River Watershed area have fallen by 90%. Minnesota does not get as cold as it once did and, although Minnesota will always get cold spells, the long-term decline in cold extremes is all but guaranteed to continue.

- **Local Controls** - Gaps or inconsistencies in local ordinances, policies, or enforcement could affect the success of your plan's implementation. Landowners throughout the watershed may own property in different counties and face different permitting processes across the governmental jurisdictions. Within this watershed, efforts should be made to ensure the permitting and ordinance processes are clearly explained and that overlaps between different jurisdictions are minimized.
- **County and City Comprehensive Plans** – Land use drives water quality and many people view water as a valued amenity in their community. In addition, these comprehensive plans drive the land use decisions within each county. Involving the appropriate stakeholders from these communities in the planning process will ensure that local comprehensive plans are integrated with the Sauk River Watershed Comprehensive Management Plan.

We commend the partners for their participation in the planning effort. We look forward to working with you through the rest of the plan development process. With this new partnership, consider branding and marketing the comprehensive watershed management plan so it becomes recognizable for years to come in plan implementation. If you have any questions, please feel free to contact Jason Weinerman at 320-223-7072 or at jason.weinerman@state.mn.us.

Sincerely,

Jason Weinerman

Board Conservationist

cc: Craig Wells and Nicola Blake-Bradley, DNR (via email)

Ryan Lemickson, MDA (via email)

Karen Voz, MDH (via email)

Anna Bosch and Phil Votruba, PCA (via email)

Equal Opportunity Employer

Chapter 103E Drainage Systems Considerations
for
One Watershed, One Plan

3-20-18

As the 1W1P plan is formulated, BWSR suggests the following:

- Chapter 103E drainage authorities (who are also water planning authorities) be fully engaged from the early stages of the planning process. Use Section 103E.015 *CONSIDERATIONS BEFORE DRAINAGE WORK IS DONE.* and other provisions of drainage law identified below to capture both the extent and limitations of drainage authority responsibility, authority and opportunity for participating in the planning and implementation of conservation practices involving public drainage systems and their associated drainage areas.
- Prioritization within the watershed include identification of Chapter 103E drainage systems and their drainage areas.
- Multipurpose drainage management be included in the approach for targeting best management practices (BMPs) within the drainage area of Chapter 103E drainage systems, considering the five purposes outlined in Section 103E.015, Subdivision 1. *Environmental, land use, and multipurpose water management criteria.*, clause (2).
- Measurable outcomes for erosion and sediment reduction, nutrient reduction, improved instream biology, and detention storage to assist those outcomes, should include correlation to Chapter 103E drainage systems.
- Lay out a coordinated approach for how implementation of multipurpose drainage management practices identified in the plan can be coordinated with, and/or integrated early into Chapter 103E processes and proceedings. When projecting funding needs for BMP implementation along, or within the drainage area of, public drainage systems, incorporate use of the following Sections of Chapter 103E.
    - 103E.011, Subd. 5. *Use of external sources of funding*.;
    - 103E.015, Subd. 1a. *Investigating potential use of external sources of funding and technical assistance.;*
    - 103E.227 *Impounding, rerouting and diverting drainage system waters.;*
    - 103E.701, Subd. 6. *Wetland restoration and replacement; water quality protection and improvement.*; and
    - 103E.715, Subd. 6. *Repair by resloping ditches, incorporating multistage ditch cross-section, leveling spoil banks, installing erosion control, or removing trees.*

  These provisions enable public-private funding partnerships involving Chapter 103E drainage systems.
- Drainage authorities consider the permissive authority in Section 103E.021 Subd. 6 *Incremental implementation of vegetated ditch buffer strips and side inlet controls.* to establish permanent buffer strips of perennial vegetation and/or side inlet controls, where necessary to control erosion and sedimentation, improve water quality, or maintain the efficiency of the drainage system.
- Note that in accordance with Section 103E.021, Subdivision 1. *Spoil banks must be spread and permanent vegetation established.*, a drainage authority shall order minimum 16-1/2 ft. wide ditch buffer strip(s) of perennial vegetation approved by drainage authority for any proceeding to establish, construct, improve or do any work affecting a public drainage system under any law that appoints viewers to assess benefits and damages.

DEPARTMENT OF NATURAL RESOURCES

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
CENTRAL REGION
1200 Warner Rd.
St Paul, MN 55106

July 31, 2018

Scott Henderson
District Administrator
Sauk River Watershed District
524 4th St.
Sauk Centre, MN 56378

Dear Mr. Henderson,

Thank you for inviting the Minnesota Department of Natural Resources (DNR) to provide input as you and other partners begin developing a Comprehensive Watershed Management Plan for the Sauk River Watershed. We are writing on behalf of DNR Commissioner Tom Landwehr to share our priorities and express our support.

Attached are priorities we encourage you to address in your plan – keys to protecting and improving the health of the watershed. A plan centered on these priorities will help sustain water resources in ways that enhance the quality of life for all who live, work, and enjoy the outdoors in this watershed.

The DNR can supply scientific data and information related to the attached priorities. We also offer services that can enhance the planning process. For example, we can help stakeholders get to know the watershed, or lead interactive exercises to help local partners explore water resource values.

Our lead staff person for this One Watershed One Plan (1W1P) project is Craig Wills, 763-284-7221, craig.wills@state.mn.us, presently based at the DNR office in Cambridge. Please contact Craig Wills if you have questions or want more information about the attached priorities or the types of technical support we can provide.

Also feel free to contact me directly if needed. As the DNR's Regional Director, I am committed to ensuring that DNR staff in the region are organized to support 1W1P planning efforts and the resulting plan. We greatly value the opportunity to contribute to the process and hope the information we provide is helpful.

Sincerely,

Jarrett Purdue

On behalf of Keith Parker, Regional Director, DNR Central Region

CC: Craig Wills (DNR), Dan Lais (DNR), Tim Crocker (DNR), Barbara Weisman (DNR), Jason Weinerman (BWSR), Ryan Lemickson (MDA), Karen Voz (MDH), Anna Bosch (MPCA)

DNR Priorities for the Sauk River Watershed

Comprehensive Watershed Management Plans are required to consider several important high-level issues. The priority concerns and opportunities below (on the left) relate most closely to three of these high-level issues (as listed on the right)—Water Quality, Habitat and Outdoor Recreation, and Shoreland and Riparian Zones. Also, attached to the table is a list of priority water resources.

Priority Resource Concerns & Opportunities	High-Level Priority Issues
• Implement strategies identified in existing WRAPS and watershed documents to reduce the number of impaired lakes and streams. • Significant hydrologic alteration is a major driver of water quality issues and habitat degradation in this watershed. We strongly support protecting, restoring, and improving the existing hydrology in the sub-watersheds of wild rice lakes (Cedar, McCormic and Henry), Lake Osakis, and along the main stem of the Sauk River. • Reducing nutrient and sediment loading to Lake Osakis and the headwaters of the Sauk River is a top priority for the DNR. • Unstable streambed and channel banks are a concern along parts of the Sauk River main stem. We encourage opportunities for stream restoration that could involve local conservation groups and other partners working with DNR to restore key areas. Targeted land acquisition opportunities could also be considered in this regard. • Increased development around Big and Little Birch Lakes is both a concern and an opportunity. Promoting forestry stewardship on private lands along the lake shore would benefit water quality and habitat. The DNR's Forest Stewardship Program helps woodland owners through advice, cost-share programs and stewardship plans.	**Water Quality**
• Public lands such as Grey Eagle WMA, Elgin Woods and Birch Lake Forest serve as core habitats that support high biodiversity, protect valued water resources and support the local fishing, hunting and outdoor recreation economy. Cedar Lake is one of 55 designated Wildlife Management Lakes in the state and one of the oldest state game refuges. Examples of some of the habitats we are concerned about include Lake Osakis, home to the state's largest nesting population of Western Grebes, and Cold Spring Creek, a designated trout stream. • Healthy fish and game populations depend on high quality aquatic habitat. Protecting native species in and along the shoreline is an important way to maintain high-quality habitat. Restore Your Shore is a DNR resource that can help engage lake associations and river property owners in protecting native species in and along shoreland areas. • Continuing partnerships between state and local government and local organizations to prevent the spread of invasive species is a priority.	**Habitat and Outdoor Recreation**

• As noted in Water Quality issues above, restoring, protecting or improving hydrology in targeted areas is a priority. Practices such as restoring headwater tributaries with altered hydrology, and planting upland habitat around wetlands are ways to restore hydrology and habitat at the same time. Likewise, practices that reduce flashiness around Lake Osakis will protect the bulrush stands that support Grebes while reducing excess sediment linked to water quality impairments. • Continue support of the 90 miles of the Sauk River as a State Water Trail. This is a stretch of river that is mapped and managed especially for canoeing, kayaking, boating and camping. There are no major rapids, providing an enjoyable paddling experience for all skill levels. The Route Map shows the location of all portages, camp sites, accesses and other features. • Refer to the DNR's Cold Spring Groundwater Study web page to inform efforts that support the trout fishery in Cold Spring Creek while understanding groundwater sustainability needs in the area. • Improvements to fisheries and water-based recreation are evident where dams have been removed. There are opportunities to continue this trend by improving fish passage through dam modification or removals at Melrose (Sauk River) and Cold Spring (Cold Spring Creek). • The State Wildlife Action Plan 2015-2025 comprehensively shows where many important habitat areas that support rare species are located in the watershed. The data layer found on the MN Geospatial Commons is called MNWAP Wildlife Action Network. The network is made up of mapped habitat representing viable or persistent populations and "richness hotspots" of Species in Greatest Conservation Need (SGCN).	
• While the Sauk River, along with many lakes, and some of its tributaries have great stretches of riparian habitat, gaps exist and many headwater streams and ditches lack quality perennial cover and habitat. A key concern is the loss or degradation of riparian trees, shrubs and grass that provide important habitat corridors and help protect water quality. • Perennial riparian vegetation around lakes and along tributary streams and the Sauk River is essential. Conservation cost-share programs such as the Forest stewardship program mentioned before can be promoted for that purpose. • Enforcement of existing local shoreland and floodplain ordinances and adoption of low-impact development standards are important tools to help reduce the loss of riparian cover and decrease the volume of water eroding lake and stream banks. Resources on our website can help inform landowners and real estate professionals about the value of protecting shoreline vegetation and controlling and managing runoff. See a Guide for Buying and Managing Shoreland.	**Shoreland and Riparian Zones**

- The quality and extent of perennial vegetation along waterways that are tributary to shallow lakes and sensitive streams is important. While all lakes help support wildlife needs, it is the shallow water zone that provides the most important wildlife habitat. The DNR can identify and help prioritize shallow lakes and sensitive streams that would especially benefit from enhanced riparian vegetation. These priority waterways could also receive more targeted local enforcement of the statewide buffer law and the Wetland Conservation Act. Planning Your Buffer Zone is another resource to share with landowners.
- Expand and restore the quality of riparian habitat affected by livestock access, encroachment and degradation.

DNR 1W1P - Priority Water Resources	**Priority Resource highlights**
Sauk River Main Stem	State Water Trail, native mussels, fishing, boat accesses
Lake Osakis (77-215)	Largest breeding population of Western Grebes in the state. Also many other colonial nesting water birds that need extensive beds of emergent lake vegetation to successfully breed and nest
Cold Spring Creek	Designated Trout Stream
McCormic (73-273), Henry (73-237), and Cedar (73-226)	Wild Rice Lakes
Big Birch (77-84) and Little Birch (77-89) Lakes	Important node identified in the Wildlife Action Network
Horseshoe Chain of Lakes (multiple lakes)	Important regional recreational/fishing lakes
Big Lake (73-159)	DNR Fisheries has been stocking this lake with Walleye for the past 50 years
Big Fish (73-106)	A scenic, clear water lake that offers a variety of angling and recreational opportunities. It has a maximum depth of 70 feet and a small watershed with a high percentage of undeveloped forest and grassland and a modest amount of cultivated farmland
Long Lake (73-139)	Managed Walleye Lake
Cedar Lake (73-255)	Designated State Wildlife Lake

July 31, 2018

Sauk River Watershed District
c/o Scott Henderson, District Administrator
524 4th Street South
Sauk Centre, MN 56378

Dear Mr. Henderson,

Thank you for the opportunity to provide priority issues for consideration in the development of the Sauk River Watershed One Watershed One Plan (1W1P). The Minnesota Department of Agriculture (MDA) looks forward to working closely with local government units, stakeholders, and other agency partners in the planning process, as well as providing practical information and feedback to appropriate landowners and agricultural organizations in the watershed.

One of MDA's roles that relates to the One Watershed One Plan process is technical assistance. The MDA maintains a variety of water quality programs including research, on-farm demonstrations and groundwater and surface water monitoring. Our goal is to provide you with the data from these programs to help better understand the resource concerns and further engage the agricultural community in problem solving.

The MDA's research and on-farm demonstration projects help ensure that current and accurate scientific information is made available and used to address water quality concerns in agricultural areas of Minnesota. These activities support farmer-led discussion and peer-to-peer learning. They engage both farmers and crop advisers knowing that this trusted relationship is essential in on–farm decision making.

MDA Priority Concerns

Nitrates and pesticides in groundwater are a priority resource concern for the MDA in this watershed.

Pesticide Water Quality Monitoring

The MDA has been conducting pesticide monitoring in groundwater since 1985, and in surface waters since 1991. Annually, the MDA completes approximately 250 sample collection events from groundwater and 800 sample collection events from rivers, streams, and lakes across the state. In general, the MDA collects water samples from agriculture and urban areas of Minnesota and analyzes water for up to 150 different pesticide compounds that are widely used and/or pose the greatest risk to water resources. Groundwater monitoring is conducted by MDA and Minnesota Pollution Control Agency staff. Surface water monitoring is conducted by MDA and local organizations. All monitoring is completed following annual work plans and standard operating procedures (SOPs) developed by the MDA.

The purpose of the MDA's pesticide monitoring program is to determine the presence and concentration of pesticides in Minnesota waters, and present long-term trend analysis. Trend analysis requires a long-term investment in monitoring within the MDA's established networks. **The MDA releases an annual water quality monitoring report that includes all pesticide water quality data and long term trends available at www.mda.state.mn.us/monitoring.** The MDA will continue to conduct statewide pesticide monitoring in the future and will provide additional information related to the occurrence of pesticides in Minnesota waters.

Groundwater

- The MDA samples eight sites in the watershed. Each site consists of one to three, water table aquifer monitoring wells. Sampling began at four sites in 2000 and sites have been added throughout the watershed through 2010. All sites have been sampled at least once a year since they were established. Pesticide and nitrate data are available for the sites. Semi-annual water level measurements are also available from each site and continuous water level measurements are available for one site. Monitoring of the MDA's wells in the watershed is expected to continue into the future.

Surface water

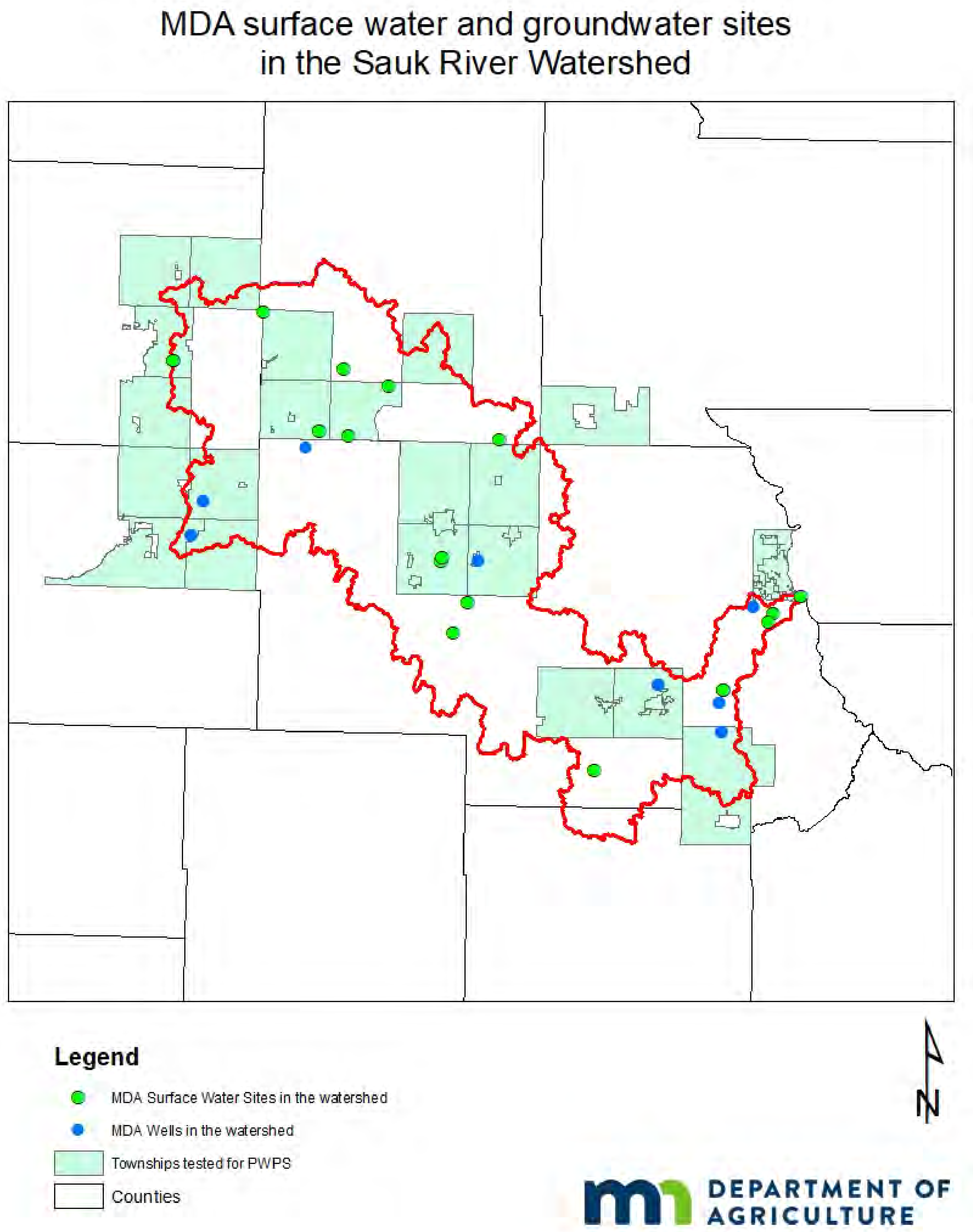
- The MDA has completed 102 pesticide and/or nutrient water quality sample collection events from 11 locations within the Sauk River Watershed from 1991-2017. The MDA has also completed eight pesticide water quality sample collection events from seven lakes (2011-2017). There are currently no pesticide water quality impairments in the watershed. All data is available in our annual report or upon request

- Since 2014, the MDA has been actively monitoring the Sauk River at CSAH-1 at Sauk Rapids, Minnesota (S000-017) and collected pesticide samples at this location from 1991-1993. The MDA collected pesticide water quality samples at this location in 2018 and will continue monitoring through at least 2021.

The MDA began evaluating pesticide presence and magnitude in private residential drinking water wells as part of the Private Well Pesticide Sampling (PWPS) Project in 2014 as a companion program to the MDA Township Testing Program (TTP), which is referenced below. Townships in different counties have been, and will continue to be, sampled every year until the project concludes in 2020. Townships in the PWPS Project depend on the participation of well owners and may not reflect all of the townships sampled in the TTP. Water samples are collected by trained MDA hydrologists and analyzed by a private contract lab for compounds similar to the MDA ambient water quality monitoring program. All monitoring is completed following annual work plans and standard operating procedures (SOPs) developed by the MDA.

- As part of the Private Well Pesticide Sampling (PWPS) Project, wells in 18 townships in Douglas, Todd, Morrison, Pope, and Stearns Counties were sampled once from 2015 through 2017. The chemistry data is available for the wells and is available upon request; however, due to privacy rules, the well locations cannot be shared.

Figure 1. MDA surface and ground water monitoring sites in the Sauk River Watershed.



Nitrogen Fertilizer Management Plan (NFMP)

The NFMP is the state's blueprint for preventing or minimizing the impacts of nitrogen fertilizer on groundwater. The original plan was developed in 1990 and recently updated in March 2015. The 2015 Nitrogen Fertilizer Management Plan (NFMP) is available at: http://www.mda.state.mn.us/nfmp

The primary goal of the Nitrogen Fertilizer Management Plan *"is to involve the agricultural community in problem solving at the local level. We all need to work together to respond to and address localized concerns about unsafe levels of nitrate in groundwater."* – Commissioner of Agriculture, Dave Frederickson.

As part of the NFMP, the MDA designed the Township Testing Program to determine current nitrate-nitrogen concentrations in private wells in areas that are vulnerable to groundwater contamination.

Township Testing Program

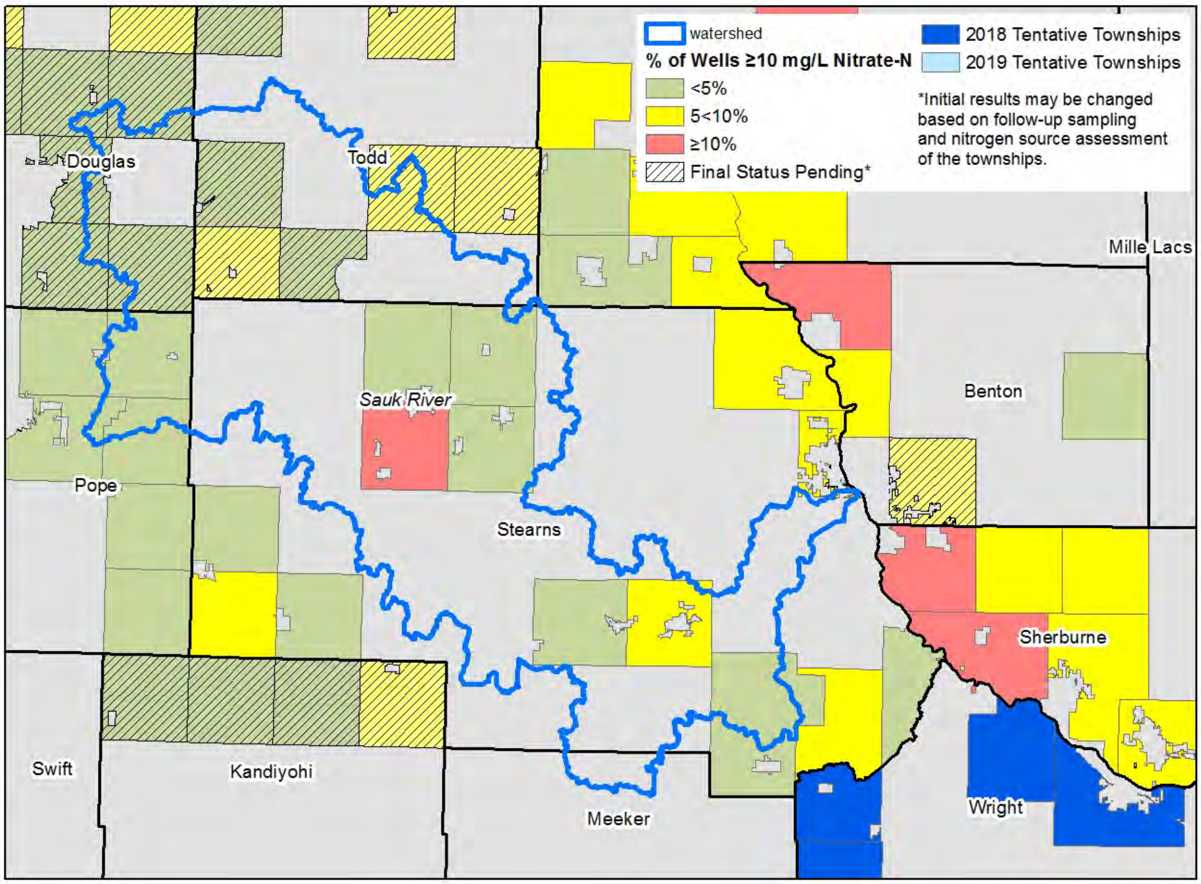
The MDA has identified townships throughout the state that are vulnerable to groundwater contamination and have significant row crop production. The MDA plans to offer free nitrate testing to 70,000 private well owners, within over 300 townships, by 2019. This work is being done in close partnership with local government units across the state.

More information, including a sampling schedule is available at: http://www.mda.state.mn.us/protecting/cleanwaterfund/gwdwprotection/~/media/Files/chemicals/nfmp/ttpudate201806.pdf or available upon request.

- Several townships in the Sauk River Watershed have been sampled as part of the Township Testing Program.

- The initial sampling for townships within Pope and Todd counties are pending finalization and the results can be found at the bottom of this webpage: **http://www.mda.state.mn.us/townshiptesting**

Figure 2. MDA Township Testing Program status in the Sauk River Watershed.



Nitrogen and Pesticide Use

The MDA surveys farmers through the National Agricultural Statistics Service (NASS). A summary of the data is attached to the submitted email as a .pdf.

The most recent nitrogen use survey was for the 2014 crop year and the most recent pesticide use survey was for the 2013 crop year.

For reference, the University of Minnesota fertilizer recommendations are found here: https://extension.umn.edu/crop-production#nutrient-management

The attached Sauk River Watershed "Nitrogen and Pesticide Use" information is from the 2014 nitrogen use report, specifically the Irrigated and non-irrigated sandy soil BMP region.

Additional Resources and Opportunities for BMP funding and cost-share

Since there is a significant portion of the watershed in agricultural production, we would like to bring to your attention a couple resources, listed below, that we encourage you to reference during the planning process.

1) The **Agricultural BMP Handbook for Minnesota** (*recently updated*) is a comprehensive inventory of agricultural best management practices that address water quality impairments. The handbook is available on-line and hard copies are available upon request. State agencies and local government partners have found this a useful resource in the WRAPS and 1W1P processes.
http://www.mda.state.mn.us/protecting/cleanwaterfund/research/handbookupdate.aspx.

- Download at:
https://wrl.mnpals.net/islandora/object/WRLrepository%3A2955/datastream/PDF/view

2) Minnesota Agricultural Water Quality Certification Program (MAWQCP)
http://www.mda.state.mn.us/awqcp.

The MAWQCP is a voluntary opportunity for farmers and agricultural landowners to take the lead in implementing conservation practices that protect our water. Those who implement and maintain approved farm management practices will be certified and in turn obtain regulatory certainty for a period of ten years. We encourage you to consider this program in the IWIP process because it is an opportunity for agricultural producers to evaluate nutrient and field management practices within the Sauk River Watershed to help reduce losses.

- There are currently 49 farmers, 183 fields, and approximately 20,000 acres certified in the Sauk River Watershed. In addition, there are currently 7 farmers, 33 fields, and approximately 6,000 acres which are assessed and are currently awaiting certification.

3) The AgBMP Loan Program
http://www.mda.state.mn.us/agbmploans

The AgBMP Loan Program is a water quality program that provides low interest loans to farmers, rural landowners, and agriculture supply businesses. The purpose is to encourage agricultural best management practices that prevent or reduce runoff from feedlots, farm fields, and other pollution problems identified by the county in local water plans. Loans can be used as match for other federal or state dollars supporting implementation.

4) Nutrient Management Initiative (NMI)
http://www.mda.state.mn.us/nmi

The NMI assists farmers and crop advisers in evaluating nutrient management practices on their own field through the use of on-farm trials. This is a great opportunity to promote new strategies that are available that could improve fertilizer use efficiency, evaluate new ideas or changes to practices, and help open the door to work directly on the farm by including local cooperators in the water quality discussion.

Furthermore, advanced trials working with the University of Minnesota research staff, help guide current nitrogen rate recommendations. There have been approximately 500 on-farm trials established in Minnesota through the NMI program since 2015.

- Five on-farm nitrogen rate evaluations have been located in the Sauk River Watershed.

5) Minnesota Discovery Farms
https://discoveryfarmsmn.org/

Discovery Farms Minnesota is a farmer-led effort to gather field scale water quality information from different types of farming systems, in landscapes all across Minnesota. The mission of the Discovery Farms program is to gather water quality information under real-world conditions. The goal is to provide practical, credible, site-specific information to enable better farm management.

The program is designed to collect accurate measurements of sediment, nitrogen, and phosphorus movement over the soil surface and through subsurface drainage tiles. This work leads to a better understanding of the relationship between agricultural management and water quality.

- There is currently one Discovery Farm located in the Sauk River Watershed.

6) Rosholt Research Farm - Water Quality and Irrigation Research
Managed by Pope SWCD

Pope SWCD / University of Minnesota / CHS / MDA partnership

http://www.mda.state.mn.us/rosholtfarm
https://popeswcd.org/program/rosholt-research-farm/

The Rosholt Farm, located in Westport, Minnesota, provides a better understanding of nitrogen fertilizer management and the associated water quality impacts on irrigated, sandy soils. The farm's coarse-textured soils and need for supplemental irrigation typifies the challenges that many producers face on the outwash sands of west-central and central Minnesota.

The Rosholt Farm is dedicated to agricultural research and education. MDA has provided funding support since 2010 to help the researchers focus on the following:

- **Nitrogen and Water Quality Research**
  - GOAL: To evaluate the management of nitrogen fertilizers and cover crops in irrigated crop production and their impacts to groundwater resources. The study evaluates the impact of a living mulch (kura clover) and cover crop (winter rye) or no cover crop on nitrate leaching and nitrogen management on irrigated row crops.

- **Reduced Irrigation Study**
  - GOAL: To improve irrigation water use efficiency by better understanding the interaction of water requirements of the crop and plant population. The study evaluates the grain yield impact and the crops rooting depth when reducing the frequency of irrigation. The study will also determine the role of reduced plant population under reduced irrigation frequency to optimize grain productivity.

We look forward to being involved in the 1W1P process. If you have any questions please do not hesitate to contact me at the information listed below.

Sincerely,

Ryan Lemickson
Minnesota Department of Agriculture
23070 North Lakeshore Drive
Glenwood, MN 56334
612-209-9181
ryan.lemickson@state.mn.us

Sauk River River Watershed

One Watershed One Plan

Pope County–Douglas County–Todd County–Stearns County

Minnesota Department of Agriculture
Nitrogen and Pesticide Use

The Minnesota Department of Agriculture surveys farmers through the National Agricultural Statistics Service. The most recent nitrogen use survey was for the 2014 crop year and the most recent pesticide use survey was for the 2013 crop year.

The following nitrogen use information is from the 2014 nitrogen use report, specifically the Irrigated and Non-irrigated sandy Soils BMP region.

Figure 1. Minnesota nitrogen BMP Regions.

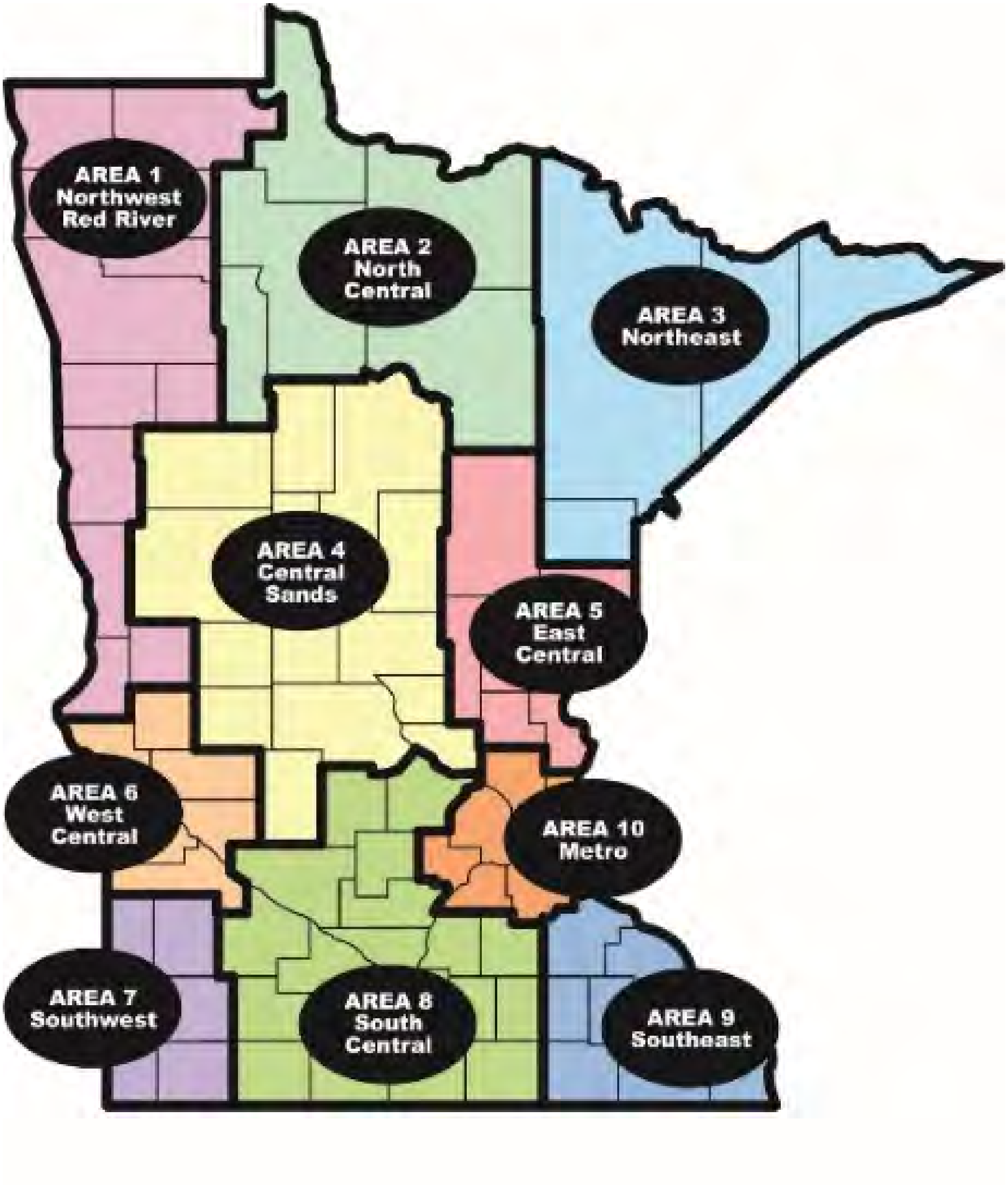


Figure 2. Minnesota pesticide BMP Regions.

Nitrogen use in the Sauk River Watershed: 2014 Crop Year

Fertilizer section

Figure 3 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following soybeans; the corresponding corn yields are detailed in red.

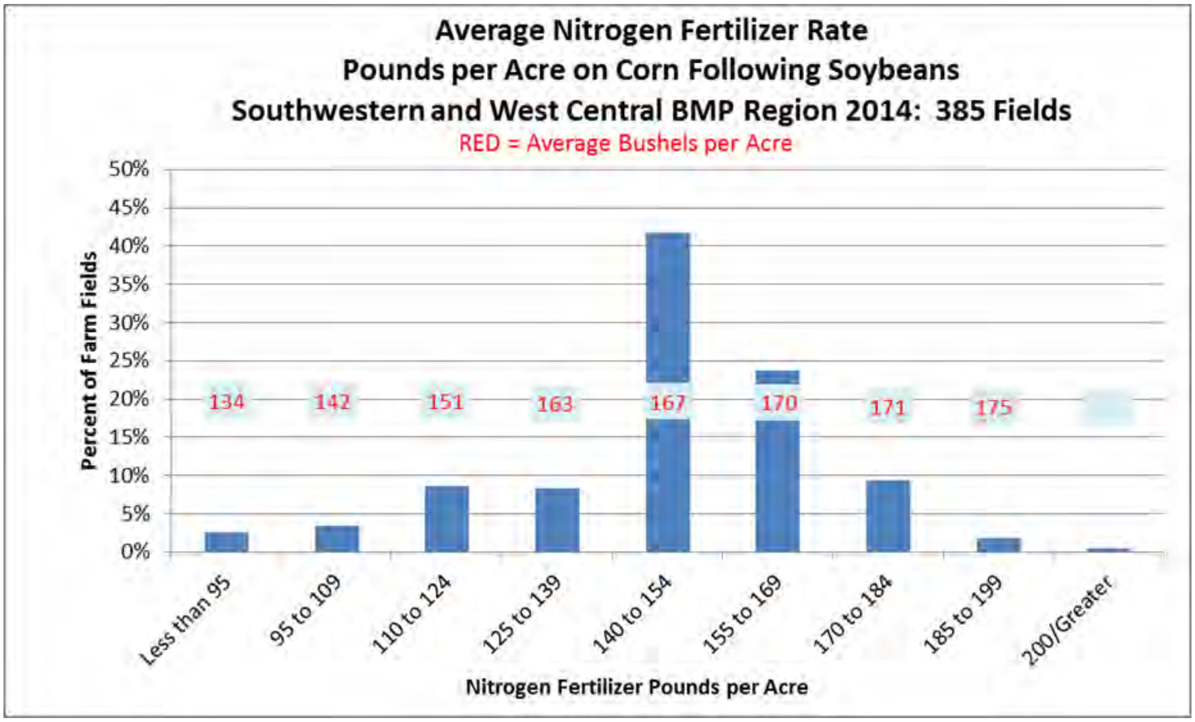


Figure 3. Average nitrogen fertilizer rates and yields on corn following soybeans in the SW BMP region for 2014: 385 fields.

In the SW BMP region, nitrogen fertilizer rates ranged from an average of 126 pounds per acre in Douglas County to 147 pounds per acre in Pope County as shown in Table 1.

Table 1. Average county nitrogen fertilizer rates and corn yields for the SW BMP region for corn following soybeans.

Average County Nitrogen Fertilizer Rates for the SW BMP Region for corn following soybeans			
County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Douglas	16	126	146
Pope	19	147	162

Figure 4 details the distribution of nitrogen fertilizer rates in the IRR BMP region for corn following soybeans; the corresponding corn yields are detailed in red.

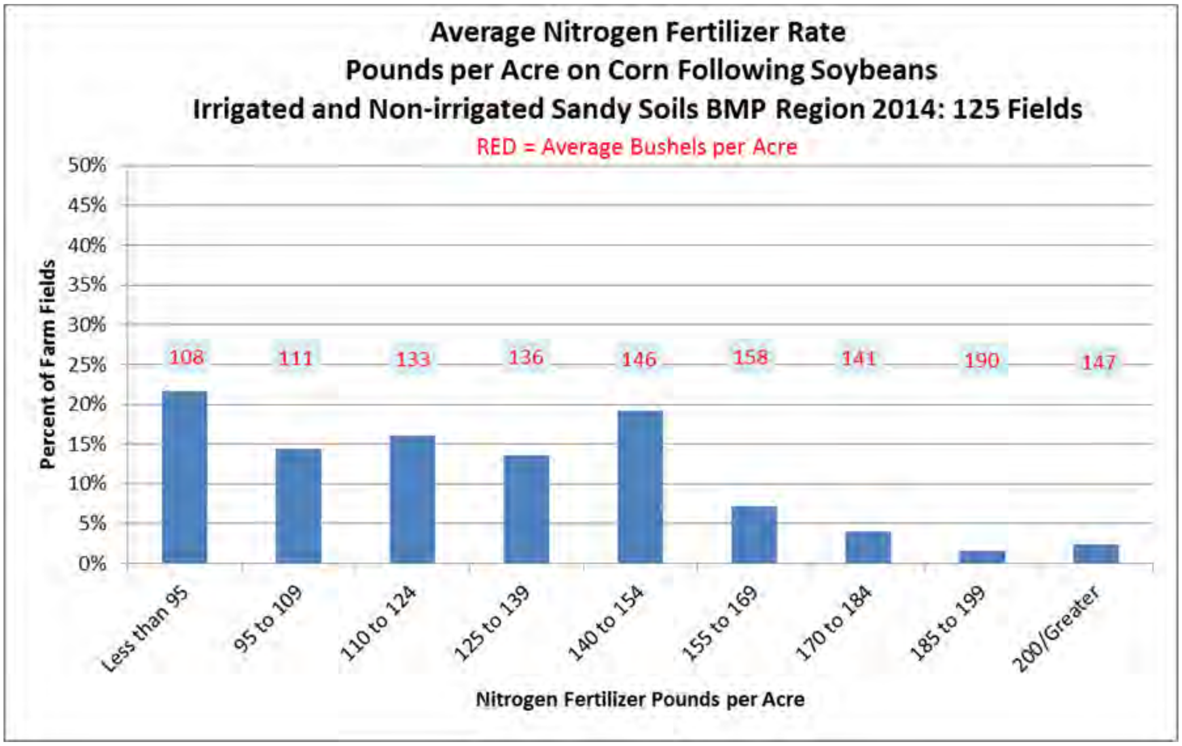


Figure 4. Average nitrogen fertilizer rates and yields on corn following soybeans in the IRR BMP region for 2014: 125 fields.

Two counties had five or more responses in the IRR BMP region. Nitrogen fertilizer rates ranged from an average of 109 pounds per acre in Todd County to 131 pounds per acre in Stearns County as shown in Table 2.

Table 2. Average county nitrogen fertilizer rates and corn yields for the IRR BMP region for corn following soybeans.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Soybeans			
County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Stearns	18	131	151
Todd	10	109	101

Figure 5 provides the distribution of nitrogen fertilizer rates in the SW BMP region for corn following corn; the corresponding corn yields are detailed in red.

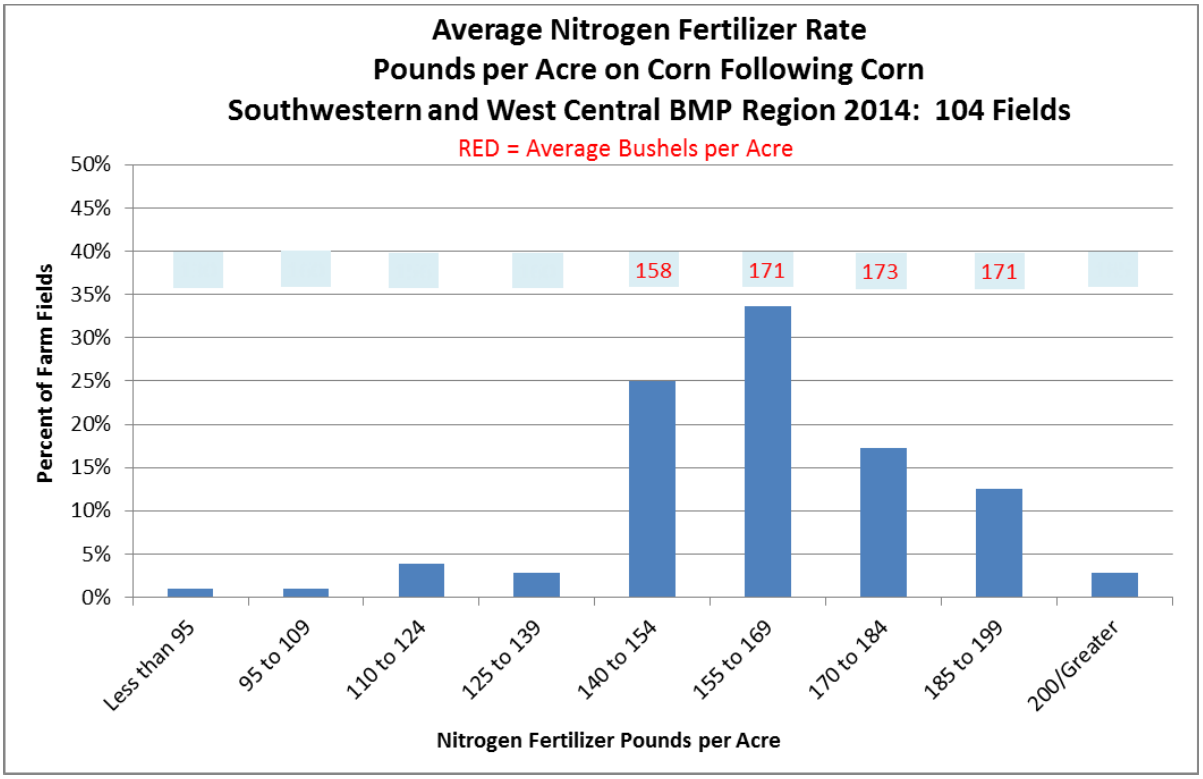


Figure 5. Average nitrogen fertilizer rates and yields on corn following corn in the SW BMP region for 2014: 104 fields.

Less than five farmers reported growing corn following corn in the SW BMP region.

Figure 6 details the distribution of nitrogen fertilizer rates in the IRR BMP region for corn following corn; the corresponding corn yields are detailed in red.

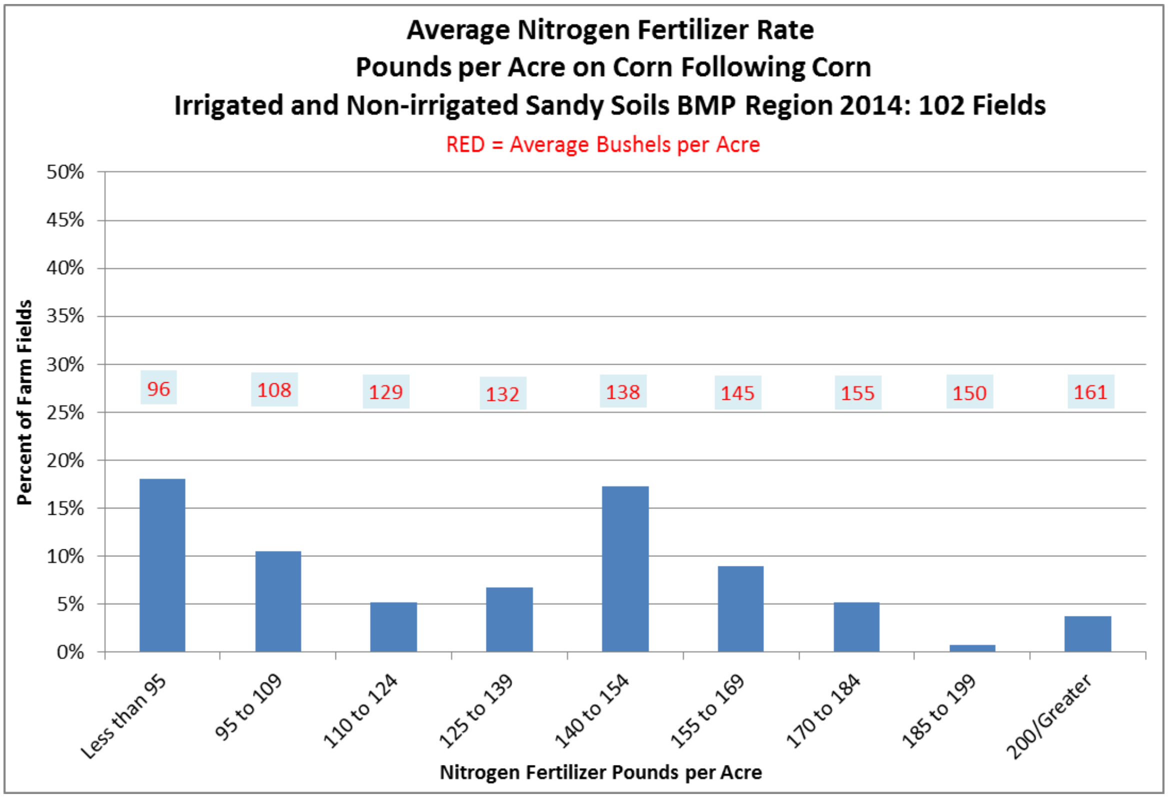


Figure 6. Average nitrogen fertilizer rates and yields on corn following corn in the IRR BMP region for 2014: 102 fields.

Two counties had five or more responses in IRR BMP region. Nitrogen fertilizer rates ranged from an average of 128 pounds per acre in Todd County to 138 pounds per acre in Stearns County as shown in Table 3.

Table 3. Average county nitrogen fertilizer rates and corn yields for the IRR BMP region for corn following corn.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Corn			
County	**Number of Farm Fields**	**Average Nitrogen Rate Pounds per Acre**	**Average Corn Yield Bushels per Acre**
Stearns	15	138	138
Todd	12	128	128

Figure 7 provides the distribution of nitrogen fertilizer rates in the SW BMP region for corn following corn following alfalfa; the corresponding corn yields are detailed in red.

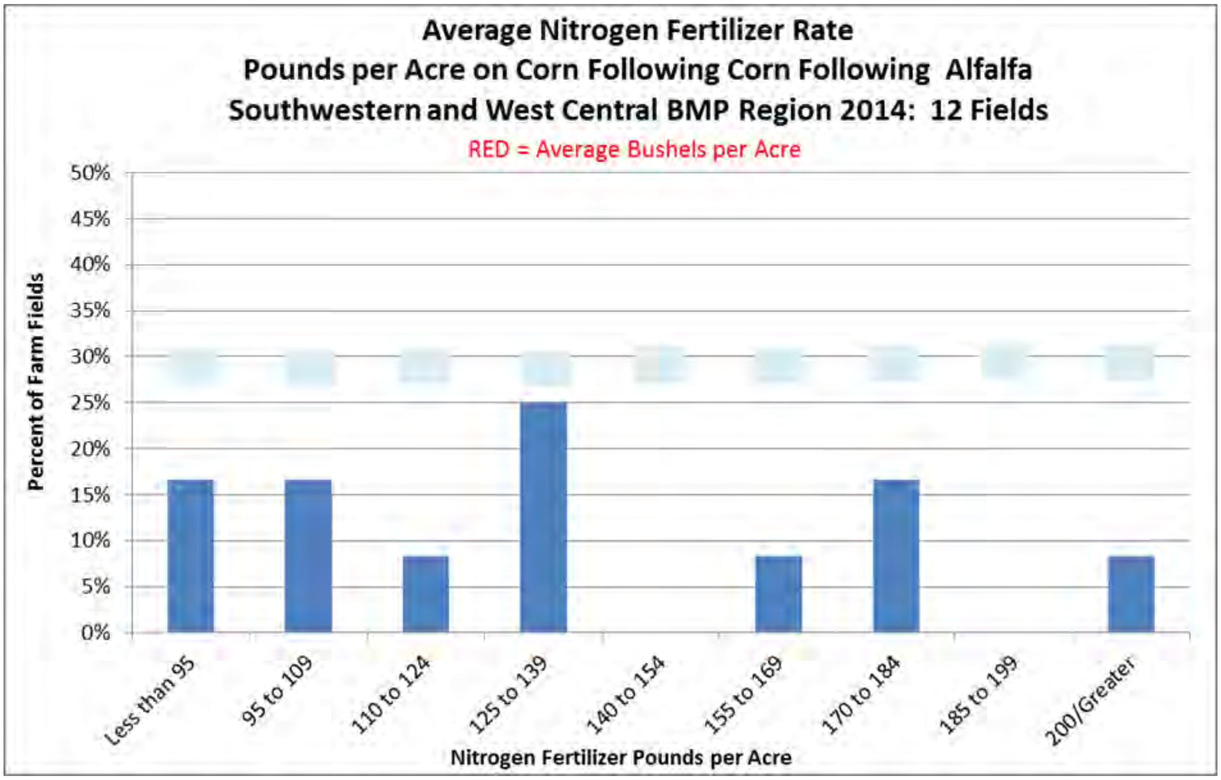


Figure 7. Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in the SW BMP region for 2014: 12 fields.

Less than five farmers reported growing corn following corn following alfalfa in the SW BMP region.

Figure 8 provides the distribution of nitrogen fertilizer rates in the IRR BMP region for corn following corn following alfalfa; the corresponding corn yields are detailed in red.

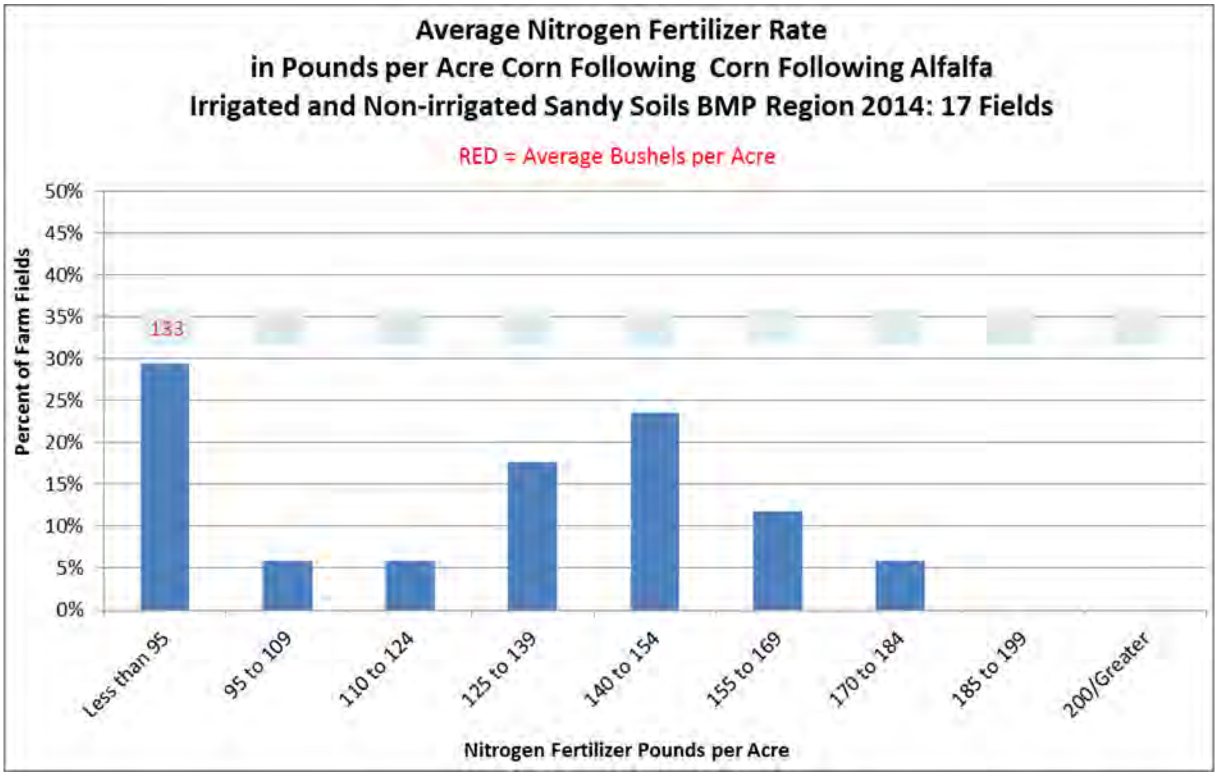


Figure 8. Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in the IRR BMP region for 2014: 17 fields.

Less than five farmers reported growing corn following corn following alfalfa in the IRR BMP region.

Figure 9 provides the distribution of nitrogen fertilizer rates in the SW BMP region for corn following alfalfa; the corresponding corn yields are detailed in red.

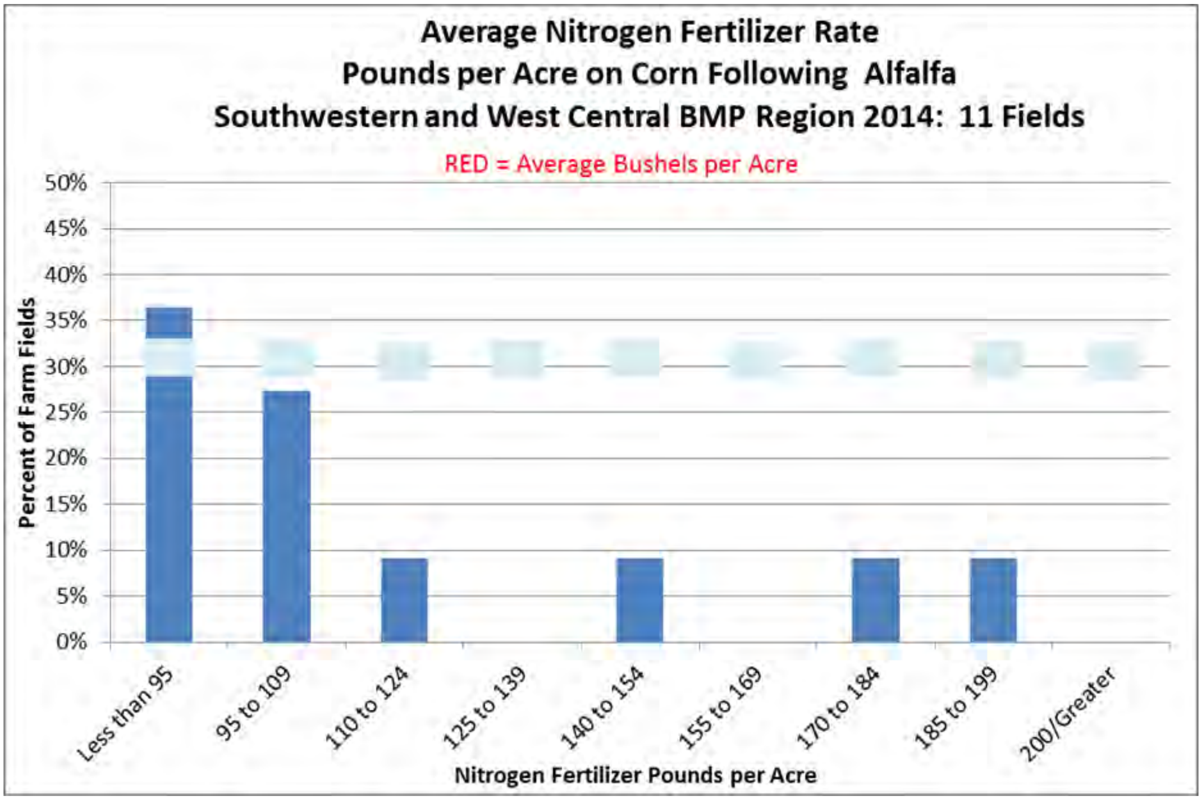


Figure 9. Average nitrogen fertilizer rates and yields on corn following alfalfa in the SW BMP region for 2014: 11 fields.

Less than five farmers reported growing corn following alfalfa in the SW BMP region.

Figure 10 provides the distribution of nitrogen fertilizer rates in the IRR BMP region for corn following alfalfa; the corresponding corn yields are detailed in red.

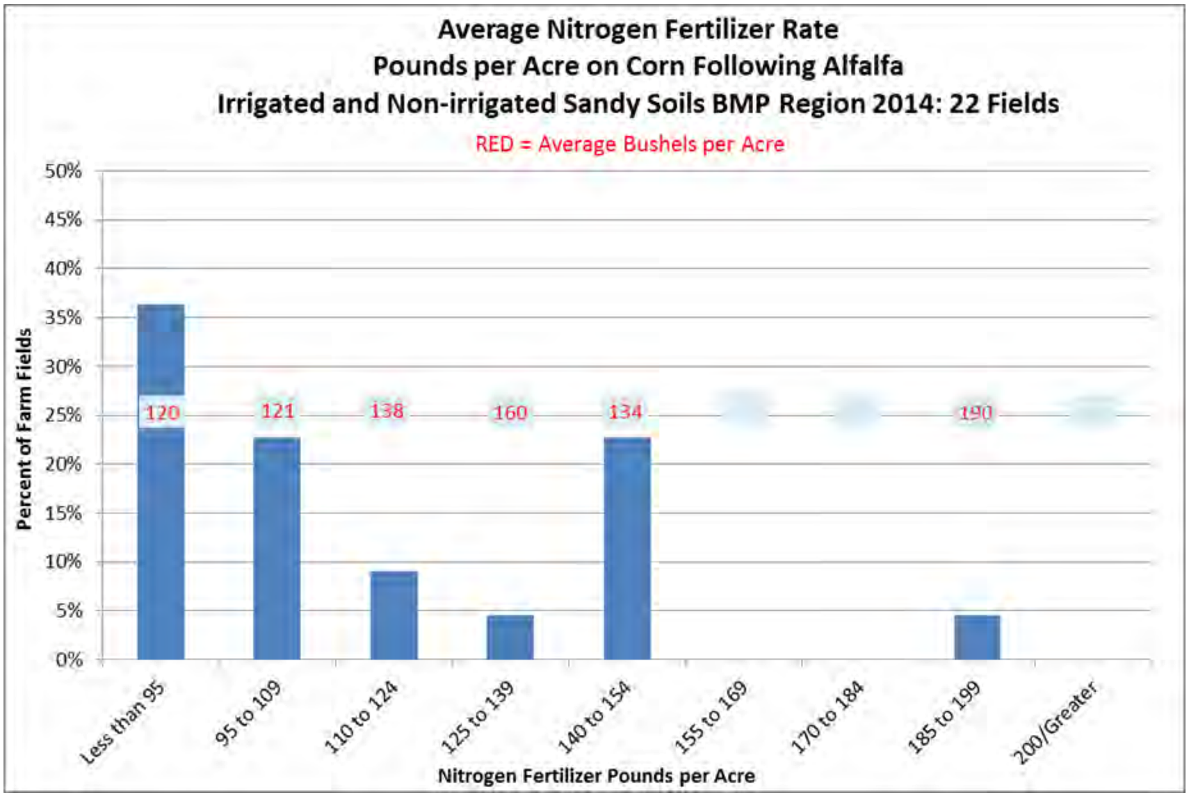


Figure 10. Average nitrogen fertilizer rates and yields on corn following alfalfa in the IRR BMP region for 2014: 22 fields.

Less than five farmers reported growing corn following alfalfa in the IRR BMP region.

Figure 11 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following small grains; the corresponding corn yields are detailed in red.

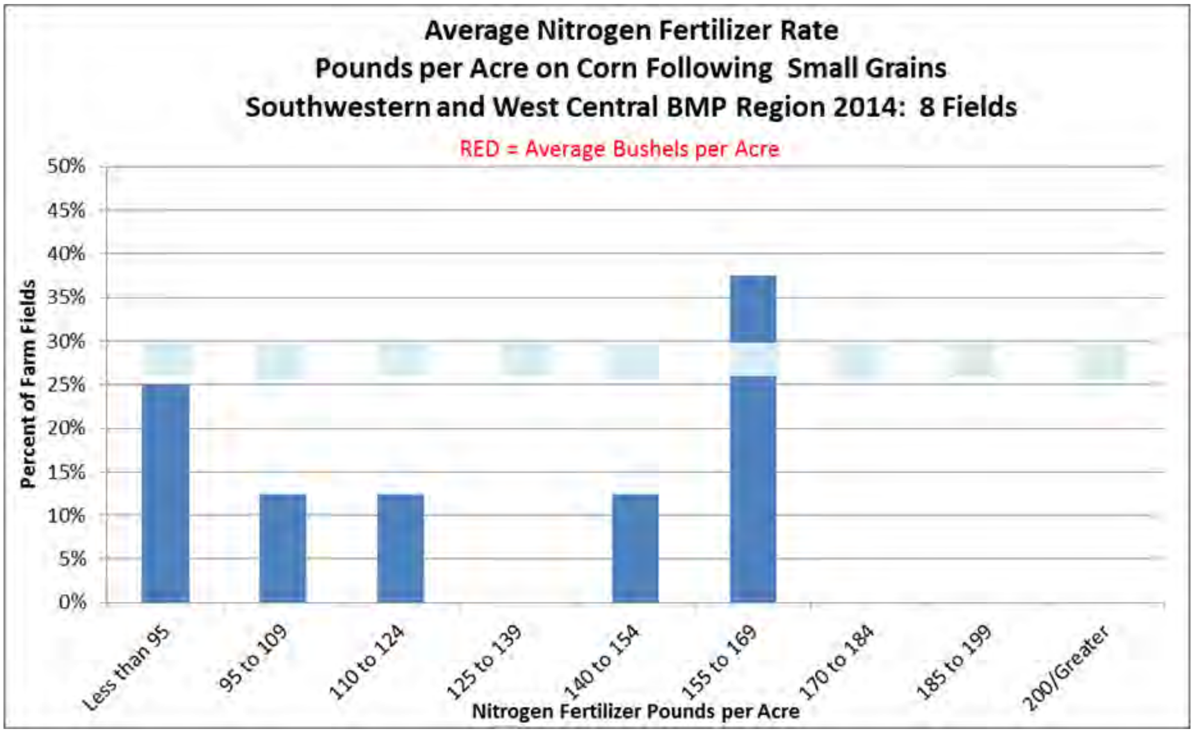


Figure 11. Average nitrogen fertilizer rates and yields on corn following small grains in the SW BMP region for 2014: 8 fields.

Less than five farmers reported growing corn following small grains in the SW BMP region.

Figure 12 details the distribution of nitrogen fertilizer rates in the IRR BMP region for corn following small grains; the corresponding corn yields are detailed in red.

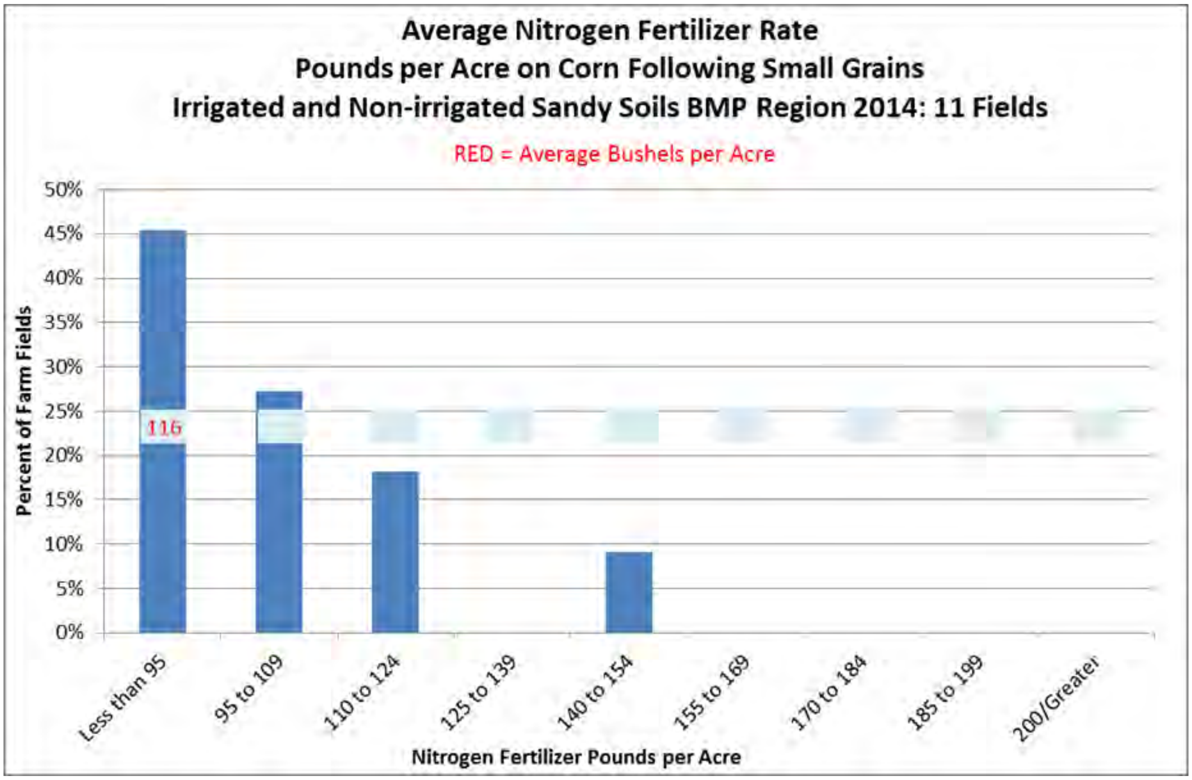


Figure 12. Average nitrogen fertilizer rates and yields on corn following small grains in the IRR BMP region for 2014: 11 fields.

Less than five farmers reported growing corn following small grains in the IRR BMP region.

Figure 13 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following other crops; the corresponding corn yields are detailed in red.

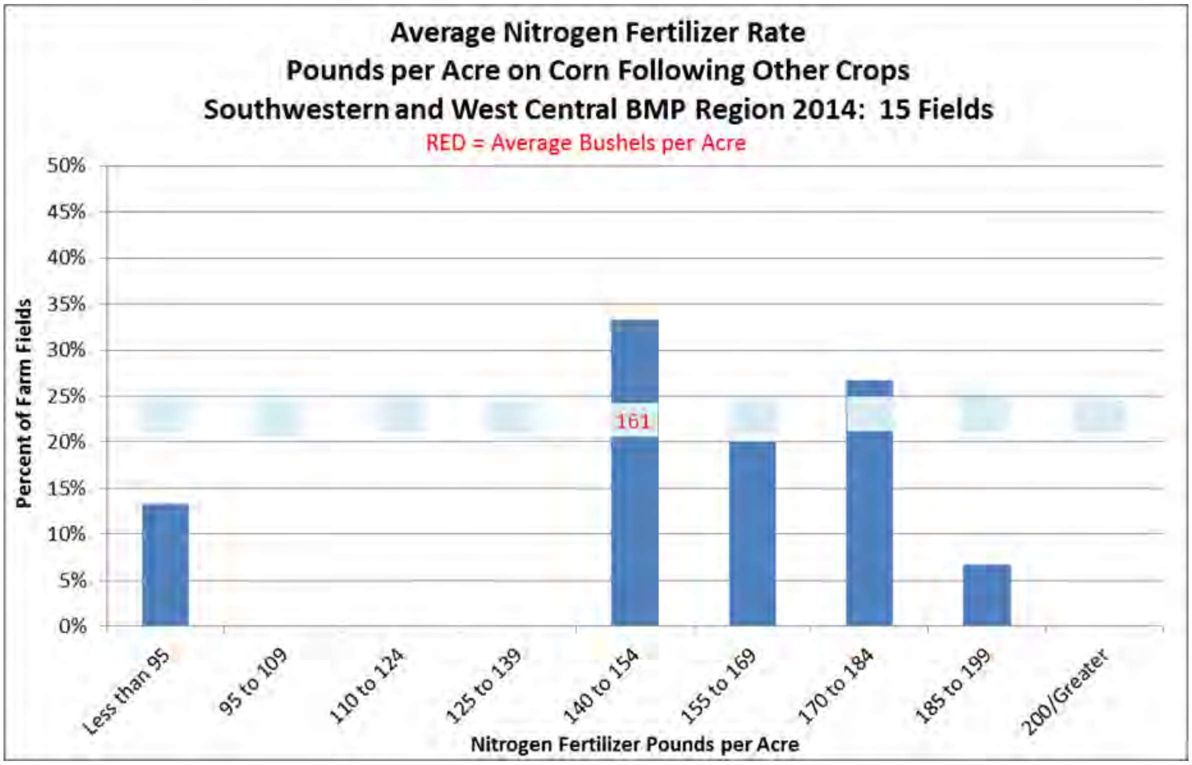


Figure 13. Average nitrogen fertilizer rates and yields on corn following other crops in the SW BMP region for 2014: 15 fields.

Less than five farmers reported growing corn following other crops in the SW BMP region.

Figure 14 details the distribution of nitrogen fertilizer rates in the IRR BMP region for corn following other crops; the corresponding corn yields are detailed in red.

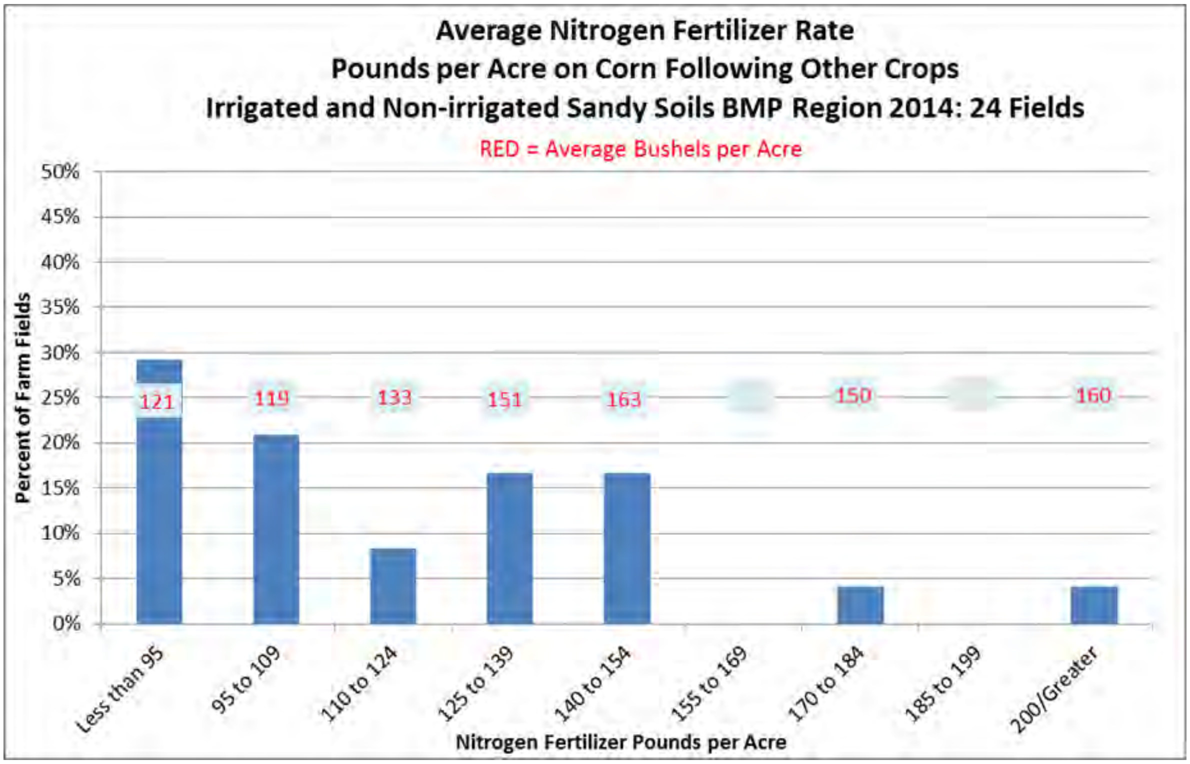


Figure 14. Average nitrogen fertilizer rates and yields on corn following other crops in the IRR BMP region for 2014: 24 fields.

Less than five farmers reported growing corn following other crops in the IRR BMP region.

Manure Section

Table 4 details the percentage of respondents on if the farmer knew the amount of nitrogen that is in the manure applied for the 2014 corn crop.

Table 4. The farmers' knowledge of nitrogen content of manure being applied for the 2014 corn crop.

BMP Region	Knowledge of the Actual Amount of Nitrogen Applied	Percentage of Respondents
Irrigated and Non-irrigated Sandy Soils	Yes	16
Irrigated and Non-irrigated Sandy Soils	No	84
Southwestern and West Central	Yes	37
Southwestern and West Central	No	63

§ Percent was calculated using only those respondents who answered yes or no to the question.

Table 5 details the nitrogen rates and corn yields in the SW BMP region and IRR BMP region on corn following various crops. These are corn fields applied with manure and commercial nitrogen fertilizer.

Table 5. Average amount of nitrogen applied from manure and commercial nitrogen fertilizer and corresponding corn yields to previous crops by BMP region.

BMP Region	Previous Crop	Average Nitrogen Rate From Manure And Commercial Fertilizer Pounds per Acre	Average Corn Yield Bushels per Acre
Irrigated and Non-irrigated Sandy Soils	Soybeans	165	158
Irrigated and Non-irrigated Sandy Soils	Corn	184	150
Irrigated and Non-irrigated Sandy Soils	Corn/Alfalfa	**	**
Irrigated and Non-irrigated Sandy Soils	Small Grains	**	`**
Irrigated and Non-irrigated Sandy Soils	Other	**	**
Southwestern and West Central	Soybeans	177	182
Southwestern and West Central	Corn	178	182
Southwestern and West Central	Corn/Alfalfa	**	**
Southwestern and West Central	Other	**	**

Table 6 details the total amount of nitrogen applied to fields from both manure and commercial nitrogen.

Table 6. Average amount of nitrogen applied to fields from both commercial fertilizer and manure.

BMP Region	Main Source of Manure	Average Nitrogen Rate From Manure And Commercial Fertilizer Pounds per Acre
Irrigated and Non-irrigated Sandy Soils	All	180
Irrigated and Non-irrigated Sandy Soils	Dairy	175
Irrigated and Non-irrigated Sandy Soils	Beef	**
Irrigated and Non-irrigated Sandy Soils	Hog	**
Irrigated and Non-irrigated Sandy Soils	Poultry	**
Irrigated and Non-irrigated Sandy Soils	Other	**
South Western and West Central	All	180
South Western and West Central	Dairy	159
South Western and West Central	Beef	198
South Western and West Central	Hog	179
South Western and West Central	Poultry	**
South Western and West Central	Other	**

Pesticide Section

Table 7 details the rates and active ingredients from pesticides applied to corn in Pesticide Management Area (PMA) 4.

Table 7. Pesticide applications and rates for corn – PMA 4

Agricultural Chemical (a.i.)	Surveyed Area Applied	Average Appli-cations	Average Rate Per Application	Average Rate Per Crop Year	Total Applied Per Crop Year[1]
	Percent	*Number*	*Pounds per Acre* (a.i.)	*Pounds per Acre* (a.i.)	*Total Pounds* (a.i.)
Herbicides					
Acetochlor	25	1.0	1.07	1.09	14,497
Atrazine	13	1.0	0.60	0.60	4,060
Clopyralid	21	1.0	0.07	0.07	833
Dicamba	7	1.0	0.27	0.27	1,010
Diflufenzopyr	4	1.0	0.05	0.05	95
Dimethenamid-p	6	1.0	0.44	0.44	1,275
Flumetsulam	21	1.0	0.03	0.03	342
Glyphosate	86	1.2	0.98	1.16	52,307
Mesotrione	18	1.0	0.10	0.10	923
S-metolachlor	21	1.0	0.96	0.97	10,747
Tembotrione	2	1.0	0.08	0.08	79
Fungicides					
Prothioconazole	7	1.0	0.09	0.09	336
Pyraclostrobin	3	1.0	0.33	0.33	444
Tebuconazole	7	1.0	0.09	0.09	336

[1] Data in this column is calculated from “raw” data and represents the total pounds of active ingredient applied to the indicated crop(s) in 2013 by survey participants in this area. Data in this table and the selection of survey participants was not statistically "weighted" in any fashion. Thus, inappropriate extrapolation of the data may over- or under-estimate the total pounds of a.i. used at the state, area or sub-area levels.

Herbicides applied but not published included the following: 2,4-D, Bromoxynil, Fluthiacet-methyl, Glufosinate-ammonium, Nicosulfuron, Pendimethalin, Primisulfuron, Saflufenacil, Topramezone, Triencarbazone-methyl
Insecticides applied but not published included the following: Bifenthrin, Chlorethoxyfos, Chlorpyrifos, Cyfluthrin, Gamma-cyhalothrin, Phostebupirim, Tefluthrin, and Terbufos.
Fungicides applied but not published included the following: Fluxapyroxad and Metconazole.

Table 8 details the rates and active ingredients from pesticides applied to soybeans in Pesticide Management Area (PMA) 4.

Table 8. Pesticide applications and rates for soybean – PMA 4

Agricultural Chemical (a.i.)	Surveyed Area Applied	Average Appli-cations	Average Rate Per Application	Average Rate Per Crop Year	Total Applied Per Crop Year[1]
	Percent	*Number*	*Pounds per Acre* (a.i.)	*Pounds per Acre* (a.i.)	*Total Pounds* (a.i.)
Herbicides					
Clethodim	9	1.0	0.06	0.06	171
Cloransulam	6	1.0	0.02	0.02	41
Fluthiacet-methyl	2	1.0	0.00	0.00	2
Fomesafen	7	1.0	0.16	0.16	323
Glufosinate-ammonium	2	1.7	0.37	0.64	356
Glyphosate	92	1.5	0.95	1.47	42,505
Imazethapyr	9	1.0	0.03	0.03	100
Sulfentrazone	11	1.0	0.14	0.14	520
Insecticides					
Bifenthrin	8	1.0	0.08	0.08	185
Chlorpyrifos	13	1.1	0.37	0.41	1,730
Esfenvalerate	2	1.0	0.03	0.03	19
Lambda-cyhalothrin	21	1.1	0.02	0.02	143
Thiamethoxam	1	1.0	0.03	0.03	14
Fungicide					
Pyraclostrobin	6	1.0	0.09	0.09	174

[1] Data in this column is calculated from "raw" data and represents the total pounds of active ingredient applied to the indicated crop(s) in 2013 by survey participants in this area. Data in this table and the selection of survey participants was not statistically "weighted" in any fashion. Thus, inappropriate extrapolation of the data may over- or under-estimate the total pounds of a.i. used at the state, area or sub-area levels.

Herbicides applied but not published included the following: Chlorimuron, Dimethenamid-p, Fluazifop, Flumiclorac, Lactofen, Metribuzin, S-metolachlor, Saflufenacil, Thifensulfuron, and Trifluralin.
Insecticides applied but not published included the following: Beta-cyfluthrin, Gamma-cyhalothrin, Imidacloprid, and Zeta-cypermethrin.
Fungicides applied but not published included the following: Fluoxastrobin, Propiconazole, Tetraconazole, and Trifloxystrobin.

Table 9 details the rates and active ingredients from pesticides applied to wheat in Pesticide Management Area (PMA) 4.

Table 9. Pesticide applications and rates for wheat – PMA 4

Agricultural Chemical (a.i.)	Surveyed Area Applied	Average Appli-cations	Average Rate Per Application	Average Rate Per Crop Year	Total Applied Per Crop Year[1]
	Percent	*Number*	*Pounds per Acre* (a.i.)	*Pounds per Acre* (a.i.)	*Total Pounds* (a.i.)
Herbicides					
2,4-D	8	1.0	0.43	0.45	447
Bromoxynil	65	1.0	0.19	0.19	1,552
Clopyralid	15	1.0	0.09	0.09	162
Dicamba	5	1.0	0.07	0.07	40
Fenoxaprop	13	1.0	0.07	0.07	127
Fluroxypyr	17	1.0	0.09	0.09	190
Glyphosate	12	1.0	0.70	0.70	1,050
MCPA	22	1.0	0.27	0.29	813
Pyrasulfotole	44	1.0	0.03	0.03	167
Fungicides					
Pyraclostrobin	18	1.0	0.06	0.06	134

[1] Data in this column is calculated from "raw" data and represents the total pounds of active ingredient applied to the indicated crop(s) in 2013 by survey participants in this area. Data in this table and the selection of survey participants was not statistically "weighted" in any fashion. Thus, inappropriate extrapolation of the data may over- or under-estimate the total pounds of a.i. used at the state, area or sub-area levels.

Herbicides applied but not published included the following: Florasulam, Flucarbazone, Pinoxaden, Pyroxsulam,Thifensulfuron, and Tribenuron.
Insecticides applied but not published included the following: Chlorpyrifos and Gamma-cyhalothrin.
Fungicides applied but not published included the following: Azoxystrobin, Fluoxastrobin, Metconazole, Propiconazole, Prothioconazole, Tebuconazole, and Trifloxystrobin.

Table 10 details the rates and active ingredients from pesticides applied to hay in Pesticide Management Area (PMA) 4.

Table 10. Pesticide applications and rates for hay – PMA 4

Agricultural Chemical (a.i.)	Surveyed Area Applied	Average Appli-cations	Average Rate Per Application	Average Rate Per Crop Year	Total Applied Crop Year[1]
		Number	*Pounds per Acre* (a.i.)	*Pounds per Acre* (a.i.)	*Total Pounds* (a.i.)
Herbicide					
Glyphosate	1	1.0	0.95	0.95	251
Insecticide					
Chlorpyrifos	2	1.0	0.27	0.27	168
Lambda-cyhalothrin	3	1.0	0.02	0.02	11

[1] Data in this column is calculated from "raw" data and represents the total pounds of active ingredient applied to the indicated crop(s) in 2013 by survey participants in this area. Data in this table and the selection of survey participants was not statistically "weighted" in any fashion. Thus, inappropriate extrapolation of the data may over- or under-estimate the total pounds of a.i. used at the state, area or sub-area levels.

Herbicides applied but not published included the following: 2,4-D, Aminopyralid, Imazamox, Imazethapyr, Pendimethalin, and Picloram.
Insecticides applied but not published included the following: Gamma-cyhalothrin.
Fungicides applied but not published included the following: Pyraclostrobin.

DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

July 20, 2018

Scott Henderson
Sauk River Watershed District Administrator
524 4th Street South
Sauk Centre, MN 56378

Dear: Scott Henderson

Subject: Initial Comment Letter – Sauk River One Watershed, One Plan

Thank you for the opportunity to submit comments regarding water management issues for consideration in the 1W1P planning process for the Sauk River Watershed Planning Area. Our agency looks forward to working closely with the local government units, stakeholders, and other agency partners on this watershed planning initiative.

The Minnesota Department of Health's (MDH) mission is to protect, maintain, and improve the health of all Minnesotans. An important aspect to protecting citizens health is the protection of drinking water sources. MDH is the agency responsible for implementing programs under the federal Safe Drinking Water Act (SDWA).

Source Water Protection (SWP) is the framework MDH uses to protect drinking water sources. The broad goal of SWP in Minnesota is to protect and prevent contamination of public and private sources of groundwater and surface water sources of drinking water using best management practices and local planning. Core MDH programs relevant to watershed planning are the State Well Code (MR 4725), Wellhead Protection (MR 4720) and surface water / intake protection planning resulting in a strong focus in groundwater management and protecting drinking water sources.

One of the three high level state priorities in Minnesota's Nonpoint Priority Funding Plan is to "Restore and protect water resources for public use and public health, including drinking water" which aligns with our agency's mission and recommendations to your planning process.

<u>MDH Priority Concerns:</u>

Prioritize Drinking Water Supply Management Areas in the *Name of* Watershed 1W1P.

DWSMA boundaries establish a protection area through an extensive evaluation that determines the contribution area of a public water supply well, aquifer vulnerability and provide an opportunity to prioritize specific geographic areas for drinking water protection purposes. DWSMA boundaries that extend beyond city jurisdictional limits or are established in WHP Action Plans for nonmunicipal public water supplies like mobile home parks can be a special focus for local partners prioritizing drinking water protection activities.

Aquifer vulnerability determines the level of management required to protect a drinking water supply and provides an opportunity to target implementation practices in accordance with the level of risk different land uses pose. The attached Public Water Supply Summary Spreadsheet highlights the primary drinking water protection activities for many DWSMAs in the watershed.

Prioritize Sealing Abandoned Wells

Unused, unsealed wells can provide a conduit for contaminants from the land surface to reach the sources of drinking water. This activity is particularly important for abandoned wells that penetrate a confining layer above a source aquifer.

Sealing wells is a central practice in protecting groundwater quality, however when resource dollars are limited it is important to evaluate private well density to identify the populations most at risk from a contaminated aquifer.

Prioritize Protection of Private Wells

Many residents of the Sauk River Watershed rely on a private well for the water they drink. However, no public entity is responsible for water testing or management of a private well after drilling is completed. Local governments are best equipped to assist private landowners through land use management and ordinance development, which can have the greatest impact on protecting private wells. Other suggested activities to protect private wells include: hosting well testing or screening clinics, providing water testing kits, working with landowners to better manage nutrient loss, promoting household hazardous waste collection, managing storm water runoff, managing septic systems, and providing best practices information to private well owners.

Targeting Groundwater & Drinking Water Activities in the 1W1P Planning Process

Limitation of Existing Tools –

Watershed models used for prioritizing and targeting implementation scenarios in the One Watershed One Plan (1W1P), whether PTMapp, HSPF-Scenario Application Manager (SAM) or others, leverage GIS information and/or digital terrain analysis to determine the flow paths of runoff across the landscape and the pour points where concentrated flow reaches surface water features. While this is an effective approach for targeting surface water contaminates, it does not transfer to groundwater concerns because it only accounts for the movement of water on the land's surface. Unfortunately, targeting tools are not currently available to model the impact on groundwater resources. The Minnesota Department of Health suggests using methodologies applied by the agency to prioritize and target implementation activities in the Source Water Protection program.

Using the Groundwater Restoration and Protection Strategies (GRAPS) Report –

The MDH, along with its state agency partners, are developing a Groundwater Restoration and Protection Strategies (GRAPS) report for the *Name of watershed*. GRAPS will provide information and strategies on groundwater and drinking water supplies to help inform the local decision making process of the 1W1P. Information in a GRAPS Report can be used to identify risks to drinking water from different land uses. Knowing the risks to drinking water in a specific area allows targeting of specific activities.

- Prioritize Actions Identified in the Groundwater Restoration and Protection Strategies (GRAPS) report.

- Target private wells by evaluating the vulnerability of the upper most aquifers to determine the areas within the watershed most at risk from different land uses. Geologic atlases provide this information where available, as well as the statewide geomorphology layer, or the DNR's statewide aquifer sensitivity layer.

Using Wellhead Protection Plans –

- Identify Drinking Water Supply Management Areas (DWSMA) located in the watershed.
- Examine the vulnerability of the aquifer to contamination risk to determine the level of management required to protect groundwater quality. For example, a highly vulnerable setting requires many different types of land uses to be managed, whereas a low vulnerability setting focuses on a few land uses due to the long recharge time and protective geologic layer.
- Use the Management Strategies Table in a Wellhead Protection Plan to identify and prioritize action items for each DWSMA

Attached you will find a listing of the data and information MDH can provide to help you in the planning process. Thank you for the opportunity to be involved in your watershed planning process. If you have any questions, please feel free to contact me at (320)223-7322 or karen.s.voz@state.mn.us.

Sincerely,

Karen Voz, Principal Planner
Minnesota Department of Health
Source Water Protection Unit
3333 W Division Street
St. Cloud, MN 56375

Attachments

CC: John Woodside, Area Hydro, MDH Source Water Protection Unit
Carrie Raber, MDH Source Water Protection Unit
Derek Richter, MDH Source Water Protection Unit
Chris Elvrum, MDH Well Management Section

Jason Weinerman, BWSR Board Conservationist

Brad Wozney, BWSR Clean Water Specialist

Craig Willis, DNR Area Hydrologist

Anna Bosch, MPCA North Central Watershed

Ryan Lemickson, MDA Soil Scientist

<u>Data and information MDH can provide:</u>

- Drinking Water Statistics – Where do people get their drinking water in the Sauk River Watershed? Approximately 60 percent obtain their drinking water from groundwater and 40 percentage from surface water sources. This information can help you understand where people are obtaining their drinking water and develop implementation strategies to protect the sources of drinking water in the watershed.

- A spreadsheet of the public water supply systems in the watershed, status in wellhead protection planning, and any drinking water protection concerns or issues that have been identified in protection areas. This information can help you understand the drinking water protection issues in the watershed, prioritize areas for implementation activities, and identify potential multiple benefits for implementation activities.

- Shape files of the Drinking Water Supply Management Areas (DWSMA) in the watershed are located at http://www.health.state.mn.us/divs/eh/water/swp/maps/index.htm. This information can help you prioritize and target implementation activities that protect drinking water sources for public water supplies.

Information in GRAPS Reports

- A figure detailing the "Pollution Sensitivity of the Upper Most Aquifer" in the Sauk River Watershed. This information can help you understand the ease with which recharge and contaminants from the ground surface may be transmitted into the upper most aquifer on a watershed scale. Individual wellhead protection areas provide this same information on a localized scale. This is turn can be used to prioritize areas and implementation activities.

- A figure detailing "Pollution Sensitivity of Wells" in the Sauk River Watershed. This information can help you understand which wells in the watershed are most geologically sensitive based on the vulnerability of the aquifer in which the well is completed. This information allows for targeting of implementation activities to the sources of water people are drinking.

- A figure detailing "Pollution Sensitivity of Wells and Nitrate Results" in the Sauk River Watershed Underlain by Geologic Sensitivity Ratings from Wells. This information takes what we know about the sensitivity of wells to contamination and combines it with nitrate results to highlight areas of the watershed where there is known nitrate contamination of the water people are drinking. This figure can help prioritize implementation activities aimed at reducing nitrate levels in the sources of drinking water.

- A figure detailing "Arsenic Results" in the Sauk River Watershed Underlain by Geologic Sensitivity Ratings from Wells. This information can help you understand which wells in the watershed contain elevated arsenic levels.

Prioritize Protecting Noncommunity Public Water Supplies

Noncommunity public water supplies provide drinking water to people at their places of work or play (schools, offices, campgrounds, etc.). Land use and management activities should consider effects on these public water systems. Find information regarding noncommunity public water supplies in the watershed in reports titled Source Water Assessments at http://www.health.state.mn.us/divs/eh/water/swp/index.htm#swa

Source Water Assessments provide a concise description of the water source - such as a well, lake, or river - used by a public water system and discuss how susceptible that source may be to contamination.

Prioritize Drinking Water Supply Management Areas impacted by nitrate.

Prioritize these protection areas for working with landowners on nutrient management and other sources of nitrogen.

Support the development and implementation of comprehensive source water protection plans for the public water supply systems using surface water in the watershed.

Surface water based drinking water systems are highly susceptible to potential contamination. Recognizing those surface water bodies that are sources of drinking water in the watershed is very important. Prioritize management activities to protect and restore drinking water sources.

Prioritize protection activities in highly vulnerable DWSMAs where there are not currently water quality impacts to drinking water aquifers.

Maintaining aquifers with good water quality is a worthwhile investment. Promote management activities that reduce or minimize the risk potential contaminants or land uses may pose to the aquifer.

Sauk River Watershed Public Water Supplies -
Drinking Water Protection Concerns for Quality & Quantity

Source Water Risk	Name	County	HUC 10	Drinking Water Source	WHP/Surface Intake Plan	DWSMA Vulnerability/Surface Water Source	Drinking Water Protection Concerns
Very high potential contaminant risk due to surface water source and/or connection with surface water - Focus on impacts from land use practices and surface water runoff							
	Sauk Centre	Stearns	Upper Sauk	groundwater	yes	High with a SWCA	
	St. Joseph	Stearns	Lower Sauk	groundwater	yes	High with a SWCA	
	New Munich	Stearns	Middle Sauk	groundwater	yes	High with a SWCA	
	EdenValley/Watkins	Stearns/ Meeker	Lower Sauk	groundwater	yes	High with a SWCA	
	Cold Spring	Stearns	Lower Sauk	groundwater	yes	High with a SWCA	Nitrates exceeding MCL of 10 ppm.
	Sartell	Stearns	Lower Sauk	groundwater	yes	High with a SWCA	
High potential contaminant risk - Focus on potential land use contaminant sources that may impact water quality							
	Roscoe	Stearns	Lower Sauk	groundwater	yes	High,moderate & low	
	Pilgrims Pride	Stearns	Lower Sauk	groundwater	yes	High	
	Coldspring	Stearns	Lower Sauk	groundwater	yes	High	
	Melrose	Stearns	Middle Sauk	groundwater	yes	High and low	Elevated nitrates in 1 well.
	Waite Park	Stearns	Lower Sauk	groundwater	yes	High,moderate,low	
	Rockville	Stearns	Lower Sauk	groundwater	yes	High and moderate	
	Richmond	Stearns	Lower Sauk	groundwater	yes	High	
	St. Martin	Stearns	Middle Sauk	groundwater	yes	High,moderate	
Low potential contaminant risk - Focus on sealing of unused wells and old public water supply wells (funding available from MDH)							
	Freeport	Stearns	Middle Sauk	groundwater	yes	Low	
	Albany	Stearns	Middle Sauk	groundwater	yes	Low	
	St. Andrews	Stearns	Middle Sauk	groundwater	yes	Moderate	
	Grey Eagle	Todd	Adley Creek	groundwater	yes	Low	
	Carlos	Douglas	Headwaters	groundwater	yes	Low	
	Osakis	Douglas	Headwaters	groundwater	yes	Low	
	Grove Place Apt.	Stearns	Middle Sauk	groundwater	yes	Moderate	

14 Vulnerable Community, 5 low vulnerable Community , 2 Non-Municipal Public Water Supplier in HUC 10 Subwatersheds
243 Non-Community Public Water Suppliers

Acronyms:
SWCA=Surface Water Contribution Area
DWSMA=Drinking Water Supply Management Area
WHP=Wellhead Protection Plan

MINNESOTA POLLUTION
CONTROL AGENCY

Brainerd Office | 7678 College Road | Suite 105 | Baxter, MN 56425 | 218-828-2492
800-657-3864 | Use your preferred relay service | info.pca@state.mn.us | Equal Opportunity Employer

July 30, 2018

Scott Henderson, District Administrator
Sauk River Watershed District
524 4th Street South
Sauk Centre, MN 56378

Dear Mr. Henderson,

The Minnesota Pollution Control Agency (MPCA) is pleased to provide priority concerns for consideration in the development of the Sauk River Watershed (SRW) One Watershed One Plan. MPCA has contributed significant time and resources assisting our partners in addressing water quality issues in the SRW. We would invite you to consider the following reports and studies during 1W1P development.

Sauk River Monitoring and Assessment Report (2011) – Summary of 2008/2009 intensive watershed monitoring efforts. https://www.pca.state.mn.us/sites/default/files/wq-ws3-07010202b.pdf

Sauk River Stressor ID (2012) - This report summarizes and evaluates factors, natural and human, which are likely responsible for the impaired condition of the fish and macroinvertebrate communities. A thorough description of the natural features and processes occurring in the watershed and the extent of various human activity throughout the watershed that may have potential to degrade streams, rivers, and lakes. https://www.pca.state.mn.us/sites/default/files/wq-iw8-38n.pdf

Sauk River WRAPS (2015) – High level summary of past assessment and diagnostic work and outlines ways to prioritize actions and strategies for continued implementation- specifically, see Section 3, and Table 18. https://www.pca.state.mn.us/sites/default/files/wq-ws4-08a.pdf

Sauk River Bacteria and Nutrients TMDL (2017) – E. coli TMDL study for Ashley, Adley and Stoney Creeks, and Sauk River from Getchell Creek to State Highway 23, and nutrient TMDL for Maple, Little Sauk, Guernsey, Juergens, Westport, Sand, Henry, Uhlenkolts and McCormic lakes.
https://www.pca.state.mn.us/sites/default/files/wq-iw8-47e.pdf

Sauk River Watershed Pollutant Source Assessment and Evaluation of Resource Management Scenarios (2014) The Sauk River HSPF model was used to complete a pollutant source assessment for the Sauk River Watershed District (SRWD) and evaluate potential pollutant load reductions to surface waters under multiple resource management scenarios.
https://www.pca.state.mn.us/sites/default/files/wq-iw8-38p.pdf

Turbidity TMDL for Stony, Un-named and Getchell Creek (2010) - Un-named Creek was included on Minnesota's 2008 303(d) list for excess turbidity. Neither Stony nor Getchell Creeks are currently on this list but were included in this document for turbidity assessment due to the significant proportion of loading into the Sauk River from these two watersheds. However, the furthest downstream reach of Stony will be added to the 2020 Impaired Waters list for Total Suspended Solids, as Turbidity is no longer used as the standard. https://www.pca.state.mn.us/water/tmdl/getchel-unnamed-stoney-gus-turbidity-tmdl-project

Pearl Lake and Mill Creek TMDL (2012) - Mill Creek is impaired for Escherichia coli bacteria. Pearl Lake is a shallow, eutrophic lake approximately 750 acres in size, with a maximum depth of 18.2 feet and is impaired for Nutrient/Eutrophication Biological Indicators. Mill Creek flows through Pearl Lake.
https://www.pca.state.mn.us/water/tmdl/mill-creek-bacteria-and-pearl-lake-nutrients-tmdl-project

Draft Sauk River Chain of Lakes & Eden Valley Creek Subwatershed TMDL (2014)
https://www.pca.state.mn.us/water/tmdl/sauk-river-horseshoe-chain-lakes-excessive-nutrients-tmdl-project

Draft Osakis Lake Area Excess Nutrients TMDL Report original 2013. Revised 2016- The original TMDL was approved by EPA in 2013 for excess nutrient impairments in three lakes: Lake Osakis, Smith Lake and Faille Lake. Since then, it was determined that the receiving water for the city of Osakis Wastewater Treatment Facility is a wetland, and not a lake, so the load allocation had to be revised for Faille Lake.
https://www.pca.state.mn.us/water/tmdl/lake-osakis-watershed-excess-nutrients-tmdl-project

Sauk Lake -North Bay TMDL (2013) & **Sauk Lake -Southwest Bay TMDL** (2016) - In 2004, Sauk Lake was placed on the list of impaired waters after being identified as impaired by excessive nutrients. In 2008, after different water quality standards were set for deep and shallow lakes, it was decided to split Sauk Lake into two bodies of water separated by State Highway 71, which crosses a natural narrow. For the upstream and larger lake, Sauk Lake (North Bay), classified as a deep lake, the MPCA completed a TMDL report in 2013, which received EPA approval in 2013 as well. A second TMDL for Sauk Lake (Southwest Bay), classified as a shallow lake, was completed in 2016, and approved by EPA in 2017.
https://www.pca.state.mn.us/water/tmdl/sauk-lake-nutrients-tmdl-project

The following table lists streams that are identified as resource concerns per the 2018 Impaired Waters 303(d) list and the far right column lists the corresponding issues affecting them:

Water body name	AUID	Water body description	Water body type	Pollutant or stressor
Sauk River	07010202-501	Mill Cr to Mississippi R	Stream	Nutrient/eutrophication biological indicators
Ashley Creek	07010202-503	Headwaters to Sauk Lk	Stream	Aquatic macroinvertebrate bioassessments
				Fishes bioassessments
				Escherichia coli
				Dissolved oxygen
Sauk River	07010202-505	Adley Cr to Getchell Cr	Stream	Aquatic macroinvertebrate bioassessments
Sauk River	07010202-505	Adley Cr to Getchell Cr	Stream	Fishes bioassessments
				Escherichia coli
	07010202-506	Melrose Dam to Adley Cr	Stream	Fishes bioassessments
	07010202-507	Sauk Lk to Melrose Dam	Stream	Fishes bioassessments
	07010202-508	Getchell Cr to State Hwy 23	Stream	Escherichia coli
	07010202-517	Knaus Lk to Cold Spring Dam	Stream	Nutrient/eutrophication biological indicators
	07010202-520	Cold Spring WWTP to Mill Cr	Stream	Aquatic macroinvertebrate bioassessments
				Fishes bioassessments
County Ditch 6	07010202-521	Unnamed cr to Ashley Cr	Stream	Aquatic macroinvertebrate bioassessments
				Fishes bioassessments
Adley Creek	07010202-527	Sylvia Lk to Sauk R	Stream	Escherichia coli
Stony Creek	07010202-541	Headwaters (Unnamed lk 73-0261-00) to Sauk R	Stream	Escherichia coli

Water body name	AUID	Water body description	Water body type	Pollutant or stressor
Unnamed creek	07010202-542	Unnamed cr to Sauk R	Stream	Escherichia coli
				Turbidity
Eden Lake Outlet	07010202-545	Headwaters (Eden Lk 73-0150-00) to Browns Lk	Stream	Aquatic macroinvertebrate bioassessments
				Fishes bioassessments
				Escherichia coli
				Dissolved oxygen
Unnamed creek	07010202-550	Unnamed cr to Vails (Mud) Lk	Stream	Escherichia coli
Crooked Lake Ditch	07010202-552	Unnamed cr to Lk Osakis	Stream	Escherichia coli
				Aquatic macroinvertebrate bioassessments
Unnamed creek	07010202-554	Unnamed cr to Unnamed cr	Stream	Aquatic macroinvertebrate bioassessments
Unnamed creek	07010202-556	Unnamed cr to Sauk R	Stream	Aquatic macroinvertebrate bioassessments
				Fishes bioassessments
Getchell Creek (County Ditch 26)	07010202-562	Unnamed cr to Sauk R	Stream	Escherichia coli
				Aquatic macroinvertebrate bioassessments
Unnamed creek (Cold Spring Creek)	07010202-567	T123 R30W S15, west line to Sauk R	Stream	Escherichia coli
Kolling Creek	07010202-575	Unnamed cr to Becker Lk	Stream	Dissolved oxygen
Unnamed creek	07010202-592	Headwaters to Sauk R	Stream	Fishes bioassessments
Unnamed creek	07010202-598	Unnamed ditch to Unnamed cr	Stream	Aquatic macroinvertebrate bioassessments
Unnamed creek	07010202-615	Unnamed cr to Getchell Cr	Stream	Escherichia coli
Unnamed creek	07010202-616	Unnamed cr to Schneider Lk	Stream	Dissolved oxygen
Unnamed creek	07010202-660	Unnamed cr to Sauk R	Stream	Aquatic macroinvertebrate bioassessments
Unnamed creek	07010202-660	Unnamed cr to Sauk R	Stream	Fishes bioassessments
Unnamed creek	07010202-662	Unnamed cr to Sauk R	Stream	Fishes bioassessments
Unnamed creek	07010202-663	Unnamed cr to Unnamed cr	Stream	Aquatic macroinvertebrate bioassessments
Unnamed ditch	07010202-665	Headwaters to Pearl Lk	Stream	Escherichia coli
Unnamed ditch	07010202-666	Unnamed cr to Sauk Lk	Stream	Aquatic macroinvertebrate bioassessments
				Fishes bioassessments
Sauk River	07010202-673	Juergens Lk to Sauk Lk	Stream	Fishes bioassessments
				Dissolved oxygen
Mill Creek	07010202-674	Headwaters (Goodners Lk 73-0076-00) to Pearl Lk	Stream	Aquatic macroinvertebrate bioassessments
				Fishes bioassessments
				Escherichia coli
Mill Creek	07010202-676	Pearl Lk to Sauk R	Stream	Fecal Coliform

TMDL completed; TMDL needed

As a result of deferred assessments during the 2010 cycle that were assessed in the spring of 2018, 21 stream reaches will have new or additional impairments on the 2020 Impaired Waters List. These reaches are not included above.

The following table lists lakes that are identified as resource concerns per the 2018 Impaired Waters 303(d) list and the far right column lists the corresponding issues affecting them:

Water body name	AUID	Water body type	Pollutant or stressor
Smith	21-0016-00	Lake	Nutrient/eutrophication biological indicators
Westport	61-0029-00	Lake	

Water body name	AUID	Water body type	Pollutant or stressor
Pearl	73-0037-00	Lake	Nutrient/eutrophication biological indicators
Goodners	73-0076-00	Lake	
Schneider	73-0082-00	Lake	
Great Northern	73-0083-00	Lake	
Knaus	73-0086-00	Lake	
Krays	73-0087-00	Lake	
Bolfing	73-0088-00	Lake	
Zumwalde	73-0089-00	Lake	
Cedar Island (Main Bay)	73-0133-01	Lake	
Cedar Island (Koetter Lk)	73-0133-03	Lake	
Long	73-0139-00	Lake	
North Brown's	73-0147-00	Lake	
Eden	73-0150-00	Lake	
Vails	73-0151-00	Lake	
Horseshoe	73-0157-00	Lake	
Sand	73-0199-00	Lake	
Uhlenkolts	73-0208-00	Lake	
Maria	73-0215-00	Lake	
Henry	73-0237-00	Lake	
Ellering	73-0244-00	Lake	
McCormic	73-0273-00	Lake	
Sauk (Southwest Bay)	77-0150-01	Lake	
SAUK (NORTH BAY)	77-0150-02	Lake	
Juergens	77-0163-00	Lake	
Little Sauk	77-0164-00	Lake	
Maple	77-0181-00	Lake	
Guernsey	77-0182-00	Lake	
Faille	77-0195-00	Lake	
Osakis	77-0215-00	Lake	

TMDL pending ; TMDL completed; TMDL needed

While the above tables identify specific waterbodies, the table below illustrates concerns per the ten Management Units identified by the Sauk River Watershed District in 2003. This table, as well as further discussion relating to these concerns, can be found in the 2012 Stressor ID report.

	Lake Osakis Minor	Sauk Lake Minor	Adley Creek Minor	Center Sauk River Minor	GUS Plus Minor	St Roscoe Minor	Chain of Lakes Minor	Cold Spring Minor	Grand Pearl Minor	Mini Metro Minor
Daily Dissolved Oxygen Minimum DO readings often below the 5mg/L standard. Daily Flux also indicates increased nutrient enrichment	X	X					X	X	X	
Increased bedded sediment in stream bed Bedded sediment fills the spaces between gravel and covers the coarse substrate. This leads to loss of gravel dwelling species of fish and macroinvertebrate species	X	X		X	X	X		X		
Elevated nutrients Increased plant growth leads to increased DO consumption during periods of decomposition and respiration	X	X	X	X	X	X	X	X	X	X
Altered Hydrology/Channelization Change in hydrology – altered flow rates	X	X	X	X	X	X	X	X	X	X
Lack of woody habitat Woody habitat provides food and cover for a variety of fish and macroinvertebrates. Lack of this habitat type reduces abundance of various species.	X	X		X	X					
Connectivity Loss of movement by fish species due to physical barriers (impoundments/improper placement of culverts)		X		X						
Elevated Total Suspended Sediment (TSS) Elevated TSS concentrations affect the gills of fish and macroinvertebrates, reducing their ability to uptake DO from the water.		X			X					

Based on the listed impairments and identified stressors, the following issues should be addressed as part of the 1W1P:

Manure and livestock management- Direct access of cattle to the Sauk River tributaries is causing loss of habitat, increased nutrient concentrations, and increased fine sediment transport that are filling coarse substrate for fish and macroinvertebrates. In the Sauk River Bacteria and nutrient TMDL, livestock were found to be the largest producer of bacteria in the impaired reach watersheds. Implementation activities should focus on limiting cattle access to the impaired reaches and their tributaries, and buffering runoff from pastures near streams and waterways.

Manage for altered hydrology- ditches carry nutrients and excess water through the system faster than historically (before ditching). There is also very little water storage in the watershed as a large percentage of wetlands have been drained. Changes in the delivery and rate of water through the ditch system are causing increased peak flows and reduced base flows in area streams. Many of the ditches in the watershed do not have adequate buffering and fine material is being transported through bank failures and row crop farming that is occurring next to the ditches. Wetland restoration along with buffering of ditches would reduce the peak discharge and also help stabilize the ditch banks, reducing the amount of available fine material entering the streams. Tiling is another drainage practice which is becoming more prevalent in agricultural areas as it is associated with yield increases. Although data indicates that this practice does in fact decrease Total Suspended Solids (TSS) as minimal topsoil erosion occurs, nitrate levels have been found to be higher at tile outlets, in instances where nitrogen has been applied to fields. Similar to ditching, tiling also contributes to the "flashiness" of hydrology, which plausibly is linked to increased bank erosion and more frequent and severe flooding.

Improve connectivity- Good connectivity allows fish passage from one area of a stream or river to another. Loss of connectivity can be caused by several factors such as improperly sized or elevated road culverts and also dams. Connectivity can also be directly affected by base-flow conditions, whereas if water levels get low enough, the stream may become "intermittent" making fish passage impossible.

For the Sauk, primary factors plausibly affecting base-flow conditions include altered hydrology (ditching and tiling) as well as center-pivot irrigation. For more details on connectivity, please see the Sauk River Stressor ID Report https://www.pca.state.mn.us/sites/default/files/wq-iw8-38n.pdf.

Minimize impervious surfaces –Typically associated with residential development, impervious surfaces (especially those associated with storm sewer systems) contribute to "flashy" hydrological fluctuations. Much like ditching and tiling, they can contribute to increased bank instability, erosion, and more frequent and severe flooding. Many cities now have in effect ordinances which set a maximum allowed impervious surface area percentage. Landowners who are building should be aware of any applicable ordinances and minimize the area of impervious surfaces to be installed as much as possible.

Septic system inspections and upgrades- All of the lake TMDLs reference septic systems as being a potential source of bacteria and nutrients.

Encouraging lake riparian/shoreline vegetation- Although more focus has been given to stream/ditch riparian conditions over the last several years, riparian conditions and shoreline vegetation of lakes is also very important for both fish habitat and water quality. Fish utilize shoreline vegetation for cover and also spawning habitat in the spring. Shoreline vegetation and un-mowed vegetative buffers around lakes help to prevent erosion and excessive nutrients from reaching the water, which can improve quality and clarity.

Reduce nitrates in groundwater- Most of the population of the Sauk River Watershed get their drinking water from groundwater. High levels of nitrates in drinking water are of special concern for pregnant women and small children, and monitoring well nitrate concentrations have generally gone up in the Central Sands area, which includes the Sauk River Watershed. Therefore, the Nitrogen Fertilizer Management Plan should be considered during the development of 1W1P. (http://www.mda.state.mn.us/chemicals/fertilizers/nutrient-mgmt/~/media/Files/chemicals/nfmp/nfmp2015.pdf)

Drinking water – While most of the population in the watershed get their drinking water from groundwater, there should be special attention given to drinking water obtained from surface waters. There are several highly vulnerable Drinking Water Supply Management Areas (DWSMA) in the Sauk watershed and the Sauk River discharges into the Mississippi upstream of drinking water intakes for downstream users. Therefore, surface water quality impacts on drinking water should be addressed in this plan. More information on DWSMAs and drinking water protection can be found on the MN Dept. of Health website: http://www.health.state.mn.us/divs/eh/water/swp/about/.

Reduce nutrient and sediment transport through improved management of uplands and riparian land. Field erosion was identified as the primary contributor of sediment in the Stony, Un-named and Getchell Creek watersheds. As the predominant land use in the Sauk River Watershed is agricultural, it is imperative to focus on agricultural Best Management Practices (BMPs), such as those found in the Agricultural Best Management Practices Handbook for Minnesota. http://water-research-library.mda.state.mn.us/pages/application/filedownload.xhtml?recId=186801#. Specifically, practices that have been identified as most helpful for the agroecoregions in the Sauk include:

<u>Vegetative Practices</u>
Contour farming
Strip cropping
Grassed waterways
Grass filter strip for feedlot runoff

Forest management practices
Alternative crop in rotation
Field windbreak
Pasture management (IRG)
CRP or CREP

Primary Tillage Practices
Chisel Plow
One pass tillage
Ridge till
Sustain surface roughness

Structural Practices
Wetland restoration
Livestock exclusion
Liquid manure waste facilities

Thank you for the opportunity to provide comments as we begin the 1Watershed 1Plan process for the Sauk River Watershed- the MPCA looks forward to contributing throughout.

Anna Bosch
Environmental Specialist 2
Watershed Division

Cc:
Jason Weinerman, BWSR
Seth Goreham, MPCA

From:	Cymbaluk, Wayne - NRCS-CD, Waite Park, MN
To:	Scott Henderson
Cc:	Fuchs, Dennis - NRCS-CD, Waite Park, MN
Subject:	Priority Concerns for the Sauk River One Watershed, One Plan
Date:	Monday, July 02, 2018 12:51:19 PM

Scott,

Here are the initial priority concerns from our office on the 1w1p.

1. Drinking Water; Public and Private Drinking and Irrigation Water Supplies; Water quality and quantity.

2. Surface Water; All (Public and/or Private Streams, Rivers, Wetlands, Public Waters, Tributaries, Ditches and Altered Channels), Water quality, quantity, habitat, and edge/bank stability due to new and existing urban development, turf management, altered hydrology, tillage, continuous grazing, biosolid/soil amendment (manure) management, open tile intakes, point and nonpoint pollution sources and overland flow.

3. Community Based Social Marketing, education and outreach programs; Everyone. Need to build community capacity within the plan area to raise awareness and get buy in to minimize our impacts to and improve our soil, water, habitat, and wildlife resources.

Any questions please let us know.

Thanks,

Wayne

Wayne Cymbaluk
Water Resource Specialist
Stearns County Soil & Water Conservation District
110 2nd St S Ste 128
Waite Park, MN 56387
320-345-6492 *NEW NUMBER
www.stearnscountyswcd.net

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Resource	Resource Concern	Issue Affecting a Resource Concern
Education/Outreach	Educational materials (brochures, flyers, etc.)	Materials not readily available to local partners (Extension offices, coops/feed stores, etc.)
Education/Outreach	Hands-on education (field days, demo plots, etc.)	Not enough cross-partner efforts to offer hands-on education opportunities
Surface water	Surface water in livestock pastures	Poor pasture management practices resulting in surface water contamination (nitrogen and other nutrients)
Surface water	Surface waters located near farm fields in the watershed	Excess nutrient (N, P) runoff into watershed surface waters from poorly managed farm fields

The Nature Conservancy
Protecting nature. Preserving life.

The Nature Conservancy in Minnesota
North Dakota & South Dakota
1101 West River Parkway, Suite 200
Minneapolis, MN 55415-1291

Tel (612) 331-0700
Fax (612) 331-0770

nature.org

Date: July 31, 2018

To: Scott Henderson
524 4th St. South
Sauk Centre, MN 56378

Attn: Sauk River Watershed One Watershed One Plan Policy Committee

RE: Sauk River Watershed One Watershed One Plan Invitation to Submit Priority Concerns

Mr. Scott Henderson,

Thank you for the work that you and all the other members of the Sauk River One Watershed One Plan (SRW 1W1P) Planning Work Group have and continue to put into this watershed-based planning in Minnesota. The Nature Conservancy (TNC) appreciates the opportunity that you have provided to outline the water management issues that we feel the SRW 1W1P process and resulting plan should address.

The Sauk River Watershed is one of TNC's top priority watersheds in Minnesota. We value the Sauk River Watershed due to its importance for drinking water, for the critical habitat it provides, and for the recreational opportunities it allows. Additionally, because the Sauk River is currently in relatively good health but is at a high risk of becoming impaired, we know that it is critical to act now while it's less expensive and the feasibly of improvement is still likely. We want to keep this healthy water, healthy.

Using a targeted systems approach, TNC would like the SRW 1W1P process and resulting plan to address:

1. Protection of existing natural features that provide multiple benefits (e.g. habitat, flooding/erosion control, groundwater quantity and quality, and surface water quantity and quality). This includes protecting the mainstem Sauk River corridor, headwater wetlands, riparian corridors and wetlands along tributaries, and natural areas including prairie and wetlands supporting watershed health.
2. Restoration of river and tributary riparian corridors for multiple benefits. A focus should be on restoring wetland features in the riparian corridors and vegetation management.
3. Restoration of storage within the headwaters of the mainstem and key tributaries. This should include restoration of wetlands, compatible use flowage and floodplains, and key groundwater recharge areas.

Again, thank you for the time and effort that you are putting into developing the SRW 1W1P. We hope it will provide strong direction for protecting, enhancing, and restoring the Sauk River Watershed.

Sincerely,

Leah Hall

Leah Hall
Headwaters Project Coordinator
The Nature Conservancy: Minnesota, North Dakota, South Dakota

Watershed 10-year Management Plan

- Water Quality and protection from Stormwater Runoff, erosion, flooding, and infestation of Aquatic Invasive Species (AIS) is of prime importance to Stearns County Lake Associations and property owners.

    - Lakes and other water bodies including streams and rivers should be tested for E-coli, phosphorus loading, and other pollutants.
        - Problems and solutions should be identified and remediation should involve the watershed, the county, and property owners.
        - County and watershed should use their authority to require remediation by those causing the problem.
    - Stormwater Runoff, erosion, and flooding should be identified and plans for control should be developed
        - Determine why the problem exists
        - Who or what is responsible
        - Determine what parties can work together to solve the problem.
        - Provide funding or taxing authority to implement control projects.
    - Control of AIS in watershed lakes
        - Survey lakes, streams, rivers to determine infestation
        - Determine if specific lakes have a lake association that can take the lead in prevention and control.
        - Determine what resources are available and what the watershed can do assist in creation of Lake Improvement Districts, or project taxing authority.
        - Provide funds for control of infested lakes that do not do not have active lake associations or access to funds.

Appendix G

SRCWMP CAPITAL IMPROVEMENT PROJECT TEAM FRAMEWORK

TABLE OF CONTENTS

1.0 INTRODUCTION AND PURPOSE

The Project Team Handbook provides the background information and details regarding the capital improvement project (CIP) project development team framework that was agreed upon by the Sauk River Comprehensive Watershed Management Plan (SRCWMP) Policy Committee. The Policy Committee has determined that in order for the goals of the SRCWMP to be met, on-the-ground implementation actions will need to be taken by all project partners. The Policy Committee acknowledges that the SRWD has an important role and unique authorities that facilitate implementation of larger scale projects that have the potential to make significant progress towards plan goals. The intent of this framework is to build consensus around SRWD CIP projects that address the goals identified in the SRCWMP so that they can be implemented without unnecessary delays, burden, or costs.

Note: This document uses the Red River Basin Flood Damage Reduction Work Group Agreement and subsequent Red River Basin Project Team Handbook extensively.

2.0 PROJECT TEAM GUIDELINES

This section describes when a project team should be used and provides specific recommendations for the various roles needed to implement the plan. Specifically, this section covers the following:

- When Do We Need a Project Team?
- Project Team Overview
- Roles and Responsibilities
- Team Membership
- Making Decisions

2.1 WHEN DO WE NEED A PROJECT TEAM?

The process that is outlined in this handbook is intended to apply to projects that address substantial water management or resource management problems, and/or that would benefit from early and on-going stakeholder communication and collaboration.

Use of Project Teams is voluntary. It is up to the capital improvement project (CIP) proposer to determine whether or not they want to employ this process and follow the guidelines and principles established by the SRCWMP Policy Committee. In most situations the project proposer will be a watershed district. However, other government entities (i.e. state or federal agencies, local governmental units, etc.) could be a project proposer. The goal of using this process is to ensure that the time and financial resources invested in developing and implementing CIPs is well vetted and that will be supported by agency and local government partners, citizens, and the SRCWMP Policy Committee at the time of project approval. Additionally, projects that have been developed using this process may have a better chance of receiving funding and other types of support.

Project proposers can use the Project Team process for projects that are large, complex, or have the potential to be controversial. But even small, relatively minor projects can be advanced through this process if the project proposer believes that the project could be expedited or would benefit from the group decision-making and regulatory coordination inherent in this process.

2.2 PROJECT TEAM OVERVIEW

The plan outlines a project development process for implementing watershed restoration and protection efforts in the Sauk River watershed. The SRCWMP, as envisioned by the Board of Water and Soil Resources One Watershed, One Plan process, provided for a new collaborative approach to planning and implementing projects on a watershed, rather than jurisdictional basis. In this same spirit, the SRCWMP Policy Committee has developed approved this project planning team framework, largely based on the Red River Flood Reduction Mediation Agreement, to increase the consultation with and collaboration among all stakeholders and a cooperative approach to approving and permitting projects.

A Project Team consists of appropriate stakeholders (watershed districts, state, federal and tribal agency personnel, local government officials, affected landowners and interested citizen group representatives), including at least one designated contact person from each agency. Members of the Project Team are recommended by the Policy Committee and appointed by the SRWD Board.

Project Teams are responsible for working with a project from development of a project concept through to project construction and monitoring.

2.3 ROLES AND RESPONSIBILITIES

2.3.1 RESPONSIBILITIES OF THE WATERSHED DISTRICT

The SRWD is responsible for utilizing Project Teams in the development of projects within their watershed district. Specifically, they are responsible for:

1. Identifying areas of concern where the Project Team process should be utilized, especially those identified in the SRCWMP
2. Seeking input from the Policy Committee regarding stakeholders that should be invited to serve as delegates (and alternates) on the Project Team and to endorse their appointment,
3. Coordinating meeting dates and locations for the Project Team,
4. Arranging for a meeting facilitator,
5. Keeping a record of team activities, and
6. Communicating with Project team members and the Policy Committee, on at least a quarterly basis.

2.3.2 ROLE OF THE WATERSHED BOARD OF MANAGERS

The SRWD Board of Managers is the decision-making body in this process. They are responsible for setting direction, focusing and supporting the work of the Project Team, considering alternatives recommended by the Project Team, and taking action to move projects forward.

2.3.3 RESPONSIBILITIES OF THE POLICY COMMITTEE

The SRCWMP Policy Committee is responsible for:

1. recommending potential project team members to the SRWD,
2. providing time and resources for staff involvement on Project Teams
3. identify problems and opportunities for watershed protection and restoration and natural resource enhancement in areas identified by the watershed district,
4. review project team updates and materials submitted by the SRWD and providing constructive feedback meant to obtain solutions that will address the problems and opportunities consistent with the SRCWMP,
5. work to obtain a consensus regarding the preferred solution and project approval for the SRWD consideration

When considering SRWD CIPs that work to address the goals of the SRCWMP, the Policy Committee will operate in a cooperative, joint problem-solving mode using a consensus-based process.

2.3.4 ROLE OF THE POLICY COMMITTEE

The SRCWMP Policy Committee provides recommendations and guidance to the SRWD Board of Managers in this process. They are responsible for providing feedback that moves a project to approval, focusing and supporting the work of the Project Team and the SRWD, considering alternatives recommended by the Project Team, and making recommendations to the SRWD on project approval.

2.3.5 ROLE OF THE WATERSHED DISTRICT ADMINISTRATOR

The Watershed "Administrator " is a resource person to the team and is generally responsible for managing, but not necessarily leading the Project Team process.

2.3.6 RESPONSIBILITIES OF THE PROJECT TEAM

The "Project Team" is advisory to the watershed board and the Policy Committee. The team is responsible for working with a project from early concept and alternative evaluation through to construction and follow-up monitoring. The work of the team is to:

1. identify problems and opportunities for watershed protection and restoration and natural resource enhancement in areas identified by the watershed district,
2. formulate and evaluate alternative solutions that will address the problems and opportunities,
3. recommend preferred alternative solutions to the watershed district and the Policy Committee,
4. identify and clarify regulatory requirements and permitting,
5. review and comment on key project documents, and
6. assist in formulation of project operating and monitoring plans where required.

Project teams are to operate in a cooperative, joint problem-solving mode using a consensus-based process.

2.3.7 ROLE OF THE PROJECT TEAM FACILITATOR

The Project Team Facilitator is responsible for guiding the project team within this CIP development framework. The facilitator is selected by the watershed district to guide the Project Team through the consensus- based process, which includes observing group dynamics, monitoring the ground rules, and asking questions to clarify issues without participating in development of alternatives. The facilitator is not a decision-maker in the process, but rather a neutral individual who is skilled in leading group decision-making.

2.4 TEAM MEMBERSHIP

Project Team membership is at the invitation of the SRWD upon considering recommendations from the Policy Committee. When identifying members, watershed districts should consider broad-based representation from all stakeholder groups with an interest in the project area.

2.4.1 GUIDELINES FOR PROJECT TEAM SELECTION

The Project Team membership invitation should be extended by the watershed district to the following entities, which have a responsibility to determine the specific individuals to serve as representatives and alternates.

- City Councils
- County Boards of Commissioners
- Conservation Organizations

- Soil and Water Conservation Districts (SWCDs)
- Minnesota Board of Water and Soil Resources (BWSR)
- Minnesota Department of Natural Resources (DNR)
- Minnesota Pollution Control Agency (MPCA)
- Township Officers
- USDA Farm Service Agency (FSA)
- U.S. Army Corps of Engineers (USACE)
- U.S. Fish & Wildlife Service (USFWS)
- USDA Natural Resources Conservation Service (NRCS)

Membership may also include:

- Other interested persons (i.e. landowners, citizen group representatives and/or local sporting groups) as the watershed district determines to be appropriate to achieve broad-based representation relative to the issue.
- A delegate (and alternate) from the "board of managers" to serve as a member of the team to facilitate communication between the Project Team and the board.

2.4.2 EXPECTATIONS OF PROJECT TEAM MEMBERS

1. Project Team members must commit to regular attendance at team meetings. Project Team membership should be reviewed annually by the watershed district and members reappointed or replaced if they haven't been participating in the process
2. Members must also agree to deliberate issues in a constructive, productive manner.
3. Team members are expected to commit resources (personal skills and expertise, data and analysis, and/or project funds) to the work of the team.
4. Members should remind themselves that their role on the Project Team is advisory to the SRWD Board and the Policy Committee.
5. Throughout the process and specifically at all significant project milestones, Project Team members are expected to indicate any "red flags" including regulatory/permitting, political, engineering, and other local issues.
6. Individual members *(delegates and alternates)* of the Project Team are expected to:
    - follow the "*Project Team Guiding Principles*," as adopted by the Policy Committee and SRWD, (these are to be developed)
    - represent the views and programs of the agency and/or interest group they represent on the Project Team,
    - commit time and effort to identifying alternative solutions to problem areas
    - take responsibility for follow-through with responsibilities identified at meetings, and
    - come prepared for the meeting by reviewing previous meeting notes and additional background materials

2.5 MAKING DECISIONS

2.5.1 RESPONSIBILITIES OF THE PROJECT PROPOSER

The project proposer is responsible for making the final decisions around each project. This is accomplished via a voting process by the SRWD Board based on the information and/or recommendations provided to them from the Project Team and Policy Committee.

The project proposer is also responsible for assuring that Project Team and Policy Committee recommendations have been thoroughly studied and have considered the interests of all stakeholders. This is accomplished by using a consensus-based process to develop an agreement that both identifies and explores diverse interests in the specific project.

2.5.2 RESPONSIBILITIES OF THE POLICY COMMITTEE

The Policy Committee is responsible for developing a recommendation for the SRWD Board's consideration, using a consensus decision-making process. The Policy Committee's recommendation is advisory to the SRWD Board.

2.5.3 RESPONSIBILITIES OF THE PROJECT TEAM MEMBERS

Stakeholders participating in Project Teams will use a consensus decision-making process which is key to the success of Project Team efforts. It is important that the Project Team understand that they are advisory to the SRWD and the Policy Committee and that the process seeks to develop recommendations via consensus among the stakeholders to present to the SRWD and the Policy Committee.

2.5.4 USING CONSENSUS IN THE PROJECT TEAM PROCESS

Consensus is built by identifying and exploring all stakeholder interests and assembling a recommendation that satisfies those interests to the greatest extent possible. The process of building consensus involves the development of alternatives, the assessment of the impacts of those alternatives, and the selection of a preferred alternative or proposed action. Consensus has been reached when all Project Team members can live with and will not publicly oppose the recommendation.

2.5.5 INABILITY TO REACH CONSENSUS

If there are issues the Project Team cannot resolve through consensus decision- making despite good faith efforts of the members, the Project Team will be responsible for summarizing each issue and fully documenting the remaining differences, including the specific concerns of individual members, to present to the project proposer.

3.0 PROJECT TEAM MANAGEMENT

This section has been written specifically for the watershed district administrator and/or facilitator to manage the team. It includes many tools to assist watershed districts in the effective management and utilization of project teams from the initial selection of members, to agenda development, to communication and consensus- based processes.

- Managing the Process
- Project Team Checklist

3.1 MANAGING THE PROCESS

Project teams are most productive when there is support for the work and attention is given to the various parts of the process. To assist watershed districts in managing project team processes, a checklist was developed. The checklist[1] highlights eight areas of attention that are described in the following sections. These are:

1. Reviewing Roles and Responsibilities
2. Selecting and Appointing Members
3. Strategizing for Productive Meetings
4. Scheduling and Notification of Meetings
5. Planning Meeting Agendas
6. Recording Conversation Notes
7. Communicating with Stakeholders
8. Using a Consensus-Building Process

3.1.1 REVIEWING ROLES AND RESPONSIBILITIES

It is important that all participants in this work be clear about the role they play and their specific responsibilities. Specifically:

- Project Team Guiding Principles should be adopted and reviewed at least annually by the SRWD, SRCWMP Policy Committee, and project team members.
- Roles of the watershed district and the project team are clarified and understood by the SRWD, SRCWMP Policy Committee, and the project team.
- The role of staff is clear and articulated.
- The SRWD Board sets direction to keep the work of the project team focused.
- The SRWD Bboard and staff respond and/or follow through on project team recommendations.

3.1.2 SELECTING AND APPOINTING MEMBERS

This is one area where the SRWD needs to establish procedures. Specifically:

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[1] Checklist developed by Jody Horntvedt, Regional Extension Educator, who served as the Red River Basin Project Team Facilitator between 1999 and 2004

- The SRWD should have an established process that includes seeking consultation and recommendations from the SRCWMP Policy Committee for identifying membership of the project team.
- Project team membership should be broad-based and/or adjusted to represent the project area focus.
- Members should be expected to sign a statement of commitment acknowledging their willingness to work within the process described in this handbook.
- Membership should be reviewed, and members appointed (annually and/or at the startup of new projects) by the watershed district.
- Attendance at meetings should be recorded and guidelines for absent members should be followed (based on project team guiding principles adopted by the watershed district).

3.1.3 STRATEGIZING FOR PRODUCTIVE MEETINGS

Spending time between meetings to strategize for the next meeting makes meetings more productive and effective.

- It is critical that each Project Team meeting have a clear purpose.
- Use the Project Team Facilitator Position Description to identify an individual to facilitate the meetings who has sufficient skills and an understanding of the Project Team process.
- Evaluate the effectiveness of your facilitator from time to time to assure they are paying attention to the process and group dynamics.
- Pre-meeting planning conversations between the facilitator, watershed district staff and/or engineers are important to a successful meeting.
- The room size and logistics (equipment, etc.) should be appropriate for the size and work of the project team.
- There should be enough (and the appropriate) background data provided to the Project Team to assist them in making informed decisions.
- Using sub-groups (committees) to work on special topics between meetings can be beneficial to the work of the whole team when used appropriately (e.g. used to gather data, prepare written reports, etc.).
- The SRWD should follow-up with Project Team members and sub- groups/committees who have been assigned tasks to be accomplished between meetings.

3.1.4 SCHEDULING AND NOTIFICATION OF MEETINGS

Project team members must receive timely notification of the meeting. Specifically:

- Set a regular meeting schedule
- Meeting notices should be provided to the project team according to the timeframe and method agreed upon by the group.
- The meeting notice to prepare members for the meeting should include a copy of the agenda, noting specific responsibilities (data to provide, report to present, etc.) of team members.
- Distribute background materials relevant to the meeting agenda prior to the meeting to enable members to be prepared.
- Provided appropriate public notice of the meeting, if required.

3.1.5 PLANNING MEETING AGENDAS

Time spent in agenda planning, along with pre-meeting conversations with the facilitator, watershed district staff and/or individuals providing data, can assure a productive meeting. To make sure your agenda is complete, be sure that:

- The goals and purpose of the meeting are identified on the agenda.
- Meeting ground rules are printed right on the agenda or posted somewhere in the room for all to see.
- Agenda items are strategically arranged to accommodate important discussion topics.
- The appropriate "step" in the Project Implementation Process and Procedures table is included for reference.
- An estimated time for each agenda item is included.
- An "action required" *(i.e. discussion, vote, recommendation to the board, etc.)* for each agenda item is noted on the agenda.
- A "next steps" agenda item is included to discuss next steps and follow up *(i.e. recommendations to the watershed board, sub-committee meetings, etc.)* needed
- One item on the agenda involves the Project Team in recommending items for the next meeting agenda

3.1.6 RECORDING CONVERSATION NOTES

Meeting conversation notes are an important record of the work of the Project Team. A few things you should consider include:

- The watershed district should identify an individual *(non-PT member, preferred)* to take notes during the meeting.
- Conversations notes should include items of general agreement, questions and concerns, and specific recommendations.
- Conversation notes should be sent out within 2 weeks after the meeting.
- Conversation notes should be reviewed (and approved) at each meeting.
- Changes should be made after review and a final "approved" copy should be put in a permanent file.

3.1.7 COMMUNICATING WITH STAKEHOLDERS

Effective communication with stakeholders begins with clearly identifying your stakeholders and being clear about what your commitment to each of the stakeholder groups is. One way to frame this is with the IAP2 Spectrum of Public Participation where the watershed district might identify stakeholder groups and then determine what level of involvement is most important for each of the groups based on these categories[2]:

INFORM…to provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions

CONSULT…to obtain public feedback on analysis, alternatives and/or decisions

INVOLVE…to work directly with the public throughout the process to ensure that the public concerns and aspirations are consistently understood and considered

COLLABORATE…to partner with the public in each aspect of the decision including the development of alternatives and identification of the preferred solution

There is always room for improvement in the area of communication! An important concept to remember is to package messages for communication (printed or oral) using specific content for specific audiences. Here are just a few suggestions…

- ***Inform*** the public using printed materials (fact sheets, brochures, etc.), the news media (newspaper, radio, or television) and websites. Don't overlook the opportunity to give reports at meetings where stakeholders are gathered *(i.e. community meetings, county board meetings, etc.)*.
- ***Consult*** with the public by encouraging their input in a variety of ways. Suggestions would be letters asking for input, invitations to public meetings, website surveys, and others.
- ***Involve by***…making sure stakeholders know that their concerns are directly reflected in the alternatives developed and provide feedback on how their input influenced the decisions. This means developing an ongoing relationship with stakeholders through work sessions. Other methods for involving stakeholders are deliberative polling and blogs.
- ***Collaborate by***…focusing on ways to make the Project Team process most effective by encouraging ongoing communication between Project Team members, the watershed district and groups/agencies critical to the work. Using a consensus-building process is one of the best ways to collaborate with your stakeholders.

3.1.8 USING A CONSENSUS-BUILDING PROCESS

Using a consensus process is critical to the success of Project Team efforts. Consensus, when described as the process used to "reach consensus" is often referred to as "consensus-building." Consensus-building is a group process that emphasizes collaborative decision-making. In consensus-building, a diverse range of participants with varying interests work together to find a mutually agreeable solution. The essence of this approach is to *work with* others *rather than against* them.

Some of the "key principles"[2] of consensus-building include these important concepts:

- To achieve consensus, everyone in the group must actively participate.
- To participate fully and freely, all group members must have a common base of information and keep up to date on the progress of the group.
- A norm must be created in which everyone will feel comfortable to state his or her views and to disagree.
- A disagreement can illuminate unrecognized problems and serve as a catalyst for improving the decision.
- When there is an objection, the goal of the group is to discover the unmet need that has produced an objection and to find a way to meet that need in a revised agreement, rather than to suppress the objection.
- Agreement on definitions, principles and criteria should precede and become the underpinnings of substantive agreements.

The Project Team model follows a consensus-building process to assure there is broad-based representation involved in conversations and includes multiple opportunities for public input and education throughout the process.

[2] SOURCE: Operating Agreement for Stakeholder Deliberations, RRBFDRWG, May 1998

3.2 THE PROJECT TEAM CHECKLIST

It is important that groups take time to assess their effectiveness on an annual basis. This assessment can be either a formal or an informal process. Here are a few examples of how a Project Team might do this.

- **Project Team Assessment.** It is good practice to ask Project Team members to assess the effectiveness of their efforts and discuss it at a meeting. One way to do this is with a simple assessment tool that you might have group members complete individually and/or use as a conversation that seeks to identify positive things (strengths) and frustrations (areas for improvement).
- **Project Team Feedback.** Ask someone to observe a meeting and give you their comments based on the Project Team Checklist categories. These comments should be recorded on a feedback form for the WD and facilitator to review.
- **Project Team Checklist.** The checklist has been created for watershed districts to use as a quick reference. It is designed so it can be used as an evaluation tool for annual review of Project Team processes by the watershed district and/or Project Team members themselves. Responses to each statement with a *"yes"* – *"no"* – or *"??" (unsure)* would give indications as to where improvement might be needed.

Groups who take the time to review the group norms and processes are healthier and able to function more effectively.

PROJECT PLANNING CHECKLIST

Category	Description				Comments & Suggestions
	Yes	No	??	Details	
REVIEWING ROLES AND RESPONSIBILITIES	☐	☐	☐	Project Team Guidelines adopted; reviewed at least annually by the watershed district and Project Team members. *[Last review date was_]*	
	☐	☐	☐	Roles of the watershed district are clarified and understood by the watershed district and the Project Team.	
	☐	☐	☐	Roles of the Project Team are clarified and understood by the watershed district and the Project Team.	
	☐	☐	☐	The role of watershed district staff is clear and articulated.	
	☐	☐	☐	The watershed district board sets direction to keep the work of the Project Team focused.	
	☐	☐	☐	The watershed district (board and staff) respond and/or follows through on PT recommendations.	
	☐	☐	☐	Other…	

Category	Description				Comments & Suggestions
	Yes	No	??	Details	
SELECTING AND APPOINTING MEMBERS	☐	☐	☐	The watershed district has an established process for identifying membership of the project team.	
	☐	☐	☐	Project team membership is broad-based and/or adjusted to represent project area focus.	
	☐	☐	☐	Members are expected to sign a statement of commitment acknowledging their support of the process.	
	☐	☐	☐	Membership reviewed and members appointed *(i.e. annually and/or at startup of new project)* by WD.	
	☐	☐	☐	Attendance at meetings is recorded.	
	☐	☐	☐	Guidelines for absent members (based on project team guiding principles adopted by the watershed district) are followed.	
	☐	☐	☐	Other…	
STRATEGIZING FOR PRODUCTIVE MEETINGS	☐	☐	☐	Meeting facilitation is appropriate for work of the PT	
	☐	☐	☐	Pre-meeting planning conversation with facilitator to develop goals	
	☐	☐	☐	Room and logistics are appropriate for size and work of the PT	
***STRATEGIZING FOR PRODUCTIVE MEETINGS** continued…*	☐	☐	☐	Facilitator pays attention to group dynamics, allowing ALL to participate/share information	
	☐	☐	☐	There is enough (and the appropriate) background data to make good decisions	
	☐	☐	☐	Sub-groups (committees) are utilized effectively	
	☐	☐	☐	WD follows up with PT members who have been assigned tasks to accomplish between meetings	
	☐	☐	☐	Other…	

Scheduling and Notification of Meetings	☐	☐	☐	A regular meeting schedule is in place	
	☐	☐	☐	Meeting notices are sent out as agreed upon by the group	
	☐	☐	☐	Meeting notices are sent out in advance (2 weeks prior to scheduled meetings; 3-4 weeks prior to non-regularly scheduled meetings)	
	☐	☐	☐	Meeting notices to prepare members for the meeting include a copy of the agenda and reminders on specific responsibilities	
	☐	☐	☐	Background materials relevant to the meeting agenda are distributed in advance of the meeting	
***Scheduling and Notification of Meetings** continued…*	☐	☐	☐	If required, there is appropriate public notice of the meeting(s)	
	☐	☐	☐	Other…	
Planning Meeting Agendas	☐	☐	☐	Identifies goals/purpose of meeting	
	☐	☐	☐	Includes meeting ground rules (i.e. posted or printed on agenda)	
	☐	☐	☐	Agenda items strategically arranged to accommodate important discussion topics	
	☐	☐	☐	Appropriate “step” in the Project Implementation Process and Procedures table included for reference	
	☐	☐	☐	Estimated time for each agenda item is included	
	☐	☐	☐	Includes “action required” for each agenda item	
	☐	☐	☐	“Next steps” agenda item included to discuss next steps, recommendations to the WD board and Policy Committee and/or follow up action	
	☐	☐	☐	Includes item for setting agenda for next meeting	
	☐	☐	☐	Other…	

RECORDING	☐	☐	☐	WD identified an individual (non-PT member preferred) to take notes	
	☐	☐	☐	Conversation notes include items of general agreement, questions and concerns, and/or recommendations	
	☐	☐	☐	Sent out within 2 weeks after meeting	
	☐	☐	☐	Reviewed/approved at meetings	
	☐	☐	☐	Changes made after review and final “approved” copy put in permanent file	
	☐	☐	☐	Other…	
COMMUNICATING WITH STAKEHOLDERS	☐	☐	☐	WD informs stakeholders using printed materials, the news media, websites, reports at meetings where stakeholders are gathered, or other appropriate methods.	
	☐	☐	☐	WD consults with stakeholders by encouraging their input through letters asking for input, invitations to public meetings, website surveys, or other appropriate methods.	
	☐	☐	☐	WD involves stakeholders by making sure they know that their concerns are directly reflected in the alternatives developed and by providing feedback on how their input influenced the decisions.	
	☐	☐	☐	WD collaborates with stakeholders by encouraging ongoing communication (between Project Team members, the WD and groups/agencies) and by focusing on ways to make the Project Team process most effective.	
	☐	☐	☐	Other…	
USING A CONSENSUS-BUILDING PROCESS	☐	☐	☐	The PT follows a consensus-building process to assure there is broad-based representation involved in conversations and includes multiple opportunities for public input and education throughout the process	
	☐	☐	☐	Everyone in the PT actively participates	
	☐	☐	☐	All PT members have a common base of information and keep up-to-date on the progress of the group	

	☐	☐	☐	A norm exists in which everyone feels comfortable to state his or her views and to disagree	
	☐	☐	☐	Disagreements are used to understand unrecognized problems and serve as a catalyst for improving the decision	
	☐	☐	☐	Objections (when present) are not suppressed, but instead are used to discover the unmet need that has produced an objection and to find a way to meet that need	
	☐	☐	☐	There is agreement on definitions, principles and criteria used in the PT process	
	☐	☐	☐	Other…	

Need to add a section on Communicating with the PC

4.0 PROJECT IMPLEMENTATION PROCESS AND PROCEDURES

This section provides detailed information to guide the Project Teams through the process of bringing a project to completion.

- Watershed Comprehensive Plans
- Project Implementation Process and Procedures Table

4.1 COMPREHENSIVE WATERSHED MANAGEMENT PLANS

The SRCWMP outlines the prioritized, targeted and measurable goals for achieving the water resource and natural resource protection and restoration in the Sauk River watershed. The PC agreed to use the Project Team framework and process to evaluate, consider, and recommend CIP projects undertaken by the SRWD that meet the goals identified in the SRCWMP.

4.2 PROJECT DEVELOPMENT

Step-by-Step guidance for developing CIP projects based. In general, this is a multi-year process. Time required to complete a project will vary with the size and complexity of the projects. The goal is the implementation of effective projects by consensus that are accomplished in a time and cost-efficient manner.

Project Development Step	Project Team Role	SRWD Role	Policy Committee Role	Additional Information
1. Priority Area Selected - identifying problem areas based on issues and priorities in SRCWMP		Initiates effort; engages PC in identifying problem areas; decides area to focus on.	Engages proactively with the SRWD; Provides thoughtful input on problem areas and priorities.	
2. Project Team Created		Initiates formation; takes input on membership from the PC; formally approves PT membership and organizes the PT according to the Project Planning Checklist guidelines.	Fully understands the nature of the issue and develops a slate of recommended Project Team members; authorizes staff to participate on Project Team if SRWD Board approves their participation.	
3. Problem definition, formalizing the project purpose and goals, and outline of potential solutions.	Reviews materials and attends meetings; provides input and feedback to the SRWD and technical experts to refine solutions	Select and designate appropriate technical expertise to conduct analysis and engineering necessary to support the Project Team's effort.		A communication plan should be developed to keep public and stakeholders up to date on progress to address the problem.
4. Alternatives Analysis and Recommendation of Preferred Alternative	Evaluates alternatives according to established criteria (cost, benefit, ability to meet plan goals, local support, feasibility, ability to meet regulatory requirements, etc.) and makes recommendation to the PC.	Considers the Project Team and PC recommendations; determines whether to proceed to formalize the Preliminary Engineer's report as outlined in MN Statute 103D or take other action on the proposal.	PC evaluates the Project Team recommendations and determines concurrence with and support of the project; submits to SRWD Board.	Opportunities for funding should be initiated by the Project Team and SRWD.
5. Preliminary Engineer's Report	Reviews preliminary engineer's report and makes recommendations to the PC.	Considers the Project Team and PC recommendations; proceeds to public hearing.	PC evaluates the Project Team recommendations and determines concurrence with and support of the project; submits to SRWD Board.	
6. Public Hearing on Preliminary Engineer's Report		Conducts Public Hearing as outlined in 103D, determines next steps.	PC is not expected to actively participate but comments and input will be consistent with the PC consensus recommendations in Step 5.	
7. Project Development: a) Obtain regulatory pre-approval guidance b) Evaluate funding options and begin to secure funds c) Final engineering reports including operating and monitoring plans.	a. Provide input regarding regulatory requirements and provide information to assist in obtaining regulatory approval. b. Provide input regarding funding opportunities and facilitate conversations with potential funding organizations and entities. b) Review final engineer's report and makes recommendations to the PC.	a) Hold meeting with regulatory and agency representatives, identify permitting challenges and potential solutions to obtain permit approval; evaluate need for EAW or EIS, proceed as required. b) Develop a funding strategy, meet with representatives of funding organizations, partners, and entities, submit funding requests. c) Considers the Project Team and PC recommendations; proceeds to public hearing.	PC evaluates the Project Team recommendations and determines concurrence with and support of the project; submits recommendations to the SRWD Board.	

Project Development Step	Project Team Role	SRWD Role	Policy Committee Role	Additional Information
8. Final public hearing		Conducts Public Hearing as outlined in 103D, determines next steps, which may include ordering project construction.	PC is not expected to actively participate but comments and input will be consistent with the PC consensus recommendations in Step 7.	
9. Construction and Monitoring				

5.0 CRITERIA FOR EVALUATING PROJECTS

This section provides guidance on the criteria that will be used to evaluate projects as they develop through the recommendation and approval process. *<u>Specific metrics for each criterion as well as a summary evaluation sheet that documents Project Team and Policy Committee Recommendations are yet to be developed.</u>*

5.1 ALIGNMENT WITH SRCWMP GOALS

All CIP must be aligned with the priority issues and goals identified in the SRCWMP. Each CIP will be evaluated in order to determine the degree to which it will address geographic and priority issue goals. Additional considerations will be given to projects that address multiple benefits, reduce downstream impacts, and provide for long-term resiliency to ecosystems and infrastructure. Potential metrics may include assigning points based on the following considerations:

- Local impact
- Downstream impact
- Upstream impact
- Multiple benefits obtained
- Long-term impact

These metrics should be weighed separately but considered as a whole. For example, a stream restoration project that includes bermed setbacks to reduce flooding or peak flows may provide more downstream benefits than local benefits and has long term benefits by providing resiliency against future flooding.

5.2 COST

Capital improvement projects are large projects with significant costs. These costs are incurred before and at the time of construction as well as long-term operation, maintenance, and monitoring costs. These costs should be evaluated individually and as a whole across the expected life of the project in order to get a more accurate representation of overall project costs. For instance, large scale wetland restorations may have a very high project development and construction costs, including the costs of land or easement acquisition, but the long-term maintenance and monitoring costs are typically low.

5.2.1 PROJECT DEVELOPMENT AND CONSTRUCTION COSTS

Land acquisition, permitting, engineering, construction, etc

5.2.2 OPERATION AND MAINTENANCE COSTS

Long-term operation plans, monitoring results, and performing regular maintenance to ensure performance.

5.3 FUNDING

The SRWD and Policy Committee will take measures to seek out and secure project funding from diverse sources and revenue streams in order to decrease the impact to individual landowners. External funding Sources

Sources may include state government bonding, state agency or legislative commission grants, foundations, and gifts such as donated land or technical capabilities. Additionally, programs that generate funds to invest in projects will be explored. These include wetland and floodplain mitigation as well as water quality trading and other ecosystem service trading program.

5.3.1 LOCAL FUNDING AUTHORITIES

Watershed districts and counties have an extensive list of funding tools. The Policy Committee and SRWD will work collaboratively to determine appropriate use of funding authorities.

5.3.2 LOCAL CONTRIBUTION

Projects that are seeking funding from external sources are more likely to obtain funding if there is strong support from the local sponsor and many require at least a 25% local contribution. The SRWD will evaluate the best mechanism for generating local contribution funds that consider local to watershed-wide impact as well as length of time that the local funding mechanism will be used. For example, the full cost of a large-scale, multiple landowner wetland restoration project in the Stony Creek subwatershed may be $2.5 million with $625,000 required local contribution. The SRWD may choose to use the watershed management district funding authorities to apportion 35% of that cost ($156,000) to that local management district with the remaining cost ($469,000) apportioned across all the downstream management districts, over a period of two or more years.

The Policy Committee and SRWD recognize that some projects significantly address the goals of the SRCWMP may not be eligible for or receive large funding contributions from other sources. This does not prevent the project from going forward. The project must be evaluated based on all the criteria.

5.4 SUPPORT

5.4.1 LOCAL LANDOWNERS

5.4.2 EXTERNAL PARTNERS

- Non-Governmental agencies

5.4.3 POLITICAL SUPPORT

- State Government officials/legislators
- Federal Officials/legislators
- Policy Committee
- Sauk River Watershed District

5.5 REGULATORY REQUIREMENTS

Meeting regulatory requirements and obtaining permit approvals can significantly increase project costs or result in project delays. The Project Team and SRWD will seek early feedback and preliminary approvals or guidance from regulatory agencies and conduct an evaluation regarding the scope and scale of effort in obtaining regulatory approvals.

Appendix H

SAUK RIVER ENDPOINT FATE AND TRANSPORT RESULTS

LIST OF FIGURES

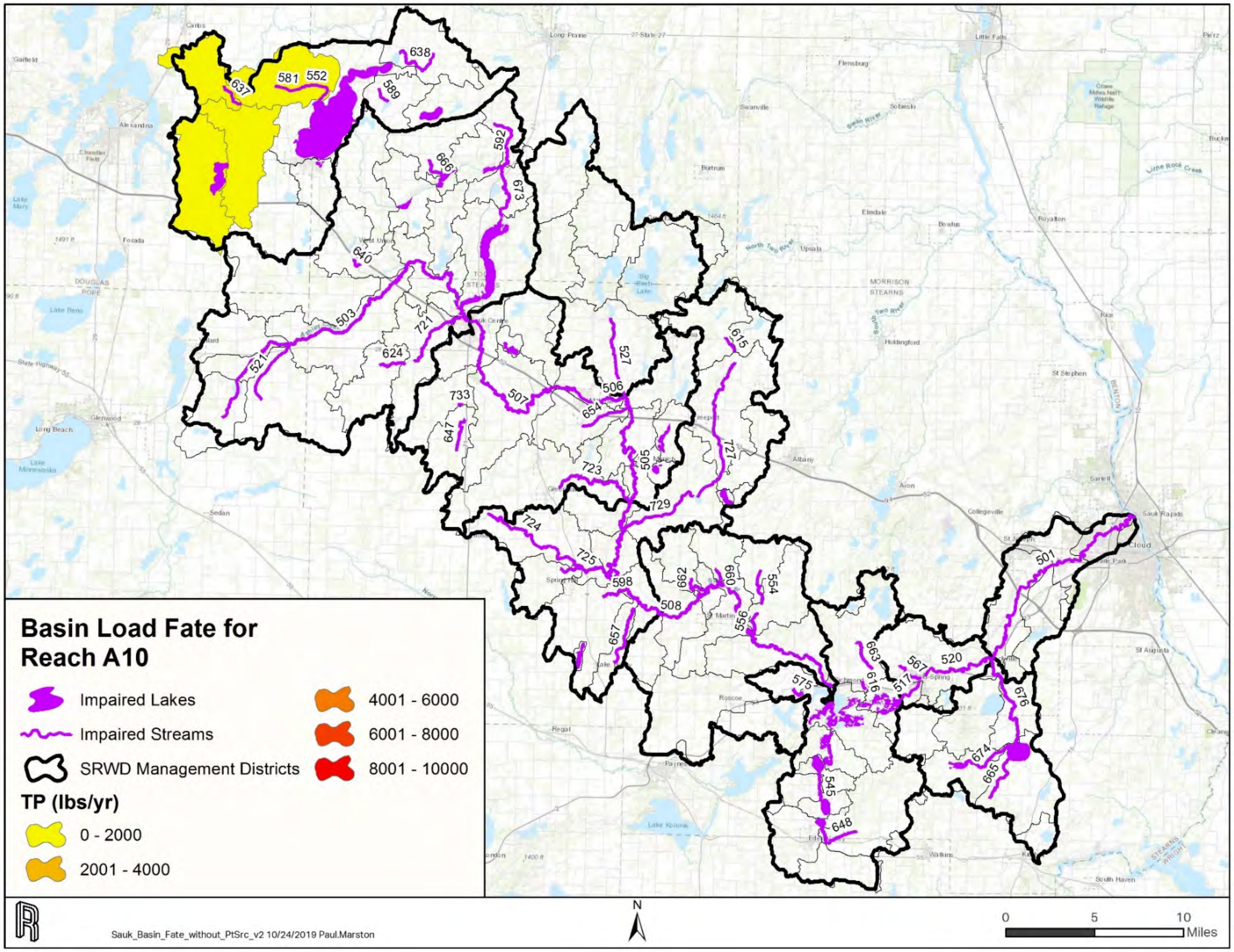

Figure H-1. Total Phosphorus Source and Fate Map to Priority Reach A10.

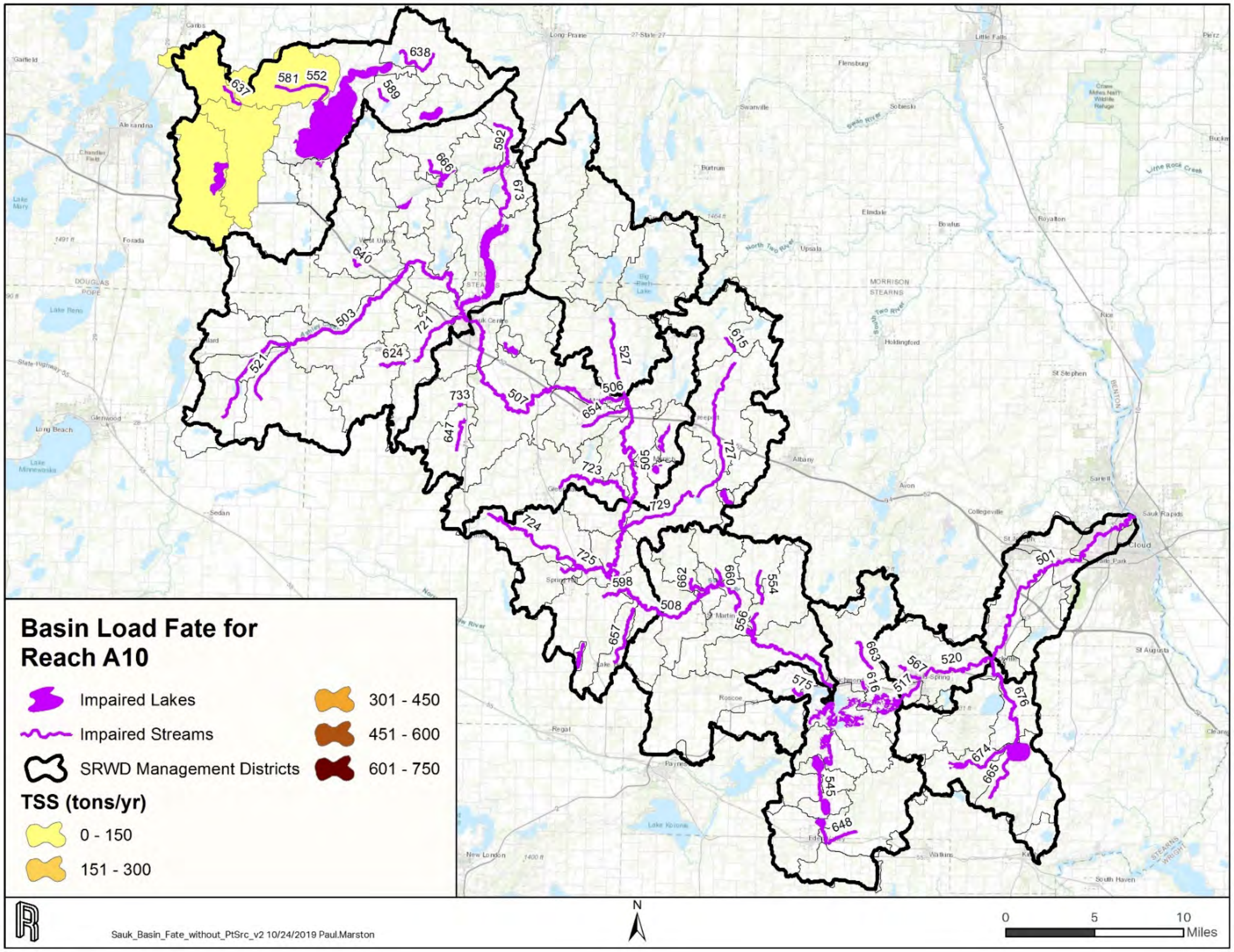

Figure H-2. Total Suspended Solid Source and Fate Map to Priority Reach A10.

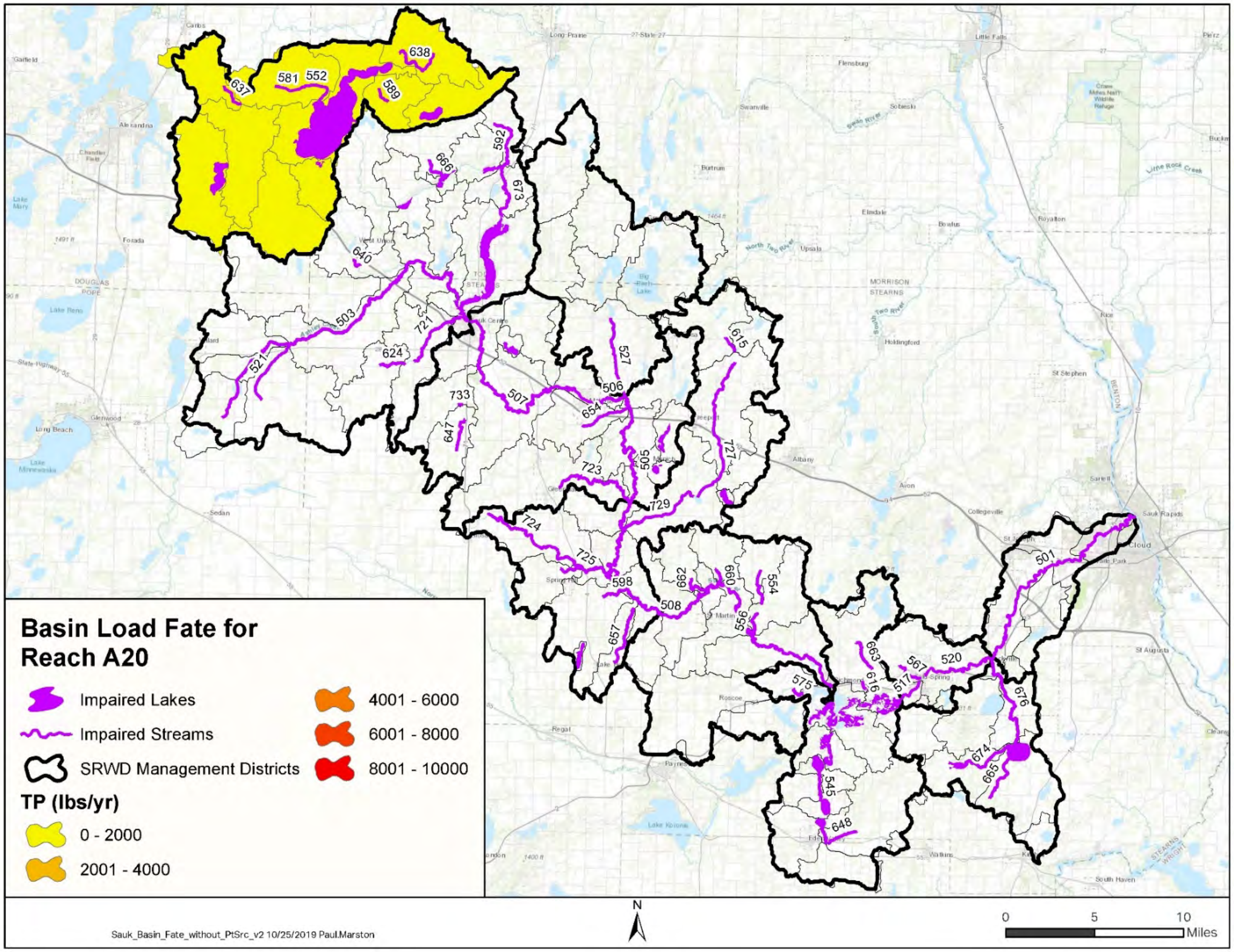

Figure H-3. Total Phosphorus Source and Fate Map to Priority Reach A20.

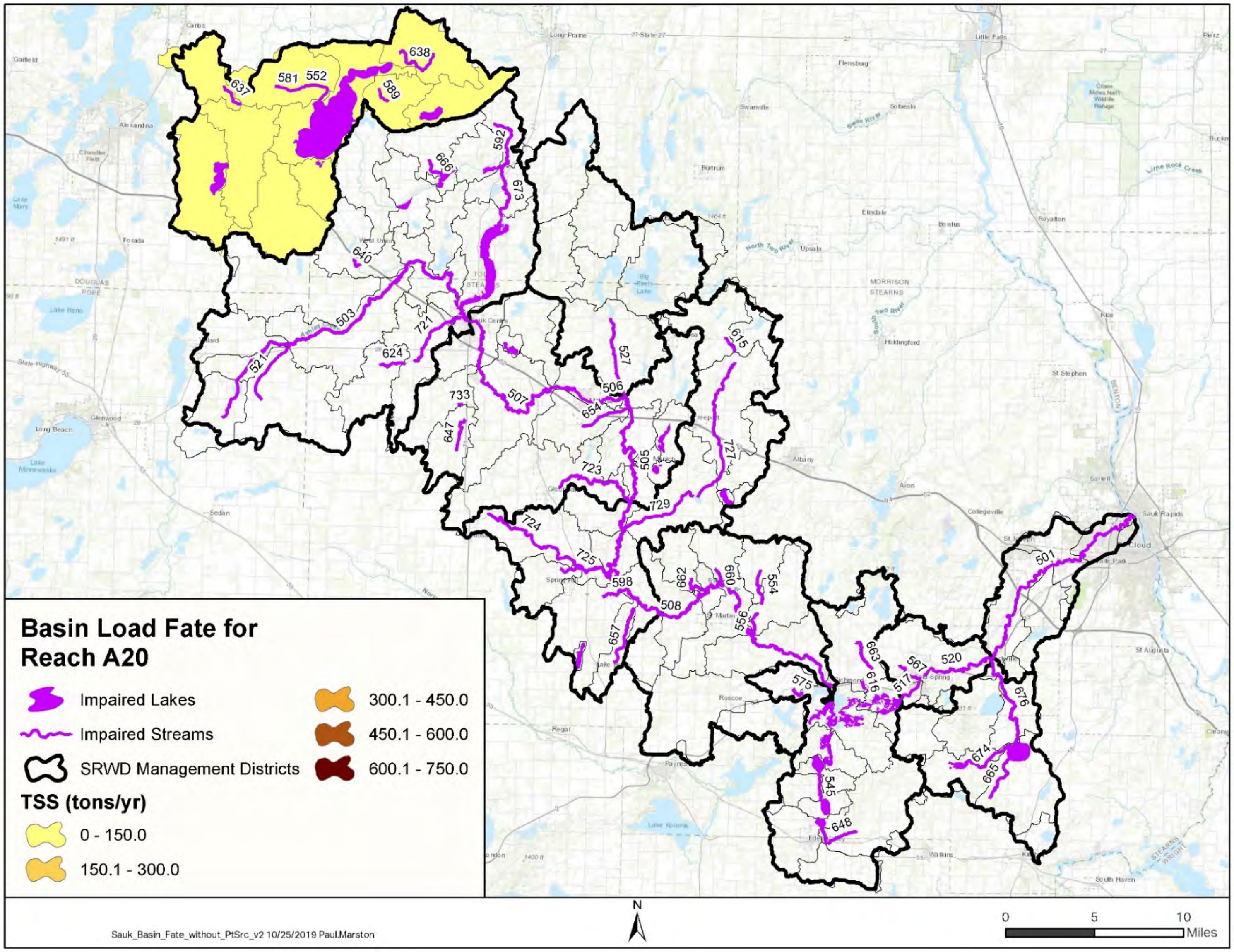

Figure H-4. Total Suspended Solid Source and Fate Map to Priority Reach A20.

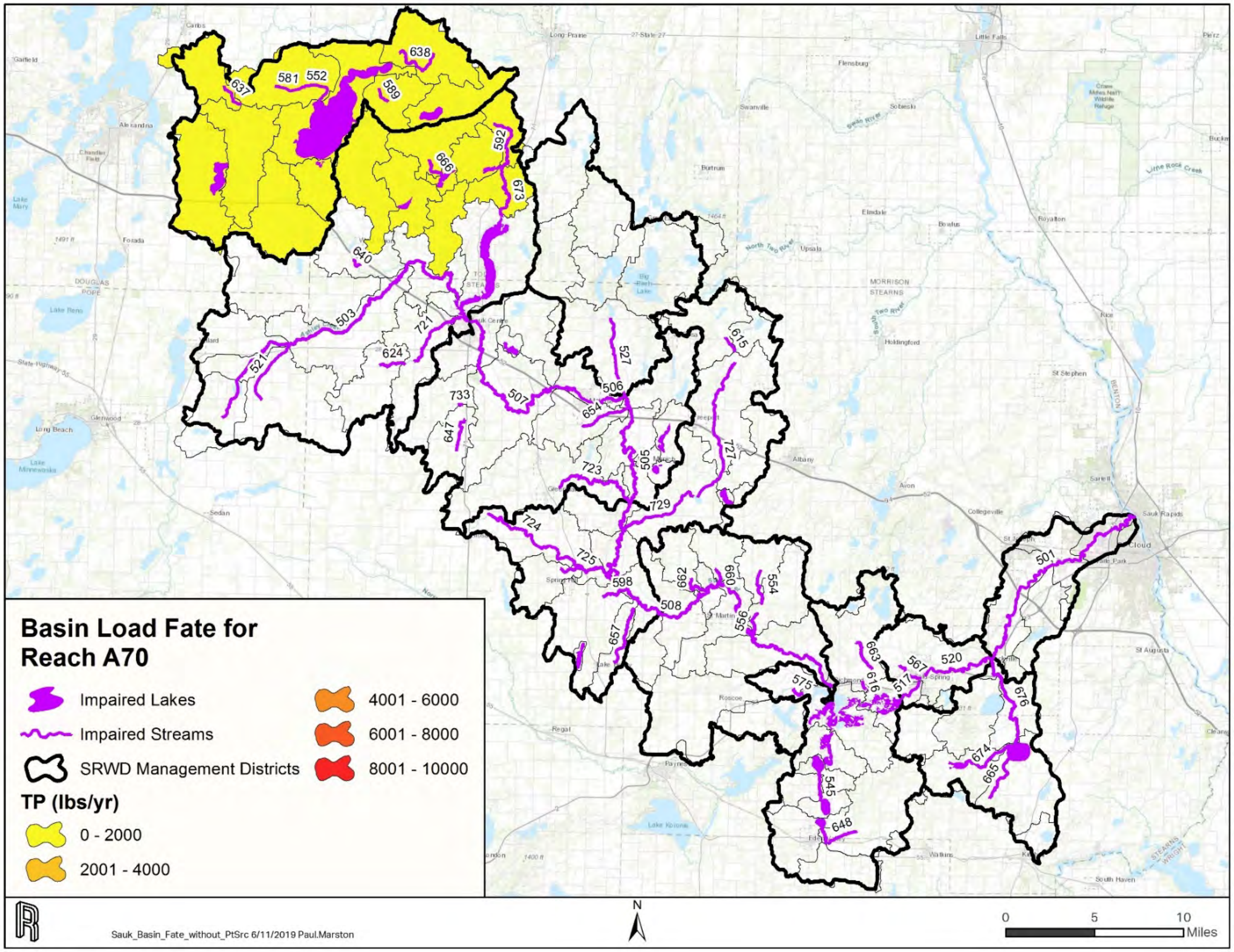

Figure H-5. Total Phosphorus Source and Fate Map to Priority Reach A70.

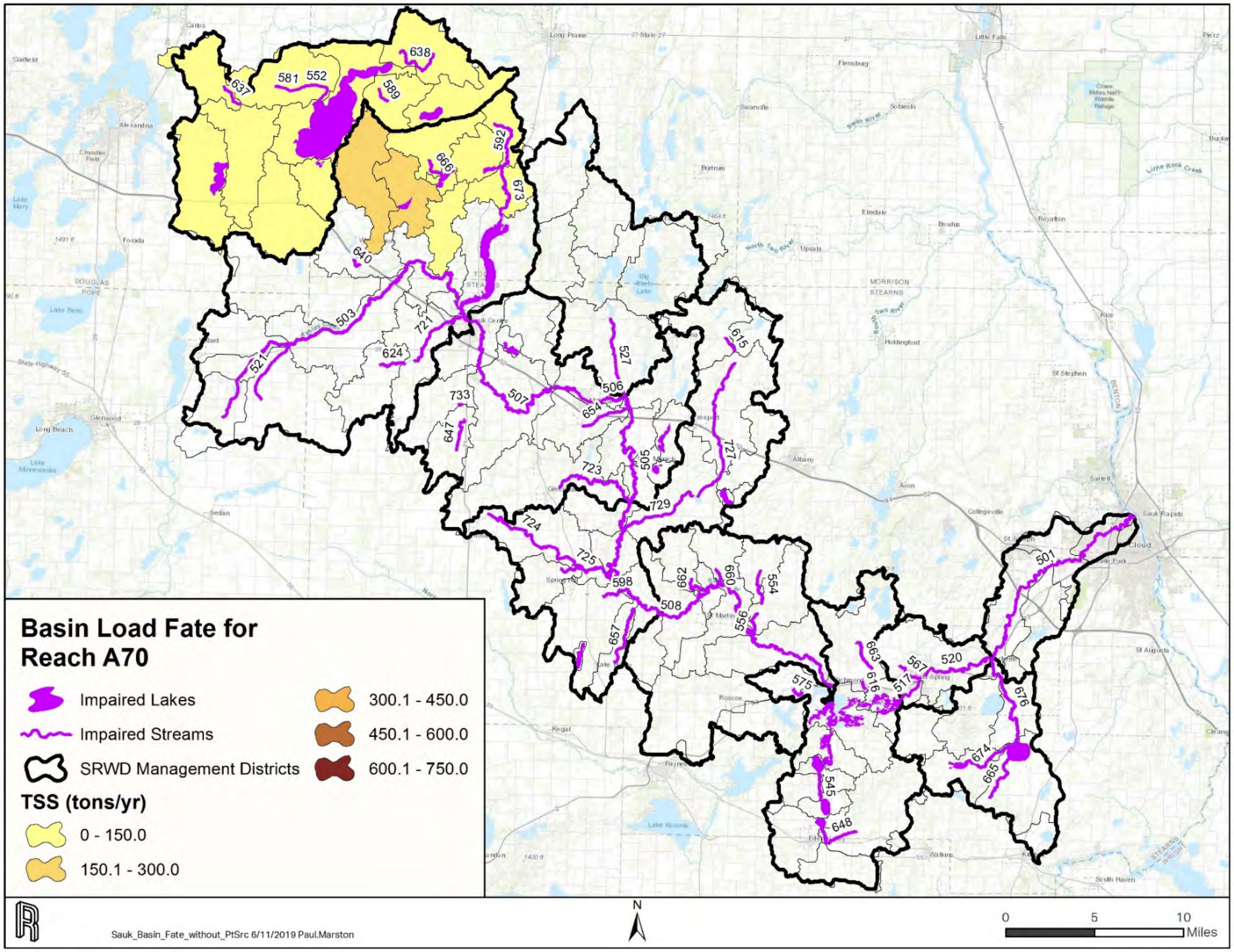

Figure H-6. Total Suspended Solid Source and Fate Map to Priority Reach A70.

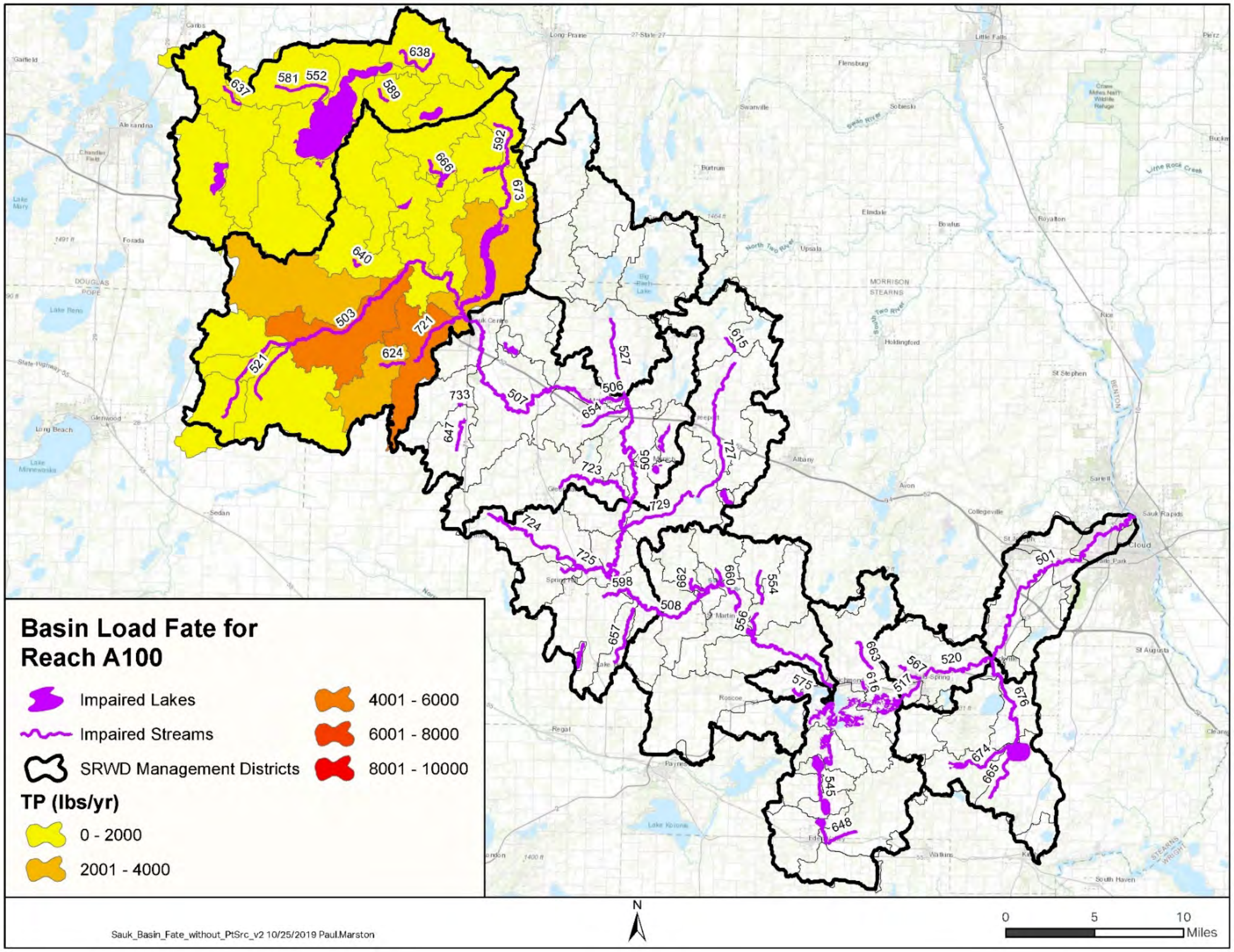

Figure H-7. Total Phosphorus Source and Fate Map to Priority Reach A100.

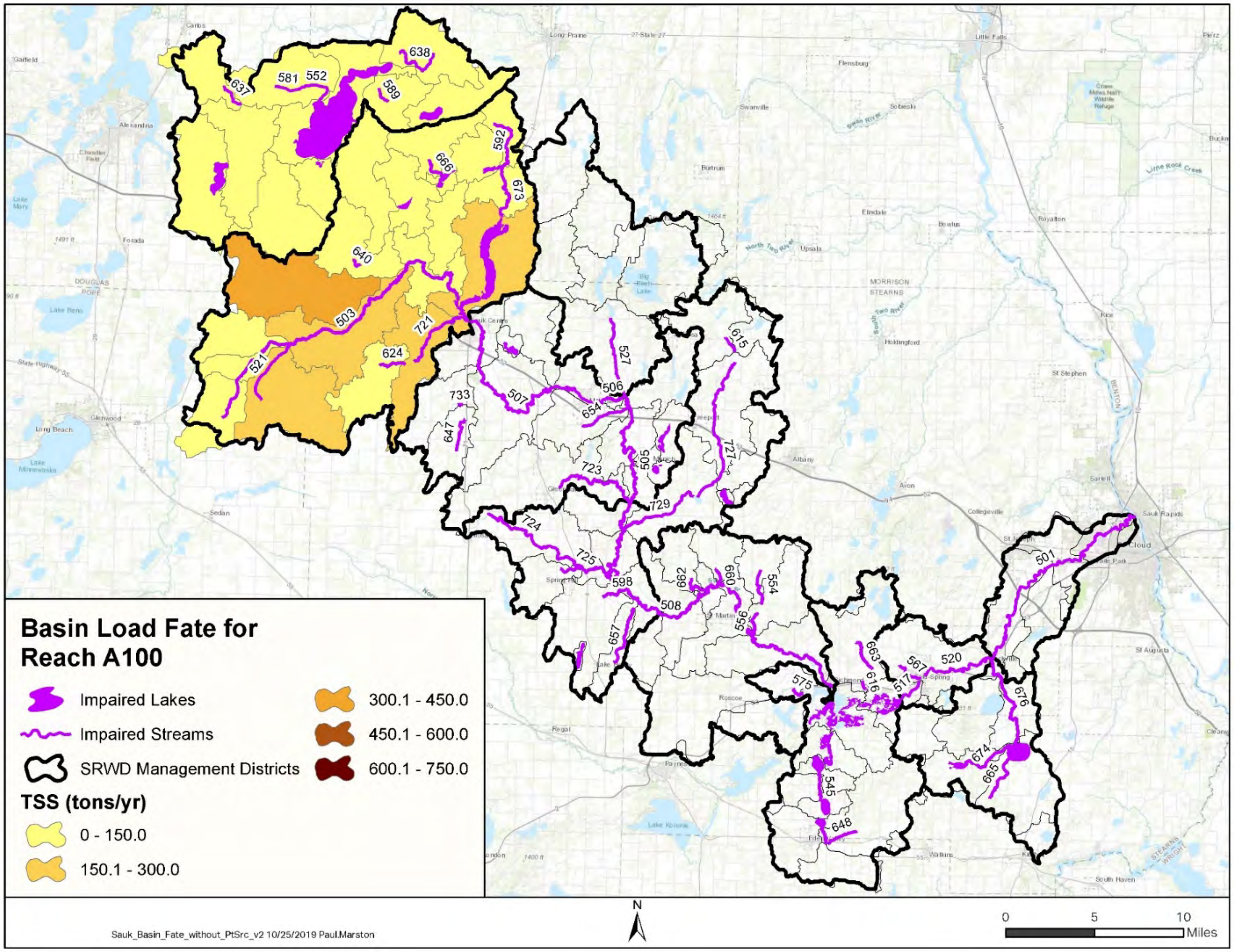

Figure H-8. Total Suspended Solid Source and Fate Map to Priority Reach A100.

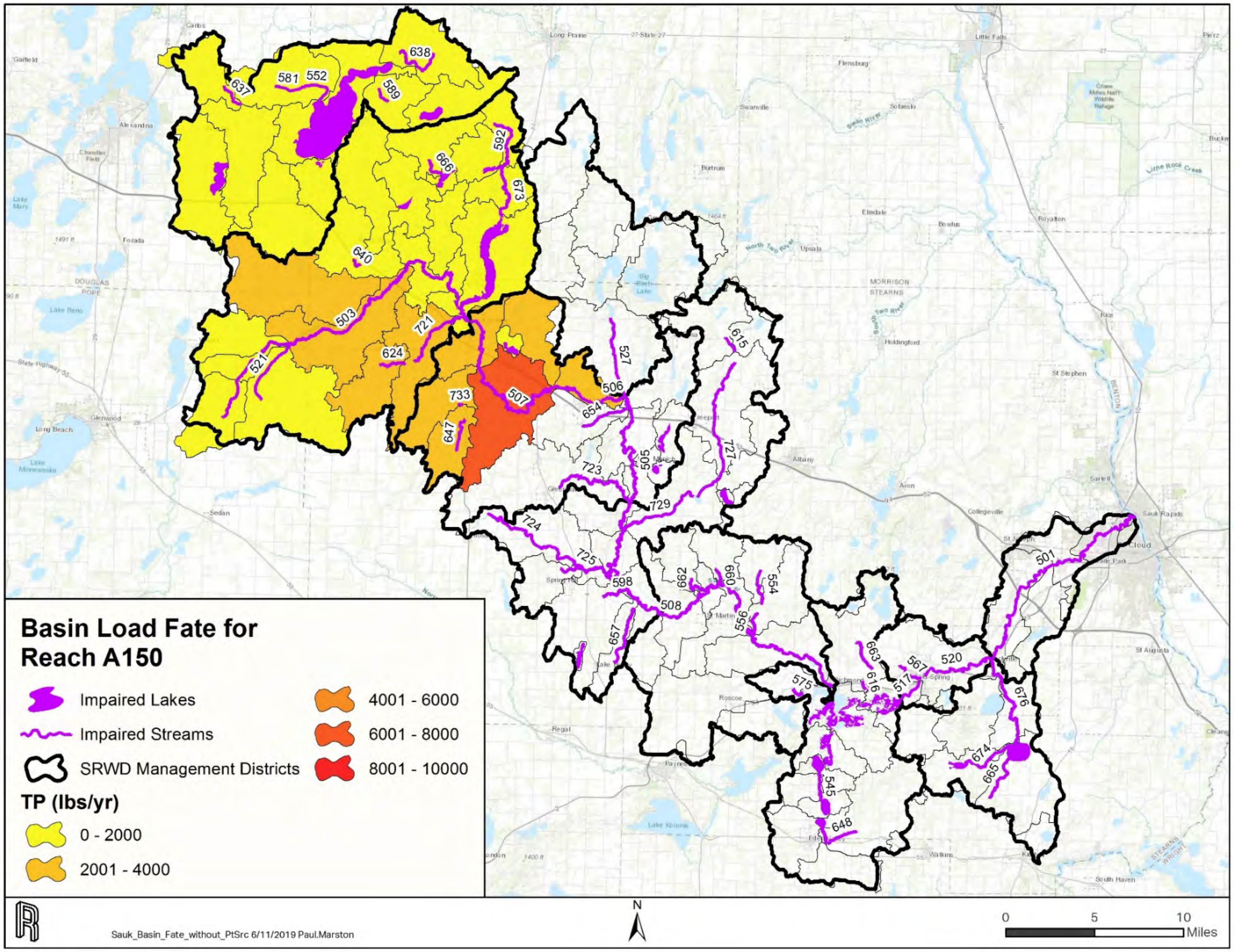

Figure H-9. Total Phosphorus Source and Fate Map to Priority Reach A150.

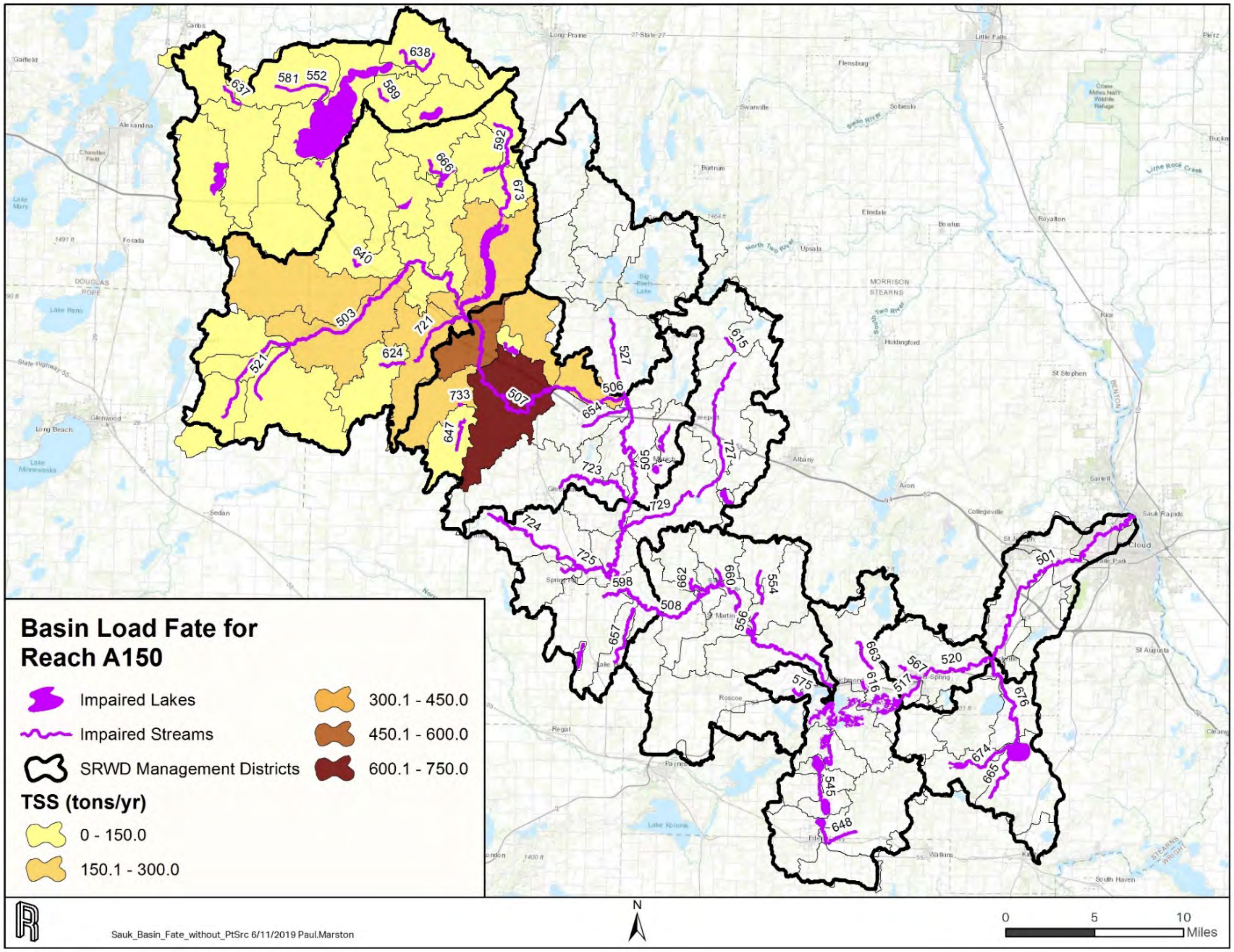

Figure H-10. Total Suspended Solid Source and Fate Map to Priority Reach A150.

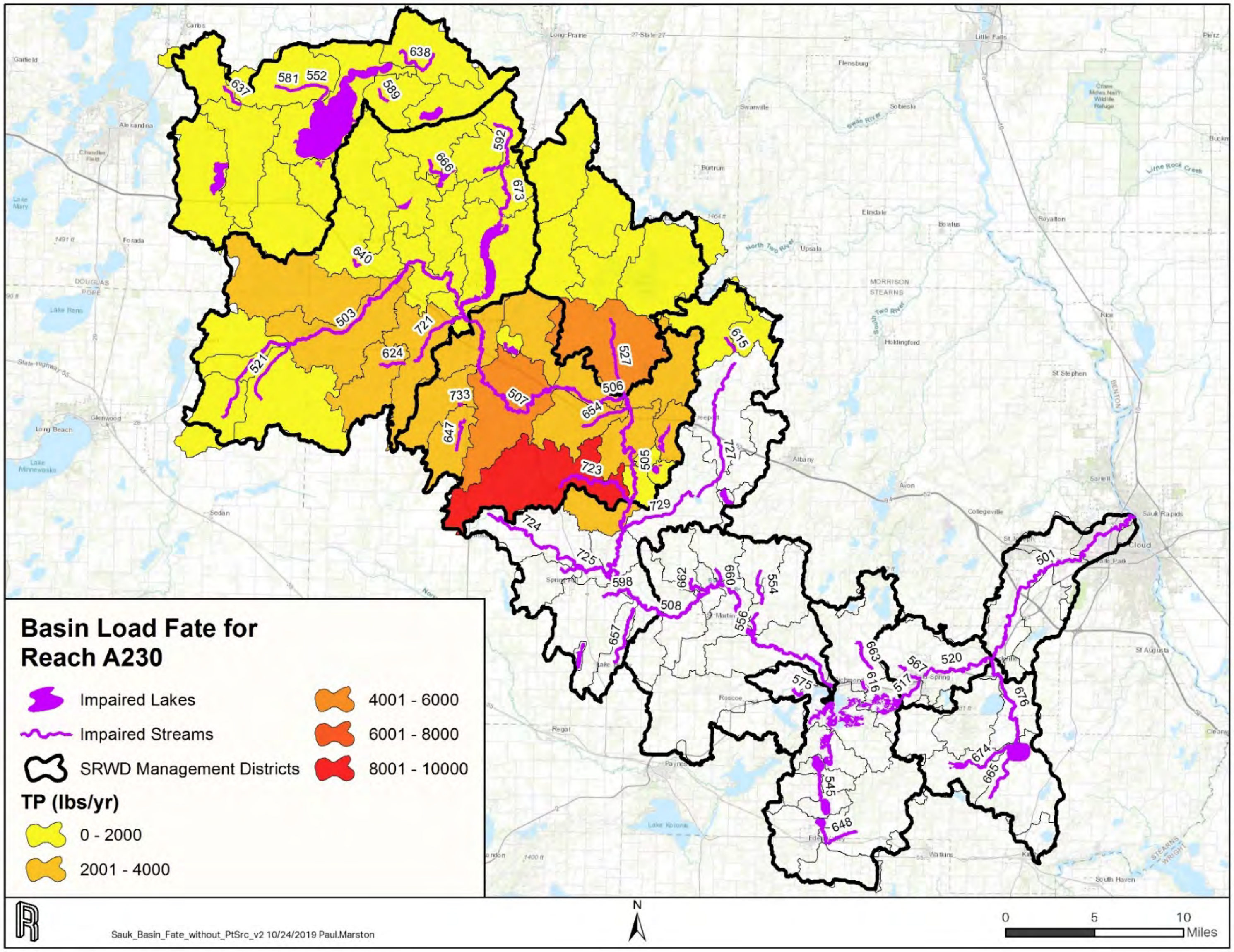

Figure H-11. Total Phosphorus Source and Fate Map to Priority Reach A230.

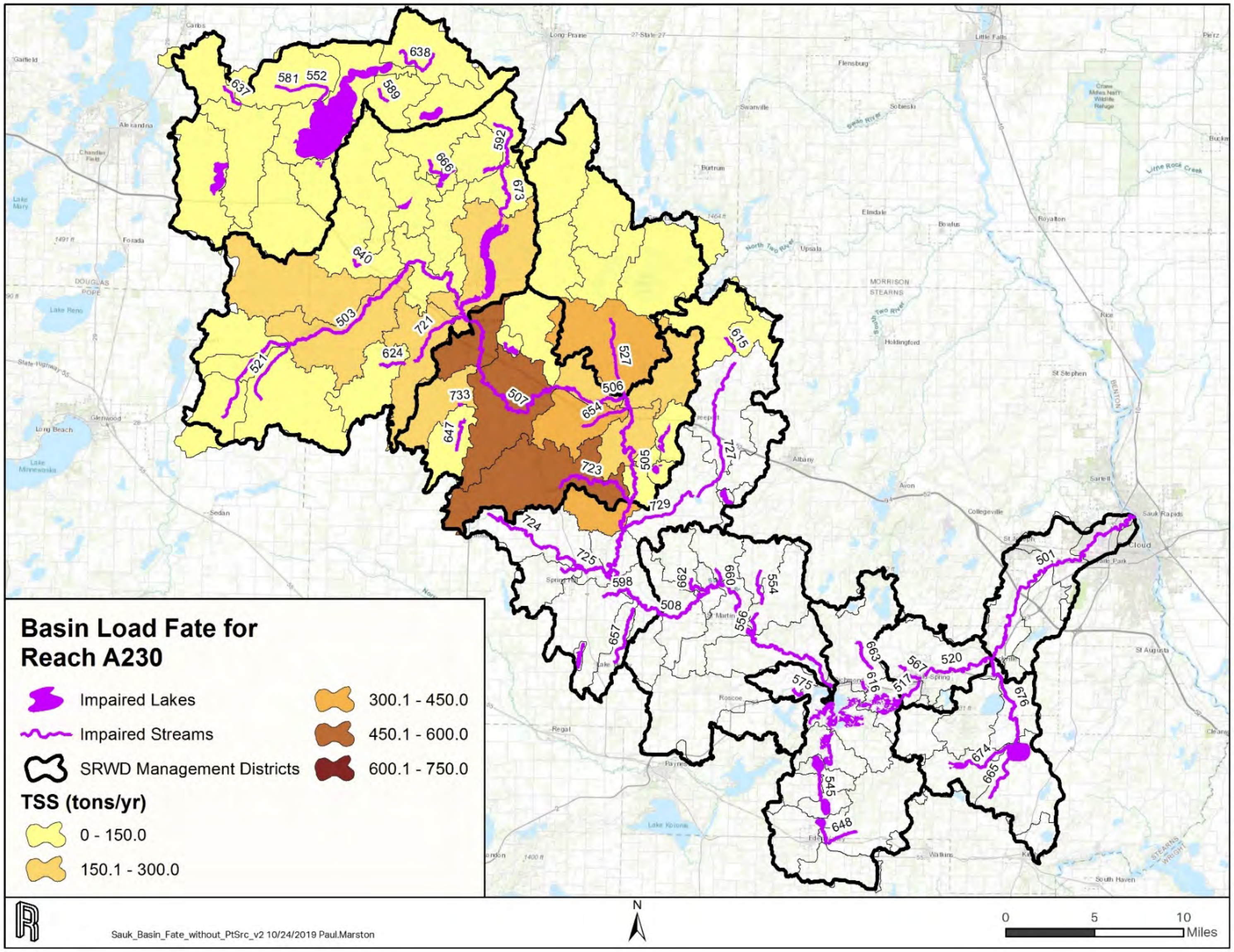

Figure H-12. Total Suspended Solid Source and Fate Map to Priority Reach A230.

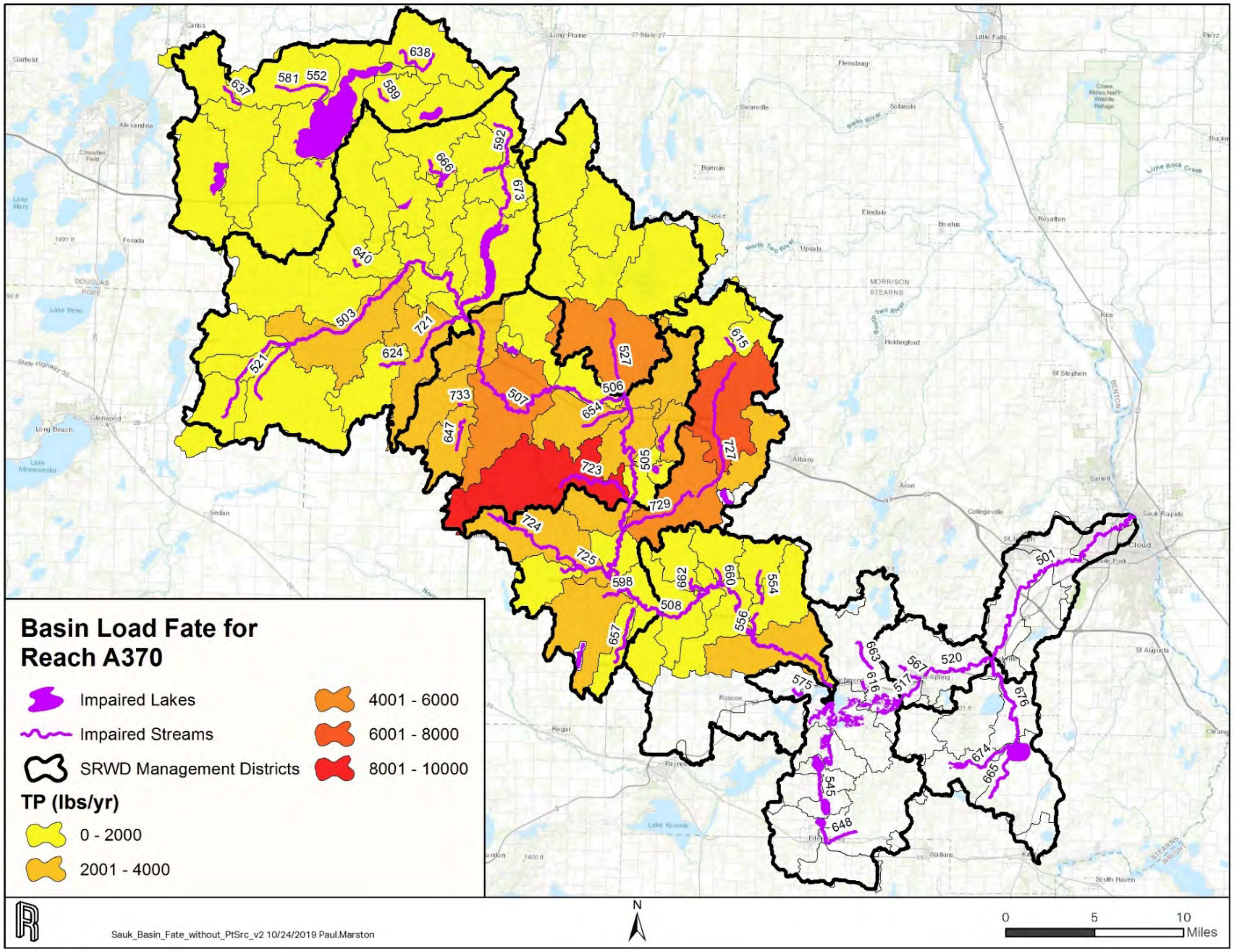

Figure H-13. Total Phosphorus Source and Fate Map to Priority Reach A370.

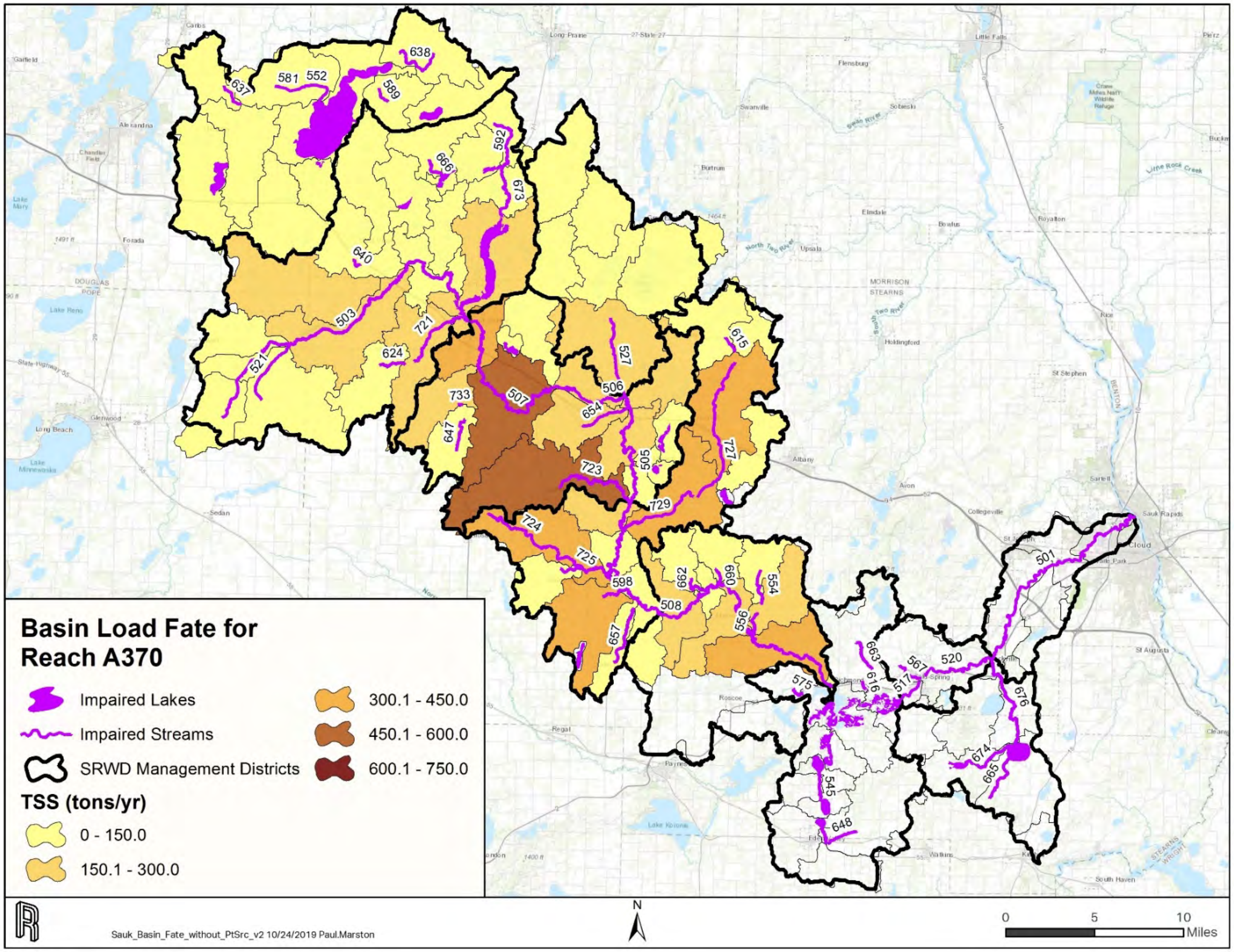

Figure H-14. Total Suspended Solid Source and Fate Map to Priority Reach A370.

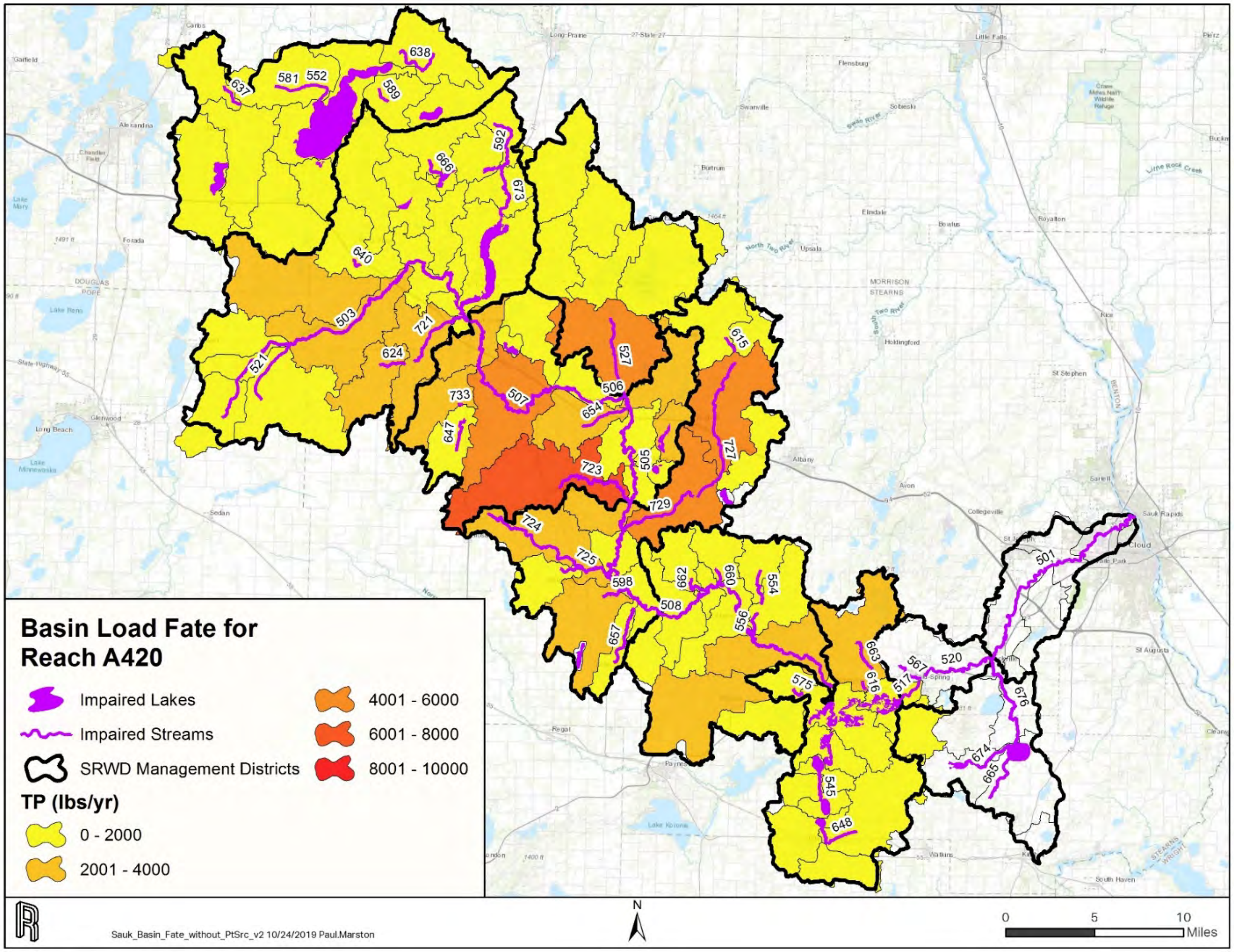

Figure H-15. Total Phosphorus Source and Fate Map to Priority Reach A420.

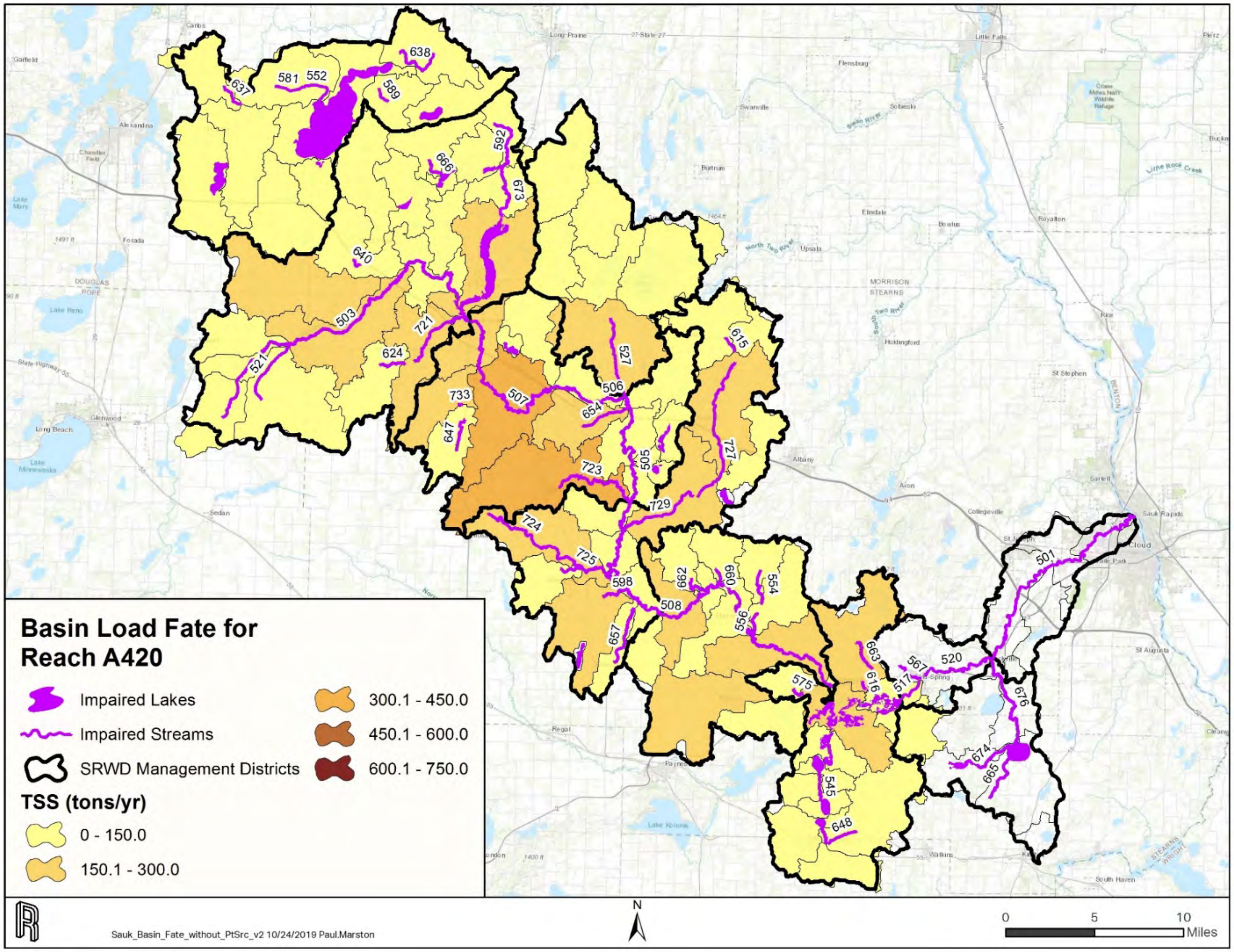

Figure H-16. Total Suspended Solid Source and Fate Map to Priority Reach A420.

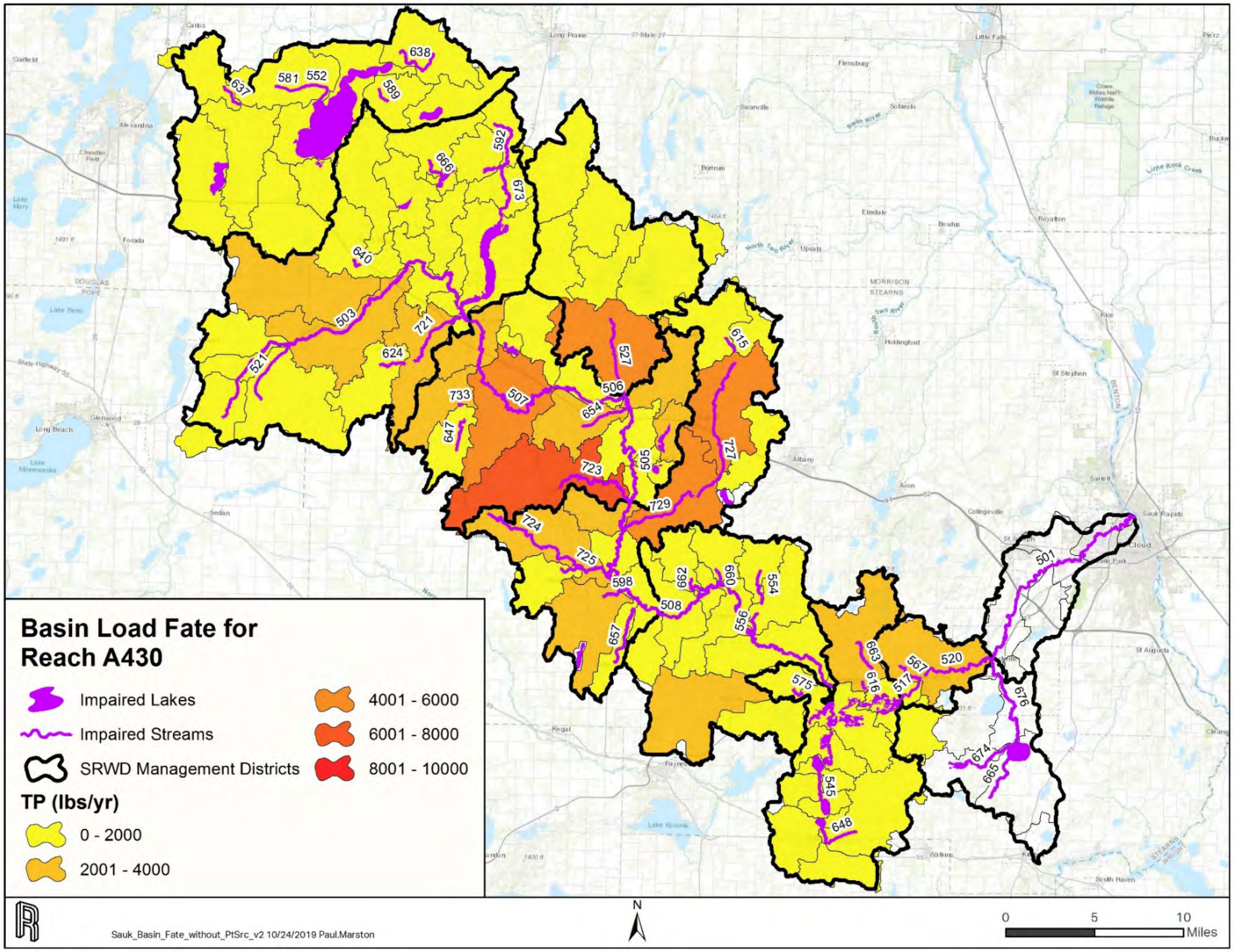

Figure H-17. Total Phosphorus Source and Fate Map to Priority Reach A430.

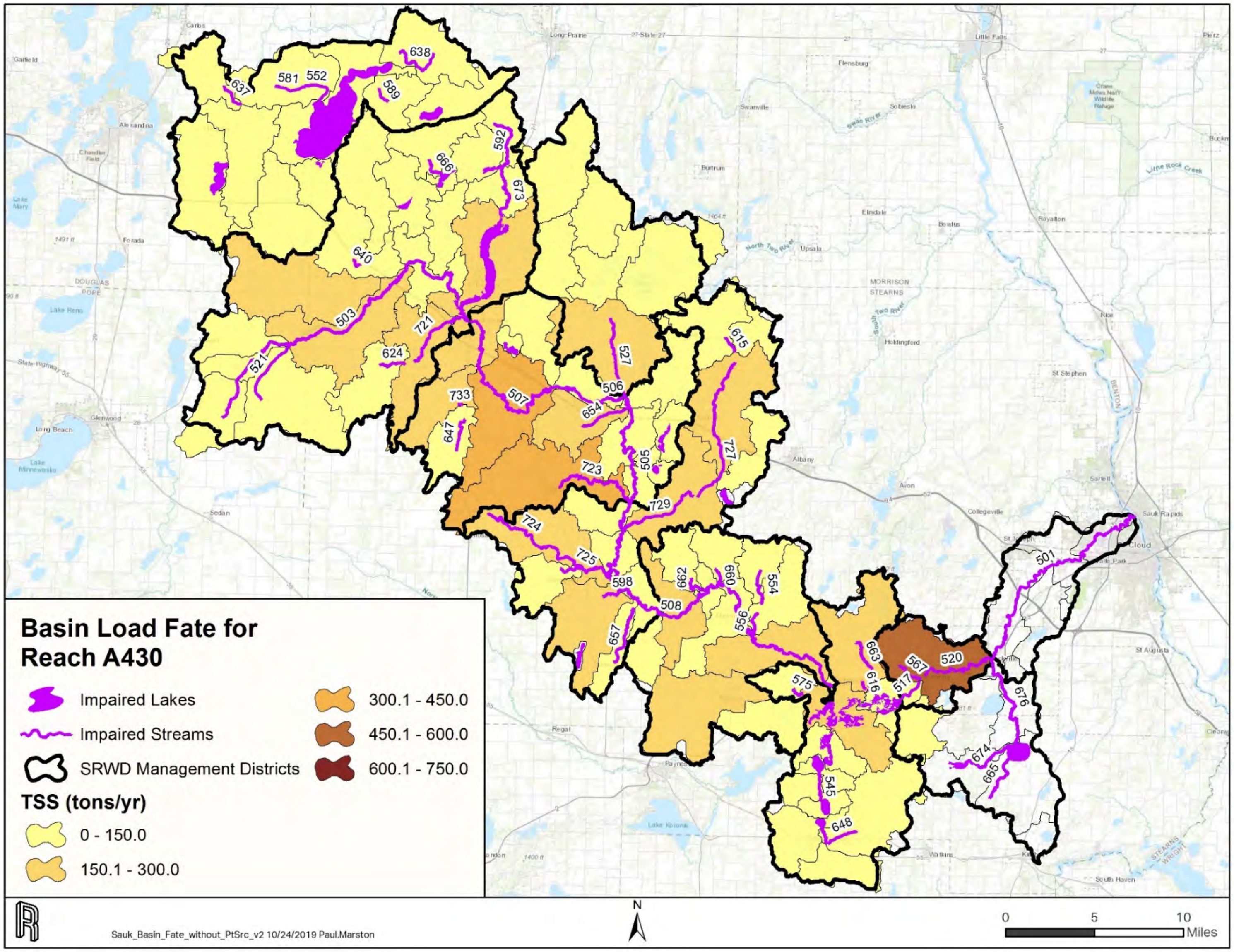

Figure H-18. Total Suspended Solid Source and Fate Map to Priority Reach A430.

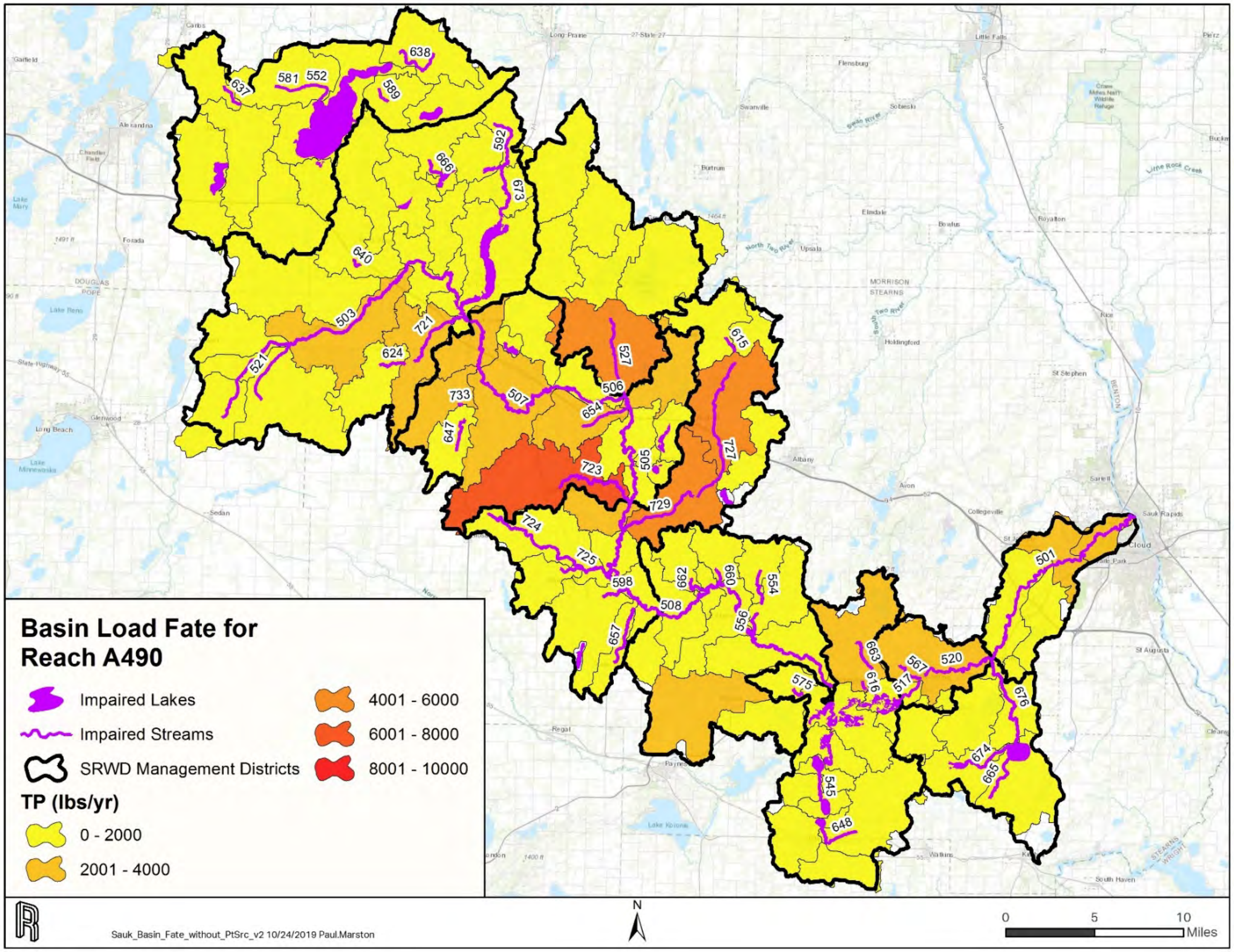

Figure H-19. Total Phosphorus Source and Fate Map to Priority Reach A490.

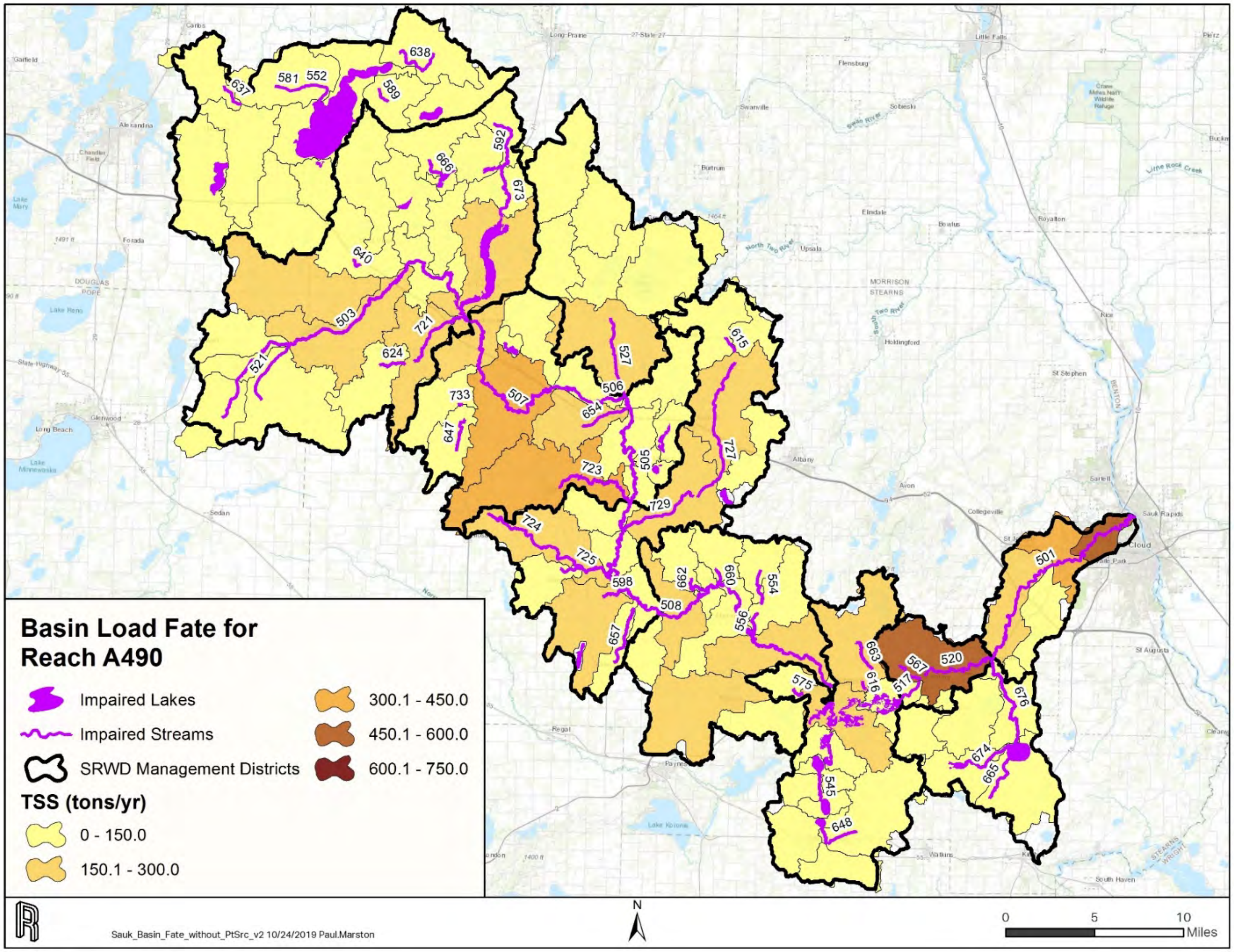

Figure H-20. Total Suspended Solid Source and Fate Map to Priority Reach A490.