Appendix A

FORMAL AGREEMENT

PLACEHOLDER

Appendix B

ID FORMAL ISSUES

PLAN APPENDIX B – IDENTIFICATION OF POTENTIAL WATERSHED CONCERNS AND ISSUES

This appendix includes the following information used to identify the priority concerns and issues addressed in the Hawk Creek-Middle Minnesota Comprehensive Watershed Management Plan:

1. List of reports, plans, and studies reviewed as part of the Comprehensive Watershed Management Plan development process (Table 1)
2. Plan Review Agency Notification Letters
   a. Board of Water and Soil Resources (BWSR)
   b. Minnesota Department of Agriculture (MDA)
   c. Minnesota Department of Health (MDH)
   d. Minnesota Department of Natural Resources (MNDNR)
   e. Minnesota Pollution Control Agency (MPCA)

The list of meetings held during the plan development are located in Table 2, Section 1.4 of the main report.

The list of data sources used to select priority areas in the watershed are located in Table 6, Section 3.4 of the main report.

Table 1. List of Documents Reviewed during Planning Process

Jurisdiction	Source	Document Name	Date	Document Type
City	City of Willmar	City of Willmar Watershed Management Plan	2012	Surface Water Management
County	Renville	Renville County Water Plan	2013-2023	Surface Water Management
County	Chippewa	Chippewa County Water Plan	2013-2023	Surface Water Management
County	Kandiyohi	Kandiyohi County Water Plan	2013-2023	Surface Water Management
County	Sibley	Sibley County Water Plan	2013-2023	Surface Water Management
County	Nicollet	Nicollet County Water Plan	2018-2023	Surface Water Management
State	MPCA	Building Resiliency to Extreme Precipitation in Minnesota	2018	Surface Water Management
State	Minnesota	Chapter 103E: Drainage Law		Surface Water Management
State	MDA	Minnesota Nitrogen Fertilizer Management Plan	2015	Surface Water Management
Watershed	MPCA	Hawk Creek Watershed Headwaters Lakes Water Quality Assessment	2008-2009	Surface Water Management
Watershed	MPCA	Hawk Creek -Yellow Medicine River Monitoring and Assessment Report	2015	Surface Water Management

Jurisdiction	Source	Document Name	Date	Document Type
Watershed	Tetra Tech	Hawk Creek/Yellow Medicine River HSPF Model	2011	Pollutant Modeling
Watershed	Tetra Tech	Hawk Creek/Yellow Medicine River BMP Scenarios	2015	Pollutant Modeling
Watershed	MPCA	Hawk Creek Watershed WRAPS	2017	Surface Water Management
Watershed	MPCA	Hawk Creek Watershed Biotic Stressor Identification	2013	Surface Water Management
Watershed	MPCA	Lower Minnesota River Dissolved Oxygen TMDL Project	2019	Pollutant Modeling
Watershed	MPCA	Habitat Quality Evaluation For Use Attainability Analysis of High Island Creek Near Arlington Minnesota	1987	Natural Resource Management
Watershed	Tetra Tech	Minnesota River Basin HSPF Sediment Delivery Analysis	2017	Pollutant Modeling
Watershed	MPCA	Minnesota River-Mankato Watershed TMDL	2019	Pollutant Modeling
Watershed	MPCA	Minnesota River-Mankato Watershed Monitoring and Assessment Report	2016	Surface Water Management
Watershed	Tetra Tech	Middle Minnesota River HSPF	2017	Pollutant Modeling
Watershed	MPCA	Minnesota River-Mankato Watershed WRAPS	2019	Surface Water Management
Watershed	MPCA	Minnesota River-Mankato Watershed Stressor Identification Report	2019	Surface Water Management
Watershed	MPCA	Middle Minnesota River Watershed Approach Civic Engagement Project Summary	2019	Education and Outreach
Watershed	MPCA	River Directory		Education and Outreach
Watershed	MPCA	Minnesota River Bacteria TMDL and Strategies	2019	Pollutant Modeling
Watershed	Hawk Creek Watershed Project	Long and Ringo Lakes Excess Nutrients TMDL	2011	Pollutant Modeling
Watershed	MPCA	Hawk Creek/Beaver Creek Fecal Coliform and Turbidity	In development	Pollutant Modeling
Watershed	MPCA	Hawk Creek Watershed TMDL	2017	Pollutant Modeling
Watershed	MDH	Groundwater Restoration and Protection Strategies Report	2020	Groundwater Management
Watershed	MPCA	Upper Hawk Creek and Willmar Chain of Lakes Section 312 Nine Key Element Plan	2020	Surface Water Management

BOARD OF WATER AND SOIL RESOURCES

11 Civic Center Plaza, Suite 300
Mankato, MN 56001

July 15, 2019

Hawk Creek-Middle Minnesota One Watershed, One Plan Partnership
C/O Diane Mitchell, Renville County
105 South 5th Street, Suite 311
Olivia, MN 56277

Re: Response to request for priority issues and plan expectations (One Watershed, One Plan)

Dear Diane,

Thank you for the opportunity to provide priority issues and plan expectations for the development of the Hawk Creek-Middle Minnesota Comprehensive Watershed Management Plan (plan) under Minnesota Statutes section 103B.801.

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 (Version 2.0), adopted by the BWSR Board on March 28, 2018. 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 (Version 2.0), adopted by the BWSR Board on March 28, 2018. 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 priority issues:

- **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 area should be included as stakeholders in the plan development process. This inclusion should ensure that the Chapter 103E processes and proceedings as well as the extent and the limitations of drainage authority responsibility are adequately included in the final plan. Additionally, the planning partners are strongly encouraged to include projects and activities consistent with multipurpose drainage criteria outlined in Minnesota Statutes §103E.011, Subd. 5 and §103E.015 As the 1W1P plan is formulated, BWSR suggests the following:

    a. 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.

    b. Prioritization within the watershed include identification of Chapter 103E drainage systems and their drainage areas.

    c. 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).

    d. 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.

    e. 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 applicable Sections of Chapter 103E.

- **Wetlands** – Protection and restoration of wetlands provides benefits for water quality, flood damage reduction, and wildlife habitat. The plan should support the continued implementation of the Wetland Conservation Act and look for opportunities to improve coordination across jurisdictional boundaries. The plan should also identify high priority areas for wetland restoration and strategically target restoration projects to those areas. The Restorable Wetland Prioritization Tool is an example resource that can be used to help identify such areas. The state is embarking on a new wetland prioritization plan that will guide wetland mitigation in the future. Wetland restoration and preservation priorities in this plan may be eligible for inclusion in this plan in the future. Please refer to the attached document "Hawk Creek-Middle Minnesota 1W1P Wetland Section Comments" for further information on this program and additional considerations regarding wetlands.
- **Conservation Easements** – The State's Re-Invest in Minnesota (RIM) Reserve easement program and the Conservation Reserve Enhancement Program (CREP), in partnership with the United States Department of Agriculture (USDA), 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 plan should take into account areas with a higher risk of contributing to surface and subsurface water degradation, such as highly erosive lands and wellhead protection areas that would benefit from being placed under permanent vegetative cover.
- **GRAPS** - The Groundwater Restoration and Protection Strategies (GRAPS) for the Hawk Creek-Middle Minnesota watersheds is currently under development and will be available in the near future. This report will help identify specific groundwater issues in the planning area; therefore, implementation actions to address these issues should be addressed in the plan.
- **WRAPS** - The Watershed Restoration and Protection Strategies (WRAPS) for the Hawk Creek is complete and is available from the MPCA. The WRAPS for the Middle Minnesota watershed is in development and pertinent information related to development of the WRAPS is available from MPCA staff. The WRAPS outlines reduction goals for excess sediment, phosphorus, nitrogen, and E. coli Bacteria as well as identifies areas for protection within the area and goals address degraded stream habitat. These goals should be reviewed and incorporated into your planning effort.
- **Lakes** – While lakes are not a major component to the overall land area within the watershed. They are very important to the local quality of life and local economies and are sensitive to nutrient enrichment and runoff from both shoreland and watershed sources. Several of the lakes within the watershed are listed as impaired. The watershed plan should consider prioritizing practices that meet the Lake Restoration and Protection Strategies listed in the Watershed Restoration and Protection Strategies (WRAPS) and the 2018 Nonpoint Priority Funding Plan (NPFP).
- **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. The weather record for the planning area shows increased frequency and severity of extreme weather events, which has a direct effect on local water management. Adjustments involving conservation and fieldwork planning and

implementation should be explored; for instance, the use of an updated precipitation frequency chart such as the NOAA Atlas 14 when designing conservation projects. An additional source of information for use in the planning process is the BWSR Landscape Resiliency Toolbox. Finally, a new white paper from the Minnesota Interagency Climate Adaptation Team titled "Building Resiliency to Extreme Precipitation in Minnesota" also provides resiliency strategies related to this topic.

- **Local Controls** - BWSR suggests a comparative review of local ordinances and regulations across the watershed, redetermination of ditches, SSTS compliance inspection requirements (property transfer, variance, etc.), level III feedlot inventories, shore land regulations, etc.) with the purpose of identifying commonalities and significant differences, and opportunities for coordination when planning implementation goals.
- **Soil Erosion/Soil Health** – BWSR believes that accelerated soil erosion, leading to turbidity and other water quality issues, is a significant issue in the watershed. This is especially true in the higher slope areas adjacent to the Minnesota River. The majority of the land use in the Hawk Creek-Middle Minnesota River planning area is agriculture. The concept and the associated practices of soil health have the potential to positively change the interaction of agriculture and the natural system at the soil level. Common soil health practices include the use of reduce or no tillage, the use of cover crops, increased areas of continuous living cover, and extended crop rotations. Improving soil health can help decreased soil erosion, increase water infiltration, provide nutrient scavenging, and increase soil organic matter. In addition, there seems to be increased interest from landowners and operators about soil health. It is recommended that these soil health practices be prioritized for implementation in the plan.
- **Surface and Groundwater Quality** – BWSR believes degraded water quality, both surface and groundwater, are significant issues in the watershed. The plan should examine current efforts to address these issues, and examine listed impairments and their locations, as strategies are developed to improve both surface and groundwater quality. BWSR advocates for efforts that will focus on reducing pollutant sources before they reach water resources as a key component of an overall strategy.
- **Altered Hydrology/Flooding/Water Quantity** – The hydrologic conditions of the watersheds in this planning area have changed over time. In recent decades more precipitation, more runoff, and more runoff per unit of precipitation has been observed as well as more frequent periods of extremely low flow in some watercourses. These hydrologic changes as well as others have contributed to instability of natural and artificial watercourses, degradation of wetland habitats, loss of agricultural productivity, and increased the risk of flood damages. Recognizing altered hydrology as a priority issue in the plan will help ensure that a driving factor behind many related issues is directly addressed.
- **Protecting Pollinator Populations** - Projects should identify opportunities to benefit pollinator populations through creating areas of refuge and providing floral resources that can benefit a wide range of pollinators. Governor Walz recently signed a new Executive Order "Restoring Healthy, Diverse Pollinator Populations that Sustain and Enhance Minnesota's Environment, Economy, and Way of Life" that directs efforts of the Interagency Pollinator Protection Team. This team recently released a Minnesota State Agency Pollinator Report that outlines state agency priorities. BWSR also has a BWSR Pollinator Toolbox that provides guidance for project planning, implementation and management. Invasive Species and Landscape Management: A cooperative approach across the watershed is recommended for invasive species management to address invasive species and weed issues across geographic and ownership boundaries. Invasive species should be prioritized based on their risk to

ecosystems, agriculture, recreation, and human health. There should also be a focus on emerging weed threats such as Palmer amaranth that pose a significant risk to agricultural production. Adaptive management strategies should be used to address invasive species and also maintain ecological functions and services within landscapes.

- **Urban Stormwater/MS4s** – Urban stormwater runoff frequently contains pollutants such as pesticides, fertilizers, sediment, salt, and other debris, which can contribute to excess algae growth and poor water clarity/quality in our water resources. Poorly managed urban stormwater can also drastically alter the natural flow and infiltration of water, scour stream banks and harm or eliminate aquatic organisms and ecosystems. Municipal Separate Storm Sewer System (MS4) General Permits is owned/operated by the City of Willmar and the City of Montevideo within the planning area. These MS4 permit holders should be invited to participate in the planning effort to ensure that their Stormwater Pollution Prevention Programs are incorporated into the plan.
- Data collection and monitoring activities necessary to support the targeted implementation schedule and reasonably assess and evaluate plan progress are required, and should be coordinated with other data collection and monitoring efforts.

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. If you have any questions, please feel free to contact us via email at Jeremy.Maul@state.mn.us or Mark.Hiles@state.mn.us, or via telephone at (507-344-2824).

Sincerely,

Jeremy Maul, *Board Conservationist*

Mark Hiles, *Clean Water Specialist*

Attachments: Hawk Creek-Middle Minnesota 1W1P Wetland Section Comments

cc: Ed Lenz, BWSR (via email)

Barbara Weisman, Ethan Jenzen and Robb Collett, DNR (via email)

Margaret Wagner and Aicam Laacouri, MDA (via email)

Carrie Raber and Amanda Strommer, MDH (via email)

Juline Holleran and Mike Weckwerth, MPCA (via email)

BOARD OF WATER AND SOIL RESOURCES

Internal Memo

Date: 7/15/2019

To: J. Maul, Board Conservationist

From: T. Smith, Wetland Section

RE: Hawk Creek-Middle Minnesota River 1W1P Wetland Section Comments

The Wetlands Section at BWSR has initiated a process to develop compensation planning frameworks (CPF) for each bank service area (BSA) in Minnesota. When completed, 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. For the baseline condition section we typically include the following watershed characteristics: pre-settlement vegetation, wetlands, lakes, watercourses, water quality, land cover, perennial cover and impervious surface, sensitive species and plant communities, Clean Water Act Section 404 permitting analysis, and aquatic resource loss. To the extent that these characteristics are assessed in the 1W1P process they will benefit our CPF development in the future. The Wetland Section may also be able to assist with compiling information on the current extent of wetlands in the watershed and assessing the amount of cumulative loss if the planning team is interested in this information.

Work on the plan for BSA 9, which includes Hawk Creek and the Middle Minnesota River, was initiated in 2017 but is not scheduled to be completed until late 2020. When the BSA 9 study began, we initially focused on the Yellow Medicine River watershed to assess the potential for integrating 1W1P planning and CPF development. Based on this pilot study we have concluded that there are potentially significant benefits in working together on these planning efforts, particularly if the schedules can be synchronized to some degree. If the Hawk Creek-Middle Minnesota River planning team is interested in exploring a cooperative approach whereby Wetland Section staff provide baseline information on wetlands and aquatic resources and some of the stakeholder coordination for the CPF development can be accomplished as part of the 1W1P process please let us know and we can discuss it further.

Our specific comments on the planning process for the Hawk Creek-Middle Minnesota River 1W1P are provided below.

- If wetland restoration projects become part of a local implementation plan they should be focused on restoring, to the greatest extent practicable, pre-disturbance conditions with respect to hydrology and vegetation. Restoration projects that are focused on a single function or service should be less of a priority than those that focus on the suite of functions provided by these resources. Also, restoration

efforts should attempt to restore self-sustaining systems that are not reliant on structures and/or routine management and operation.

- BSA 9 currently has a relatively low supply of wetland bank credits. This is true both for the general public and the Local Government Road Wetland Replacement Program (LGRWRP). The low balance of credits combined with a fairly high demand for replacement (approximately 34 standard wetland bank credits and 21 agricultural wetland bank credits were withdrawn from accounts in BSA 9 in calendar year 2018) could result in replacement for wetland impacts being exported out of the watershed which further reduces the ability of the landscape, and wetlands in particular, to perform functions at even a basic level. Through the CPF development process BWSR intends to identify priority areas where future wetland restorations would have the highest potential for success and also the greatest potential benefit to the watershed. This process could work closely with the 1W1P process to take advantage of these comprehensive planning efforts and identify wetland restoration priority areas that address multiple watershed management objectives.

In summary, the 1W1P participants, through their planning process, have the opportunity to contribute to, and benefit from, the CPF development. If there is interest in discussing opportunities to share data, coordinate baseline condition assessments, and take advantage of stakeholder input processes please do not hesitate to contact me or Mr. Dennis Rodacker of my staff.

DEPARTMENT OF AGRICULTURE

June 18, 2019

Dear Hawk-Middle Minnesota One Watershed One Plan committee,

Thank you for the opportunity to provide priority issues for consideration in the development of the Hawk-Middle Minnesota One Watershed One Plan (1W1P). The Minnesota Department of Agriculture (MDA) looks forward to working with local government units, stakeholders, and other agency partners in the planning process.

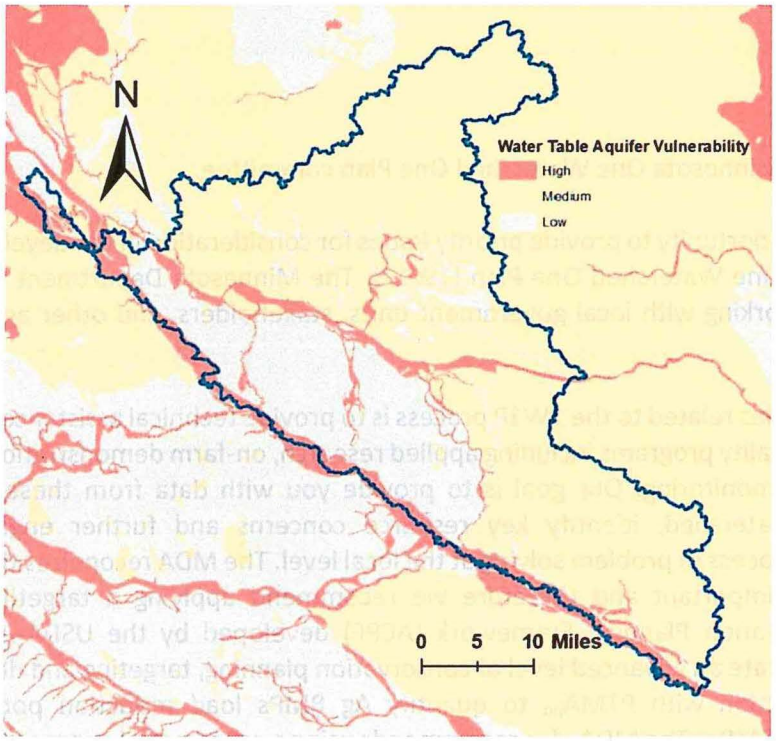
One of the MDA's roles related to the 1W1P process is to provide technical assistance. The MDA maintains a variety of water quality programs including applied research, on-farm demonstrations, and groundwater and surface water monitoring. Our goal is to provide you with data from these programs to better characterize the watershed, identify key resource concerns and further engage the agricultural community in the process of problem solving at the local level. The MDA recognizes that agricultural BMPs placement is very important and therefore we recommend applying a targeting tool such as the Agricultural Conservation Planning Framework (ACPF) developed by the USDA-Agricultural Research Service to help facilitate an advanced level of conservation planning, targeting and delivery. The ACPF can be used in conjunction with $PTMA_{pp}$ to quantify Ag BMPs load reduction potential and the cost effectiveness of the BMPs. The MDA also recommends using a coordinated approach to address nutrients both in groundwater and surface water when possible.

Minnesota Department of Agriculture Priority Concerns
Nitrates and pesticides in groundwater are a priority resource concern for the MDA in this watershed.

The following is a list of pertinent activities, datasets, resources, and programs that the MDA has supported in this watershed to address these concerns. Please consider these activities and resources in the 1W1P development process for the Hawk-Middle Minnesota 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 was updated in 2015. The Nitrogen Fertilizer Management Plan is available at: www.mda.state.mn.us/nfmp.

The primary goal of the NFMP is to involve local farmers and crop advisers in problem-solving to address elevated levels of nitrate in groundwater. As part of the NFMP, the MDA designed the Township Testing Program (TTP) to assess nitrate-nitrogen concentrations in private wells within areas that are vulnerable to groundwater contamination (See vulnerable area map below).

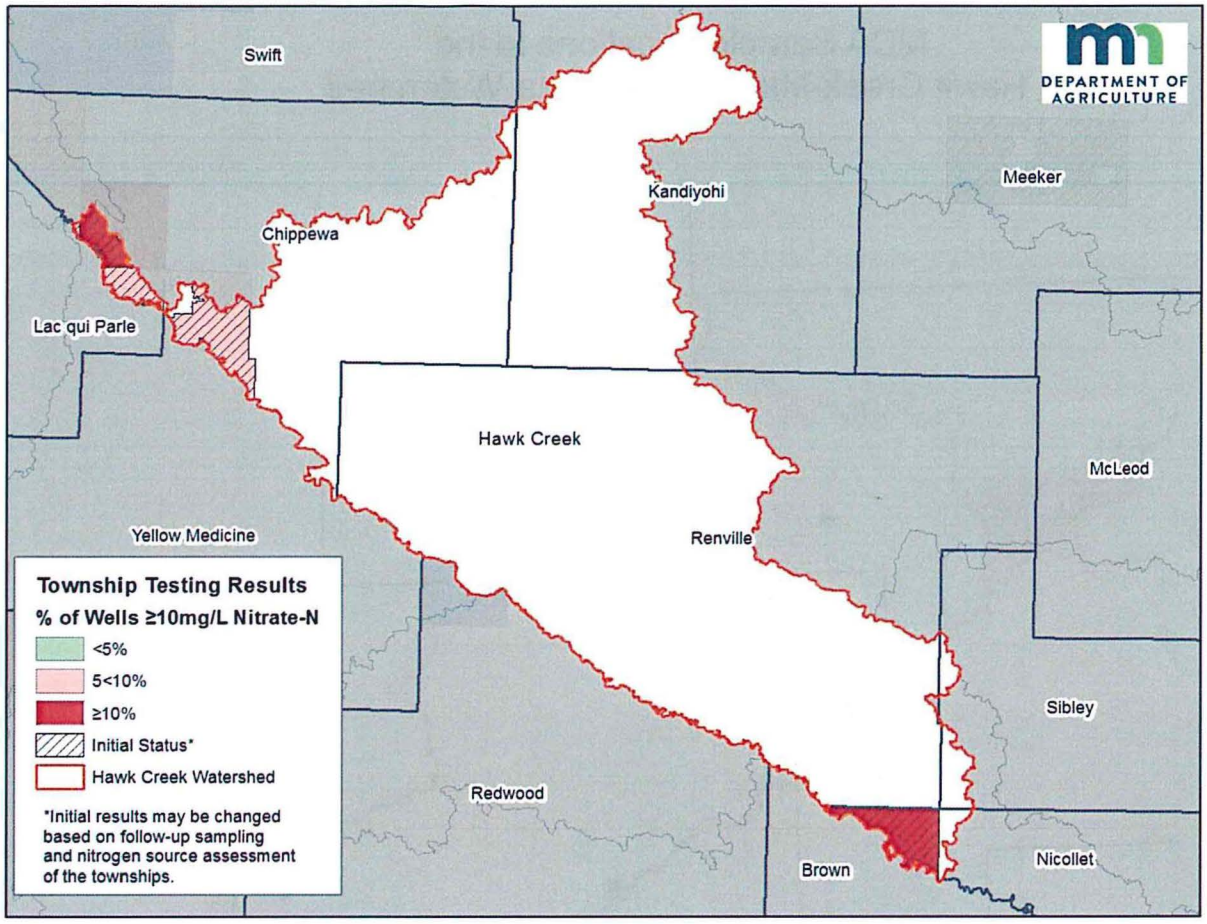


This image shows the Hawk-Middle Minnesota watershed on the Vulnerable Groundwater Area Map. Pink indicates an area where nitrate can move easily through soil and into groundwater.

Township Testing Program (TTP)

Three townships in the watershed have been through the initial township testing and will have follow-up testing in the summer of 2019. The evaluation will be completed in 2020. Two townships in Chippewa County were tested, Tunsberg had greater than or equal to 10% of its wells over 10mg/L, while Sparta Township had 5 to 10% of wells over 10 mg/L. One Township in Nicollet County was tested and 10% or more of its wells were at or over 10 mg/L.

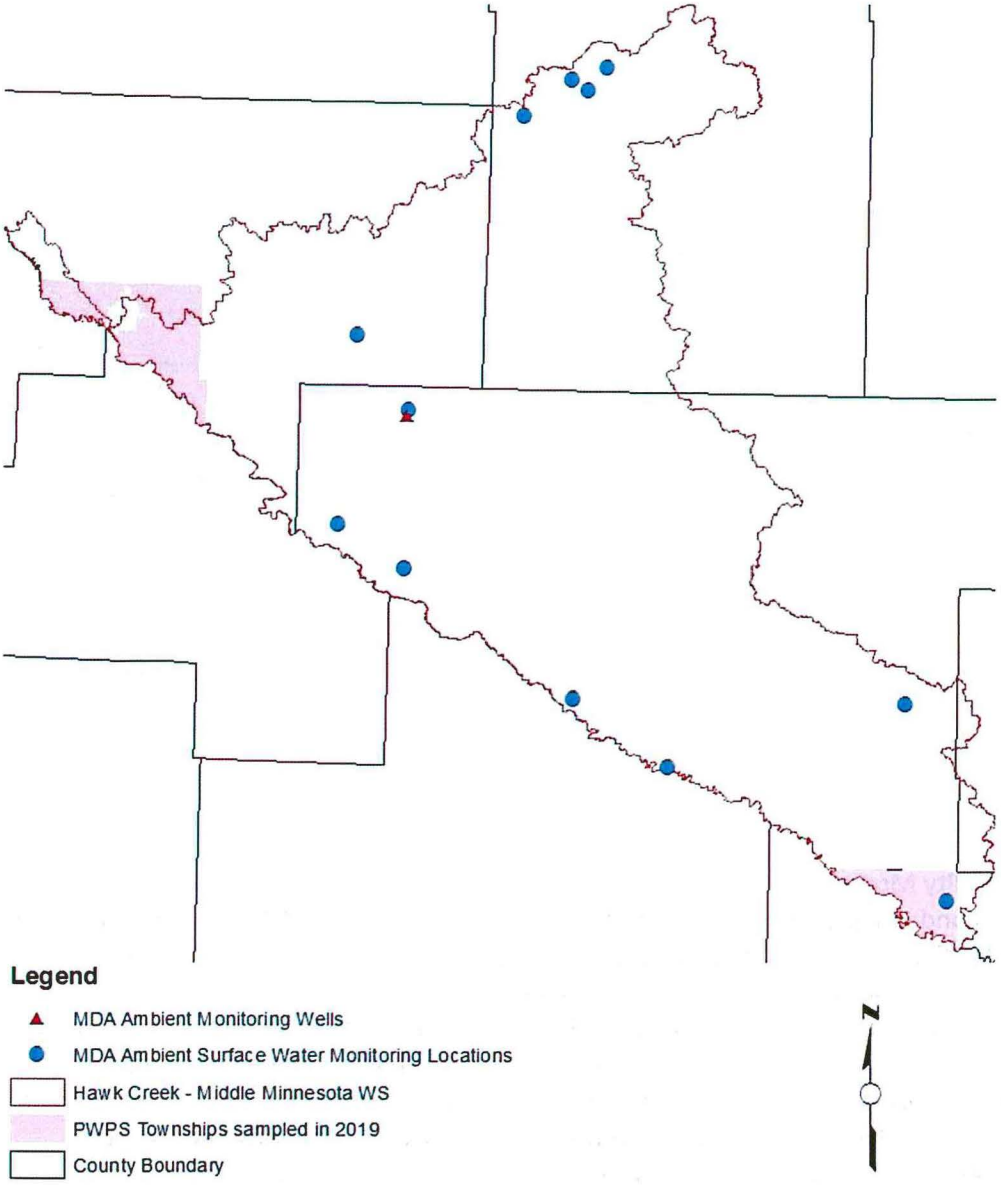
In the figure below, townships with hash lines represent initial (first year) testing results and townships without hash lines are final. All townships tested in the Hawk Creek Watershed are Initial results. Initial results represent private well drinking water regardless of the potential source of nitrate. Final results are determined using two rounds of sampling and a process to remove faulty wells (i.e. cracked casing) and those near potential non-fertilizer sources of nitrate. Final results only include results that are potentially impacted by applied commercial fertilizer. Townships noted with initial results may change based on follow-up sampling and well assessments. Detailed sampling results are available at: www.mda.state.mn.us/townshiptesting.



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 approximately 150 different pesticide compounds that are widely used and/or pose the greatest risk to water resources. Groundwater monitoring is conducted by the MDA and Minnesota Pollution Control Agency staff. Surface water monitoring is conducted by the MDA and local organizations. All monitoring is completed following annual work plans and standard operating procedures (SOP's) developed by the MDA.

MDA Sample Locations in the
Hawk Creek-Middle Minnesota Watershed



- **Private Well Pesticide Sampling (PWPS)**

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. This is a companion program to the MDA Township Testing Program (TTP). Townships in different counties have been, and will continue to be, sampled every year until the project concludes in 2020. The townships included in the PWPS depend on the voluntary participation of well owners and may not reflect all of the townships sampled in the TTP.

The PWPS Project is scheduled to sample two townships within the watershed in 2019.

More information is available at: www.mda.state.mn.us/pwps

- **Ambient Monitoring Results**

The MDA samples one water table well within the watershed. Sampling began in 2007 and the well has been sampled at least once a year since it was established. Pesticide and nitrate data is available for the site. Semiannual water level measurements are also available from the site.

Nine different pesticides or pesticide breakdown products (or degradates) have been detected in this watershed. None have exceeded human health reference values.

Nitrate-nitrite (nitrate) has been detected in the well within the watershed. The nitrate concentrations range from 0.62 to 11.4 mg/L. The health risk limit (HRL) for nitrate is 10 mg/L.

Monitoring of the MDA's monitoring well in the watershed is expected to continue into the future.

- **Surface Water**

The MDA has completed 33 pesticide and/or nutrient water quality sample collection events from eight locations within the Hawk Creek-Middle Minnesota River Watershed from 2002-2018. The MDA has also completed three pesticide water quality sample collection events from three lakes (2012 and 2017), and two pesticide water quality sample collection events from one wetland (2014).

The MDA has been actively monitoring Hawk Creek at CR52 Bridge, 6.5 miles southeast of Granite Falls, Minnesota (S002-012) since 2017. The MDA will collect pesticide water quality samples at this location through at least 2023.

Chetomba Creek was included on the 2018 Impaired Waters List due to a 2015 detection of chlorpyrifos, an organophosphate insecticide. As a result of this impairment, the MDA established the Hawk Creek location in 2017 to increase pesticide monitoring at the nearest downstream location with continuous water level and discharge equipment. No other pesticide detections have resorted in an impairment in the watershed.

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, it is available at www.mda.state.mn.us/monitoring. The MDA's surface and groundwater water quality data is also available at the National Water Quality Monitoring Council: https://www.waterqualitydata.us/

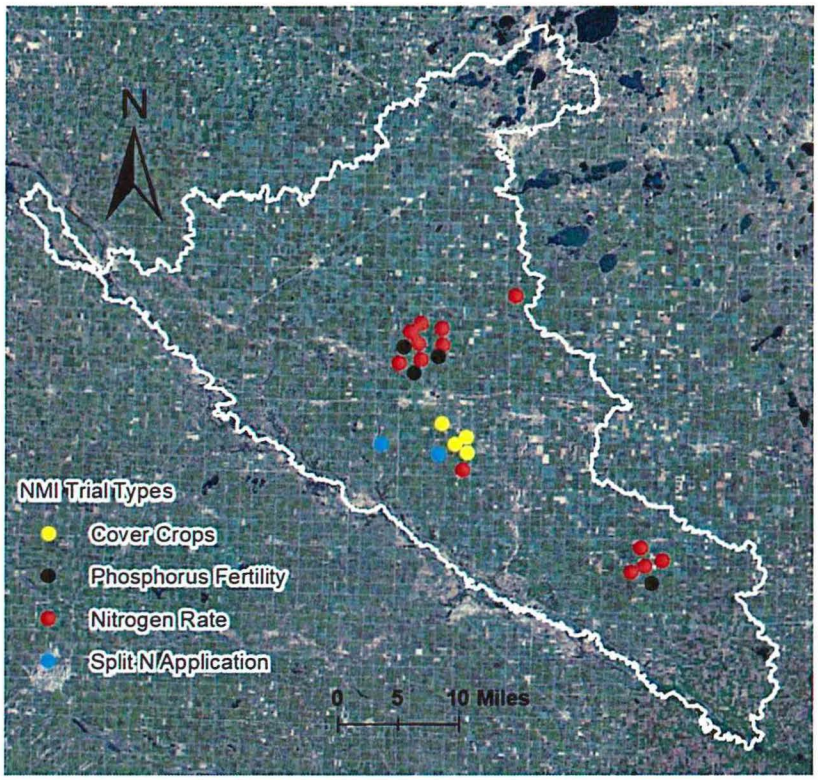
On-Farm Trials:

On-farm trials where farmers can try alternative crops, nutrient management options, and measure runoff from cropland are good options to provide local data regarding agricultural land management and water quality.

- **Nutrient Management Initiative (NMI)**

The NMI program assists crop advisers and farmers in evaluating nutrient management practices on their own fields through the use of on-farm trials. This is a great opportunity to promote new strategies that could improve fertilizer use efficiency, as well as to help open the door to include local farmers and

crop advisers in the water quality discussion. There have been approximately 23 on-farm trials established in the Hawk-Middle Minnesota watershed (see map below). Across the state, NMI trials have included cover crops, fertilizer rate, placement, and timing, as well as precision agriculture and technology. Through this program, crop advisors work directly with farmers and focus on new management strategies within the farmer's field. The trials in this watershed have focused on cover crops, and on nitrogen application rates and timing (split application) on corn following soybeans. More advanced trials in this program are coordinated with University of Minnesota researchers and have been used to help guide corn nitrogen rate recommendations for this region of the state. More information on this program is available at: www.mda.state.mn.us/nmi



- **Discovery Farm: Edge of field Monitoring**

Edge of field monitoring is important for relating farm practices and weather conditions to offsite movement of nutrients, sediments and pesticides.

There is one Discovery Farm within the Hawk Creek-Middle Minnesota watershed – RE1 (Renville County) covering about an 81-acre watershed. RE1 has seven years of data (WY2012 – WY2018) and monitors subsurface tile losses (but also has a handful of surface inlets). This site does not have a surface flume. A summary of the results from the seven year period is presented in the table below:

SUBSURFACE TILE LOSSES	Runoff (inches)	Total Suspended Solids (lbs/ac)	Total Phosphorus (lbs/ac)	Total Nitrogen (lbs/ac)	Cumulative Flow Duration (days)	% of measured Precipitation that ran off through the flume
Average	3.98	33.4	0.1	14.0	152.43	14 %
Range	0.09 – 7.97	0.2 – 145.1	<0.1 – 0.3	<0.1 – 25.7	20.39 – 305.40	<1 – 26 %
% loss during Frozen Soils	14 %	18 %	19 %	12 %	-	-

To provide information on surface loss, we present data from our McLeod County Discovery Farm (MC1) that is only about 1.5 miles from the Hawk-Middle Minnesota watershed boundary. The site currently has only one year of water quality data (WY2018). MC1 covers a 60.6 acre watershed with a corn-soybean rotation. This site monitors both surface runoff and subsurface tile losses.

SURFACE LOSSES	Runoff (inches)	Total Suspended Solids (lbs/ac)	Total Phosphorus (lbs/ac)	Total Nitrogen (lbs/ac)	Cumulative Flow Duration (days)	% of measured Precipitation that ran off through the flume
2018 WY	1.68	7.2	0.2	1.8	18.02	5 %
% loss during Frozen Soils	82 %	38 %	83 %	91 %	-	-

SUBSURFACE TILE LOSSES	Runoff (inches)	Total Suspended Solids (lbs/ac)	Total Phosphorus (lbs/ac)	Total Nitrogen (lbs/ac)	Cumulative Flow Duration (days)	% of measured Precipitation that ran off through the flume
2018 WY	8.36	24.2	0.1	29.8	270.76	4 %
% loss during Frozen Soils	22 %	30 %	61 %	16 %	-	-

Nitrogen and Pesticide Use Surveys

The MDA surveys farmers through the National Agricultural Statistics Service (NASS) on practices related to crops and farm inputs. The most recent nitrogen use survey was for the 2014 crop year (Corn), while the most recent detailed pesticide use survey was from the 2013 crop year. The two tables below provide insights into nitrogen rates by rotation in this watershed, and more information is available at: www.mda.state.mn.us/pesticide-and-fertilizer-use-surveys

For corn following soybean, nitrogen fertilizer rates ranged from an average of 146 pounds per acre in Kandiyohi County to 150 pounds per acre in Renville County as shown in the table below.

Average County Nitrogen Fertilizer Rates for the SW BMP Region for corn following soybeans (2014)			
County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Chippewa	21	148	165
Kandiyohi	14	146	167
Renville	31	150	159

For corn following corn, nitrogen fertilizer rates ranged from an average of 165 pounds per acre in Kandiyohi County to 177 pounds per acre in Renville County as shown in the table below.

Average County Nitrogen Fertilizer Rates for the SW BMP Region for Corn Following Corn (2014)			
County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Chippewa	5	173	69
Kandiyohi	6	165	57
Renville	5	177	64

For reference, the University of Minnesota nutrient management recommendations for agronomic crops grown in MN can be found here: https://extension.umn.edu/nutrient-management/crop-specific-needs

Minnesota Agricultural BMP Handbook (revised in 2018)
The MDA recently supported an update to this handbook initially created in 2012. It provides a comprehensive summary of BMPs that are practical for Minnesota. The handbook incorporates the most current data to create realistic estimates of the benefits of best management practice implementation. Estimates of effectiveness, economic consideration and other potential barriers are included with each BMP description in this handbook. This resource may be especially useful in this watershed. The handbook is available at: www.mda.state.mn.us/agbmphandbook

Minnesota Agricultural Water Quality Certification Program (MAWQCP)
The MAWQCP is a voluntary opportunity for farmers and agricultural landowners to take the lead in implementing conservation practices that protect water quality. Participants that implement and maintain approved farm management practices will be certified and in turn obtain regulatory certainty for a period of ten years. This is a planning program that should be included in the 1W1P because it is an opportunity for agricultural producers to evaluate nutrient and field management practices within the watershed to help reduce losses.

There are currently 8 certified producers in the watershed with 67 parcels that total 6,293 acres. Additional information on the MAWQCP is available at: www.mda.state.mn.us/awqcp.

Additional Resources and Opportunities for BMP funding and Cost-Share

Agricultural Land Preservation Program

The MDA assists local government in protection of farmland through its Agricultural Land Preservation Program. This includes online tools and programmatic support. More information is available at www.mda.state.mn.us/environment-sustainability/farmland-protection

Agricultural Growth, Research, and Innovation (AGRI) Program

The AGRI program has funding that may be helpful in water quality protection. Specifically:

- The AGRI **Livestock Investment Grant** encourages long-term industry development for Minnesota livestock farmers and ranchers by helping them improve, update, and modernize their livestock operation infrastructure and equipment. More information is available at www.mda.state.mn.us/livestockinvestment.

- The AGRI **Sustainable Agriculture Demonstration Grant** supports innovative on-farm research and demonstrations. It funds projects that explore sustainable agriculture practices and systems that could make farming more profitable, resource efficient, and personally satisfying. Findings are published in the MDA's annual *Greenbook*. More information is available at www.mda.state.mn.us/sustagdemogrant.

The AgBMP Loan Program: 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. In addition, these loans are available to help finance repairs, replacement wells, or water treatment equipment to provide safe drinking water to rural residents who have water quality issues.

Thank you again for the opportunity to provide background and relevant information as we look forward to being involved in the 1W1P process.

Sincerely,

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DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

July 15, 2019

Diane Mitchell, Renville County Water Planner
105 South 5th Street, Suite 311
Olivia, MN 56277
DianeM@renvillecountymn.com

Jeremy Maul, BWSR Board Conservationist
11 Civic Center Plaza, Suite 300
Mankato, MN 56001
jeremy.maul@state.mn.us

Subject: Initial Comment Letter – *Hawk Creek-Middle Minnesota Watershed Planning Project*

Thank you for the opportunity to submit comments regarding water management issues for consideration in the One Watershed One Plan (1W1P) planning process for the Hawk Creek-Middle Minnesota 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.

MDH Priority Concerns:

Prioritize Drinking Water Supply Management Areas (DWSMA) in the Hawk Creek-Middle Minnesota 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 Wellhead Protection (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 Hawk Creek-Middle Minnesota 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.

Approximately twenty percent of the 517 arsenic samples taken from wells in the Hawk Creek-Middle Minnesota Watershed have levels of arsenic higher than the Safe Drinking Water Act (SDWA) standard of 10 micrograms per liter (µg/L). Arsenic occurs naturally in rocks and soil and can dissolve into groundwater. Consuming water with low levels of arsenic over a long time (chronic exposure) is associated with diabetes and increased risk of cancers of the bladder, lungs, liver and other organs. The SDWA standard for arsenic in drinking water is 10 µg/L;

however, drinking water with arsenic at levels lower than the SDWA standard over many years can still increase the risk of cancer. The EPA has set a goal of 0 µg/L for arsenic in drinking water because there is no safe level of arsenic in drinking water.

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 (maintaining/upgrading SSTS, well sealing, etc.) should consider effects on these public water systems. Find information regarding noncommunity public water supplies in the watershed in reports titled Source Water Assessments (SWA) at:
https://www.health.state.mn.us/communities/environment/water/swp/swa.html

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 and promote groundwater conservation & recharge.

The Hawk Creek-Middle Minnesota watershed has areas with deep wells with limited groundwater resources and aquifer availability. Promote conservation practices that improve groundwater recharge and wise water use.

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 1W1P, whether PTMapp, HSPF-Scenario Application Manager (SAM) or others, leverage GIS information and/or digital terrain analysis to determine 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 Hawk Creek-Middle Minnesota. 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.

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

Using Guidance Documents to Manage Specific Potential Contaminant Sources –

The MDH has developed several guidance documents to manage impacts to drinking water from specific potential contaminant sources. Topics include mining, stormwater, septic systems, feedlots, nitrates, and chemical and fuel storage tanks. This information is available at

https://www.health.state.mn.us/communities/environment/water/swp/resources.html

Attached you will find a listing of MDH data and information 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 (507) 476-4241 or Amanda.strommer@state.mn.us.

Sincerely,

Amanda Strommer

Amanda Strommer, Principal Planner
Minnesota Department of Health, Source Water Protection Unit
1400 E. Lyon Street, Marshall, MN 56282

Attachments

CC via email:

Mark Wettlaufer, MDH Source Water Protection Unit
Yarta Clemens-Billaigbakpu, 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
Mark Hiles, BWSR Clean Water Specialist
Ethan Jenzen, DNR
Mike Weckwerth, MPCA
Aicam Laacouri, MDA

MDH Data and information:

- Drinking Water Statistics – Where do people get their drinking water in the Hawk Creek-Middle Minnesota Watershed? One hundred percent obtain their drinking water from groundwater 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 https://www.health.state.mn.us/communities/environment/water/swp/maps/index.htm This information can help you prioritize and target implementation activities that protect drinking water sources for public water supplies.

MDH Figures:

- A figure detailing the "Pollution Sensitivity of Near-Surface Materials" in the Hawk Creek-Middle Minnesota 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 Hawk Creek-Middle Minnesota 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 "Nitrate Results and Pollution Sensitivity of Wells" in the Hawk Creek-Middle Minnesota 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 Hawk Creek-Middle Minnesota Watershed Underlain by Geologic Sensitivity Ratings from Wells. This information can help you understand which wells in the watershed contain elevated arsenic levels.
- A figure detailing "DWSMA Vulnerability" in the Hawk Creek-Middle Minnesota Watershed. This information can help you understand which DWSMA is most vulnerable to contamination from the ground surface. This figure allows for targeting of implementation activities for public water suppliers.

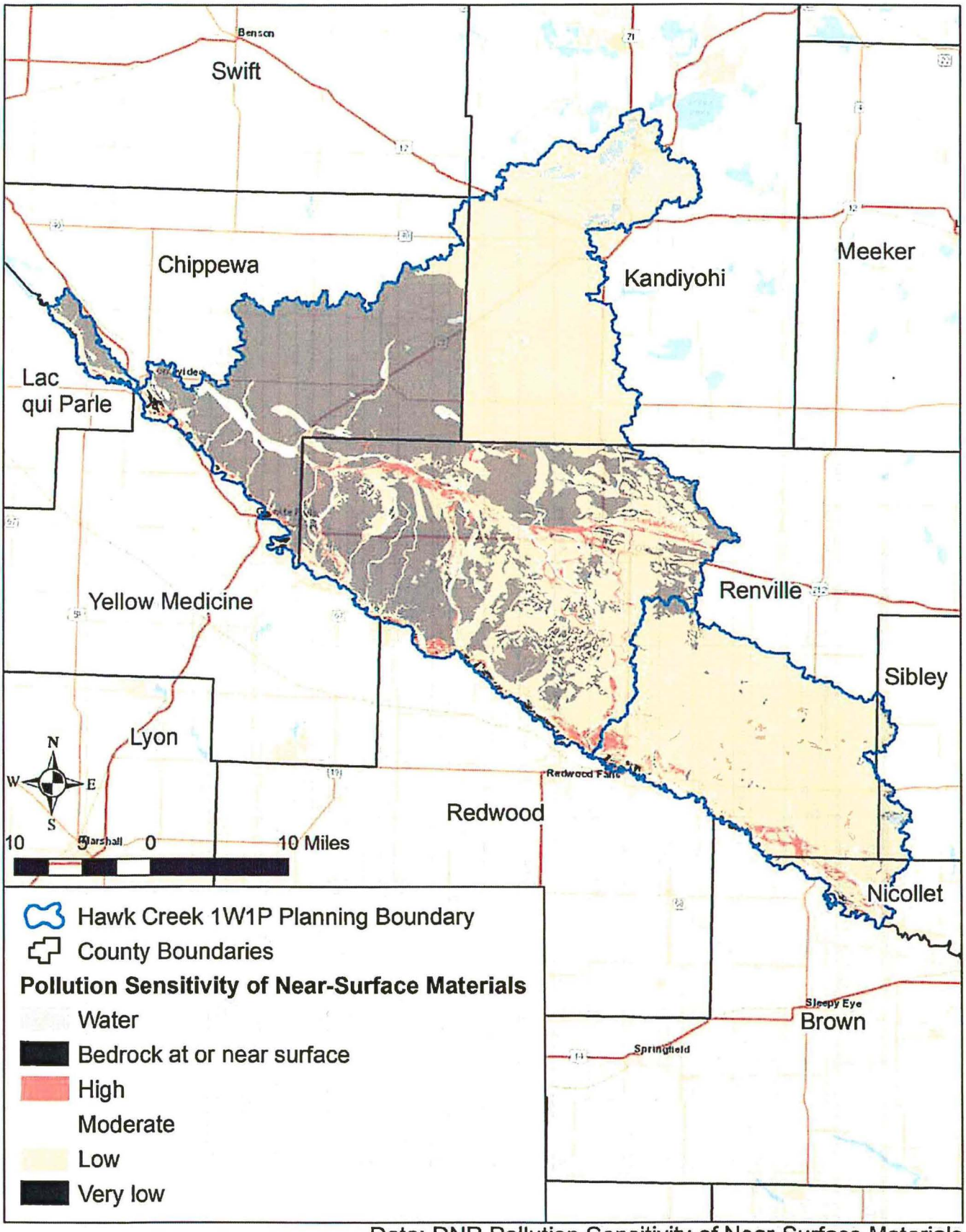
Hawk Creek-Middle Minnesota Watershed Public Water Supplies - Drinking Water Protection Concerns for Quality & Quantity

Aquifer Risk	Name	County	Watershed (HUC 8)	Subwatershed (HUC 12)	WHP Plan	DWSMA Vulnerability	Drinking Water Protection Concerns
Very high potential contaminant risk due to connection with surface water - Focus on impacts from land use practices and surface water runoff							
	Renville North	Renville	Hawk Creek	West Fork Beaver Creek	Yes	High/Low	
	Montevideo	Chippewa	Hawk Creek	Brafees Creek	Yes	High GW/High SWCA	On edge of watershed
High/Moderate potential contaminant risk - Focus on potential land use contaminant sources that may impact water quality							
	Danube	Renville	Hawk Creek	Co Ditch 59/West Fork Beaver Creek	Yes	Moderate/Low	
	Fairfax	Renville	Middle Minnesota	Little Rock Creek/Fort Ridgely Creek	Yes	Moderate	
	Maynard	Chippewa	Hawk Creek	Co Ditch 11/Co Ditch 37	Yes	Moderate	
	Morton	Renville	Middle Minnesota	City of Morton MN River	Yes	Moderate/Low	
	Raymond	Kandiyohi	Hawk Creek	Raymond-Hawk Creek	Yes	Moderate	Three DWSMAs
	Watson	Chippewa	Hawk Creek	Co Ditch 90	Yes	Moderate	On edge of watershed
	Willmar SW	Kandiyohi	Hawk Creek	Priam-Hawk Creek	Yes	Moderate/Low	
Low potential contaminant risk - Focus on sealing of unused wells and old public water supply wells (funding available from MDH)							
	Bird Island	Renville	Hawk Creek	East Fork Beaver Creek	Yes	Low	On edge of watershed
	Blomkest	Kandiyohi	Hawk Creek	Co Ditch 8	Yes	Low	
	Clara City	Chippewa	Hawk Creek		No	Anticipate Low	Plan in progress
	Franklin	Renville	Middle Minnesota	Purgatory Creek	Yes	Low	
	Granite Falls	Chippewa	Hawk Creek	Granite Falls-MN River/Co	Yes	Low	
	Olivia	Renville	Hawk Creek	East Fork Beaver Creek	Yes	Low	
	Pennock	Kandiyohi	Hawk Creek	St. Johns Lake	Yes	Low	
	Prinsburg	Kandiyohi	Hawk Creek	JD 16-Chetomba Creek	Yes	Low	
	Renville South	Renville	Hawk Creek	Co Ditch 45	Yes	Low	
	Sacred Heart	Renville	Hawk Creek	Co Ditch 104/Co Ditch 119	Yes	Low	Two DWSMAs
	Sunray Water Co.	Kandiyohi	Hawk Creek	Willmar Lake	Yes	Low	Community, Non-municipal
	Willmar NE	Kandiyohi	Hawk Creek	Willmar Lake	Yes	Low	

3 Community, Non-Municipal Public Water Suppliers
35 Non-Community Public Water Suppliers in Hawk Creek and 8 Non-Community Public Water Suppliers in Middle Minnesota

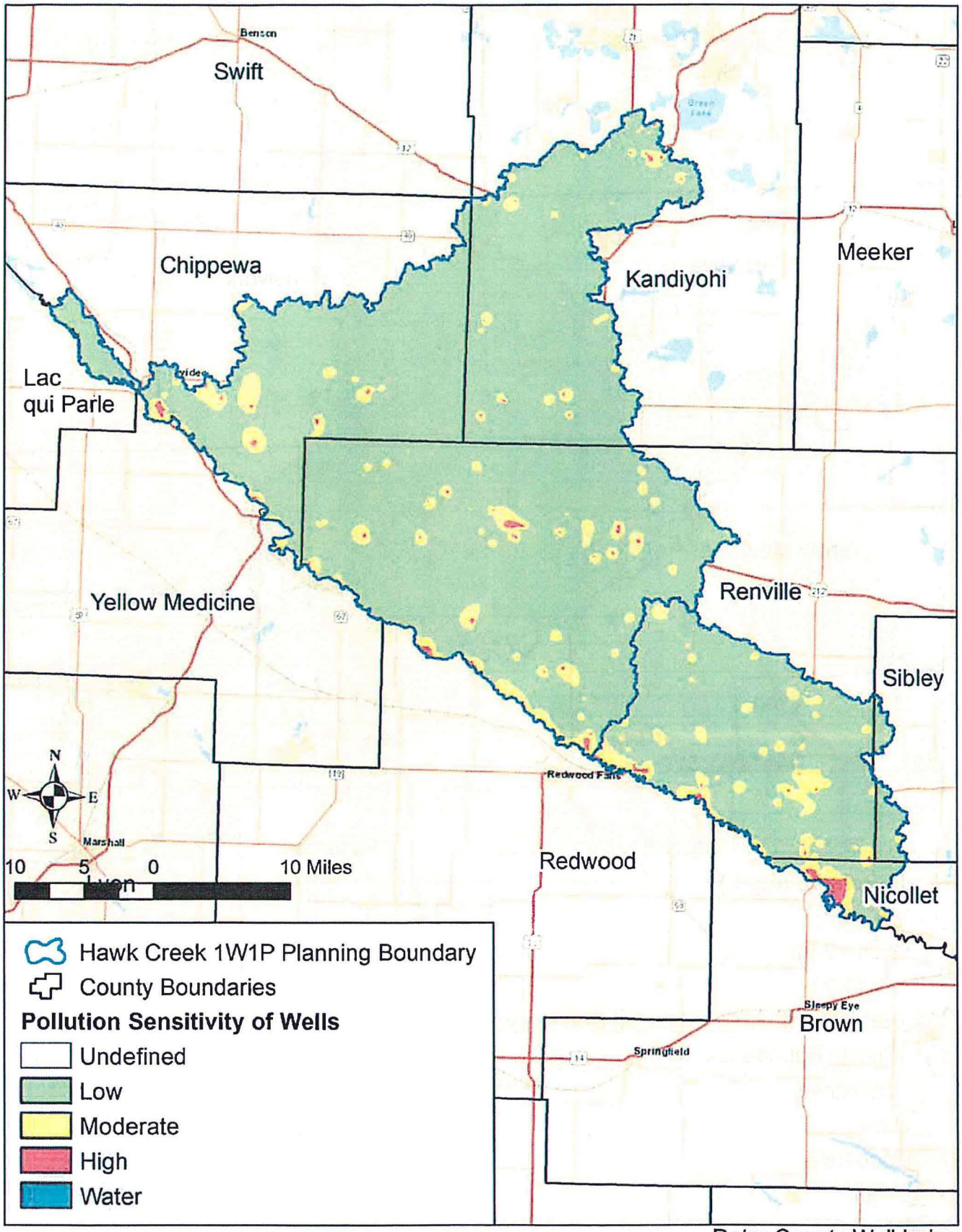
Acronyms:
SWCA=Surface Water Contribution Area
DWSMA=Drinking Water Supply Management Area

Hawk Creek - Middle Minnesota Watershed - Pollution Sensitivity of Near-Surface Materials



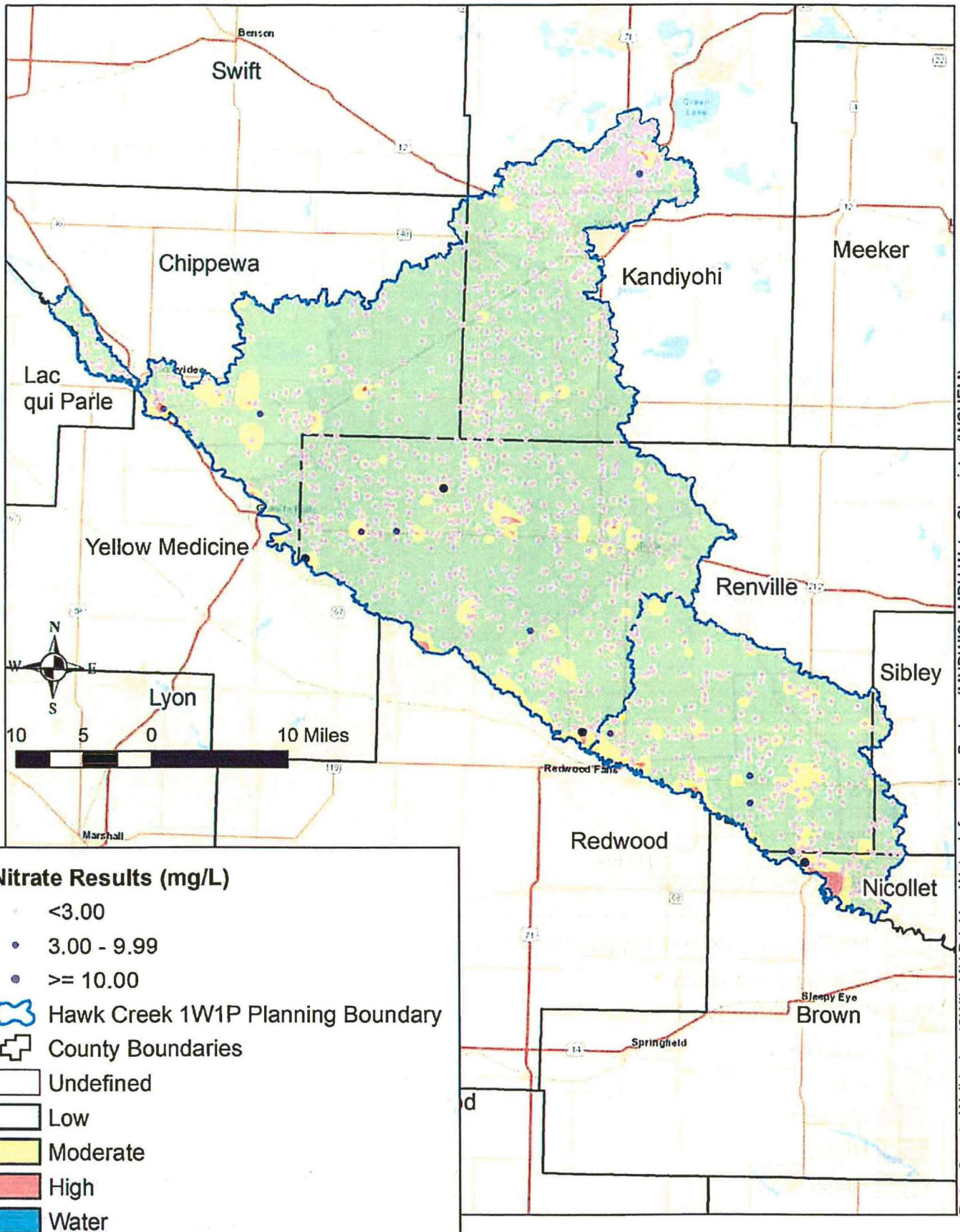
Data: DNR Pollution Sensitivity of Near-Surface Materials
Basemap: ESRI World Street Map

Hawk Creek - Middle Minnesota Watershed - Pollution Sensitivity of Wells



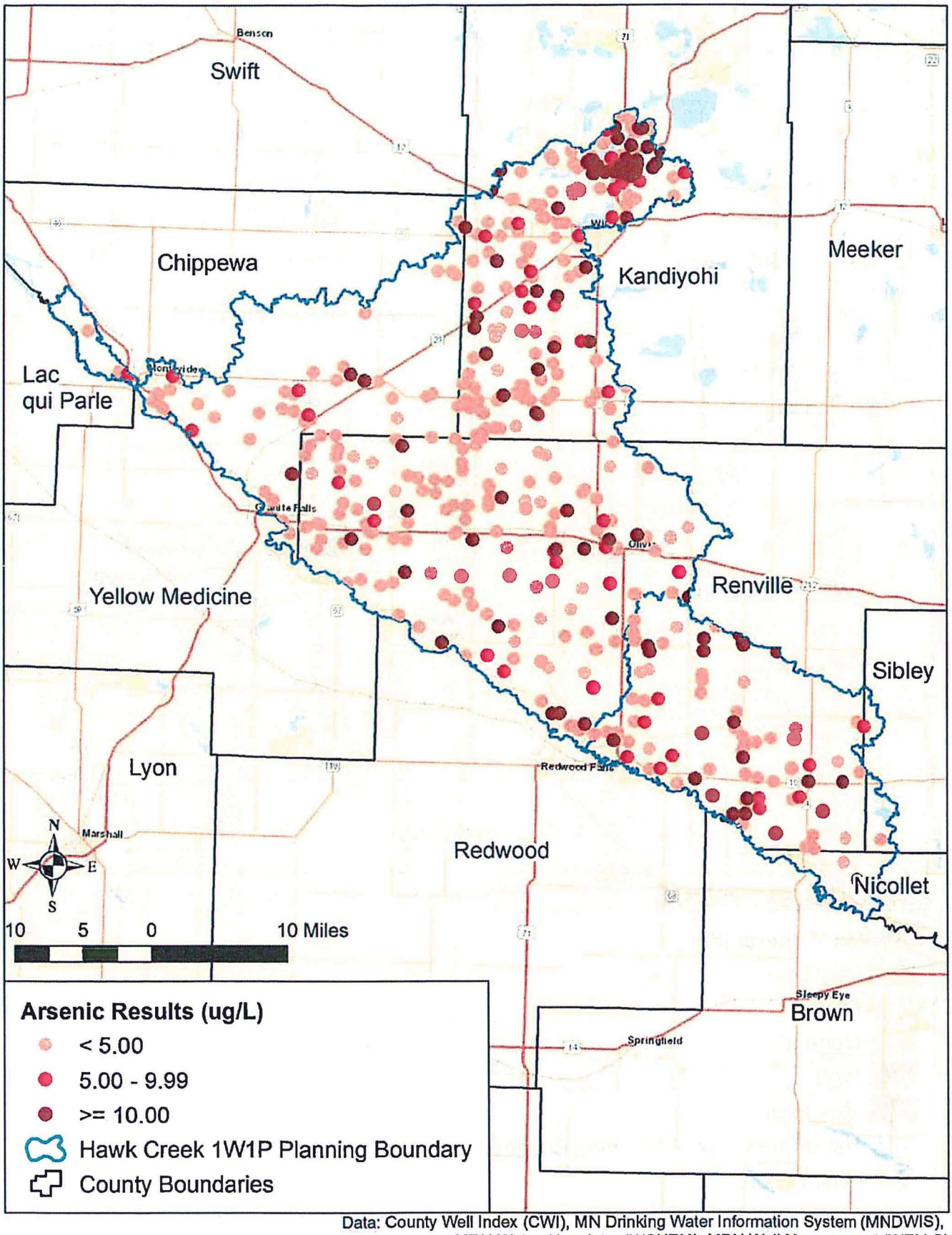
Data: County Well Index
Basemap: ESRI World Street Map

Hawk Creek - Middle Minnesota Watershed - Nitrate Results and Pollution Sensitivity of Wells



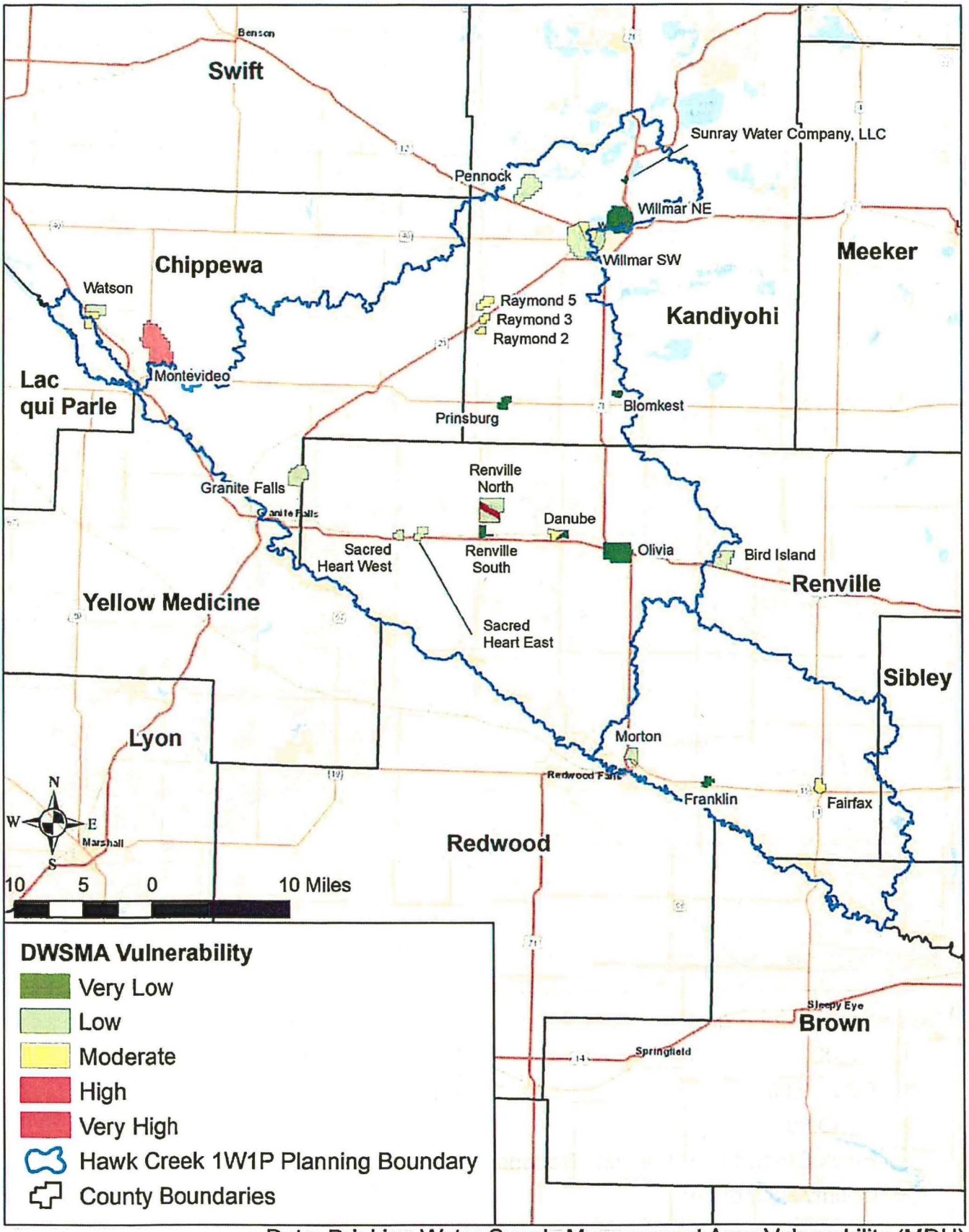
Data: County Well Index (CWI), MN Drinking Water Information System (MNDWIS), MDH Water Chemistry (WCHEM), MDH Well Management (WELLS), DNR Pollution Sensitivity of Near-Surface Materials
Basemap: ESRI World Street Map

Hawk Creek - Middle Minnesota Watershed - Arsenic Results



Data: County Well Index (CWI), MN Drinking Water Information System (MNDWIS), MDH Water Chemistry (WCHEM), MDH Well Management (WELLS)
Basemap: ESRI World Street Map

Hawk Creek - Middle Minnesota Watershed - DWSMA Vulnerability



Data: Drinking Water Supply Management Area Vulnerability (MDH)
Basemap: ESRI World Street Map

DEPARTMENT OF NATURAL RESOURCES

Southern Region Headquarters
21371 State Hwy 15
New Ulm, MN 56073

July 16, 2019

Diane Mitchell
Renville County Water Planner
105 South 5th Street, Suite 311
Olivia, MN 56377

Dear Ms. Mitchell,

I am writing on behalf of the Minnesota Department of Natural Resources (DNR) and Commissioner Sarah Strommen to express our support and share our priorities in development of the Hawk Creek Comprehensive Watershed Management Plan. Thank you for your efforts and for considering our comments.

Attached are items we see as key to protecting and improving the health of the watershed. Addressing 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 is excited to supply scientific data and information related to the attached priorities. We also offer services that can strengthen 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 Ethan Jenzen, DNR area hydrologist, based in Spicer. Please contact Ethan at 320-796-2161 or ethan.jenzen@state.mn.us for more information about the attached priorities or the types of technical support we can provide.

I am committed to ensuring local DNR staff are organized to support 1W1P planning efforts and the resulting implementation plans. We greatly value the opportunity to contribute to the process and hope the information we provide is helpful. Please feel free to contact me with any natural resource issues.

Sincerely,

Scott W. Roemhildt

Regional Director

cc: Ethan Jenzen – DNR Area Hydrologist, Robert Collett – DNR EWR South Region Manager, Barbara Weismann – DNR Clean Water Coordinator, Jeremy Maul – BWSR Board Conservationist, Cathi Fouchi – DNR Regional Planner, Brooke Hacker – DNR Clean Water Specialist, Tara Latozke – DNR Fish Habitat Specialist, Brad Carlson – DNR Asst. Area Fisheries Manager, Cory Netland - DNR Area Wildlife Manager, Brett Anderson – DNR Forestry Supervisor, Corrie Floyd – DNR Lands and Minerals, Emily Albin – DNR Parks and Trails

Field Representatives from each of the DNR's divisions compiled a list of target areas and implementation activities based on their intimate knowledge of the watershed. We hope the plan addesses the priorities - listed in no specific order below. As a team, we looked for issues and opportunities that provide multiple benefits towards watershed protection and improvement. We are committed to this process and can bring more robust information to the table as needed.

Resource	Priority Resource Concerns & Opportunities
Hydrologic Condition/Altered Hydrology - Adjust overall water volume and timing through water management and storage practices to improve the health and stability of the Hawk Creek Watershed.	**Concern:** Many of the natural streams, rivers and lakes in the watershed are degraded. Changes in cropping, unmitigated drainage improvements, adding impervious surfaces and other landuse changes have changed the volumes of surface water in the watershed. More volume flows through our streams and rivers than has historically, including more flow in the fall and even winter. Drainage is essential for the economic prosperity of agriculture and those in the Hawk Creek and Middle Minnesota River Watersheds. However, the cumulative impact of changing hydrology has negatively affected the stability of both natural streams and constructed channels. Streams are growing larger, often in both depth and width. We see failing streambanks, increased erosion, unstable channels with inadequate floodplains, property damage, and needed investments in costly infrastructure projects. The net increase in water flow and volume across the watershed intensifies flooding, increases nutrient and sediment loads to receiving waters, reduces resilience to climate change and degrades aquatic habitat and species diversity. The watershed plan should identify targeted land use and water management strategies to reduce and mitigate these impacts. • **Opportunity:** Ditch and Drainage Management - Ditch/drainage improvement should include mitigation (water storage and wetland restoration), which will result in reduced impacts to downstream roads, bridges and landowners. Constantly fluctuating water levels with more frequent high flow events can degrade water resources and have negative impacts to fish and other aquatic life. Local focus on drainage repairs and spot clean-out must consider water management options to decrease impacts to downstream resources, including mitigation or storage on system wide excavations or improvements. • **Opportunity:** Increase Water Storage - Many opportunities exist to restore drained lake or wetland basins in both the Hawk Creek and Middle Minnesota watersheds to increase water storage, build resiliency toward climate change, reduce discharge to surrounding streams and surface drainage systems and stabilize peak flows. Culverts, bridges and other infrastructure is impacted by changing hydrology in our streams and rivers. Increasing available storage within the watershed through restoring wetlands, reconnecting floodplains, increasing perennial vegetation, increasing soil organic matter and other methods is key to reducing damages to lands and receiving waters. • **Opportunity:** Natural Channel Restoration - Natural channel restorations work with geomorphic conditions and stream processes to achieve stream stability, reduce sediment, improve habitat, restore floodplains and limit downstream impacts. Channel restoration includes the plan and profile of a stream, not simply armoring stream banks. The healthy watershed approach generally

favors natural stabilization techniques in order to stabilize banks, create floodplain benches and manage vegetation.

- **Opportunity:** Ongoing Community Efforts – There are already a number of positive efforts to address altered hydrology from various partners, including efforts related to soil health improvement, rotational grazing, working lands projects and drainage water management. These programs, and others like them, should be used as a foundation for future efforts and expanded to outline the multiple benefits of these programs on a watershed scale.

Riparian/Floodplain Connectivity
Reduce impacts of channelized flow to improve channel stability and reduce sediment to receiving waters

Concern: Many streams have downgraded due to increased flows or have been deepened as part of drainage projects to the point flood flows are contained into the channel. Connecting rivers and streams to their floodplains – allowing them to flood – will slow the flow, dispersing sediment and nutrients. Perennial vegetation in the floodplain helps reduce erosion and filter sediment and nutrients. ~~Building dams on~~ Access to intact riparian corridors will also assist in building resilience to climate change impacts and mitigate flows from more extreme precipitation events.

- **Opportunity:** Multiple Benefits – Due to the extensively drained nature of these watersheds, riparian corridors and buffers would provide significant improvements with multiple high value resource benefits in many areas. These may include increased flood damage reduction potential, increased habitat benefits to aquatic and terrestrial species, and the best opportunity for change in the watershed while protecting the agricultural interests of the watershed population.
- **Opportunity:** Protection of high value stream reaches – In these watersheds, there are a number of largely unaltered direct tributaries into the Minnesota River including including Limbo Creek and Sacred Heart Creek. These stream watersheds contain a large portion of the remaining floodplain wetlands in this watershed, and provide benefits to storage, flood reduction, and habitat that warrant protection. Tributaries like these need protection to maintain value and public benefit.

Protect and/or restore Native Landscapes, process and functions while enhancing recreation opportunities (Protect natural features and native communities)

Issue: Few native landscapes remain in the Hawk Creek and Middle Minnesota watersheds. Many of these native remnants are located in and around the Minnesota River corridor area. This corridor is a mix of public lands and private parcels. These native landscapes need protection and restoration work to maintain public values and functions. Continued land use conversion pressure poses a threat to fragmented ecosystems. These landscapes also support a wide variety of threatened and high values species that warrant protection from continued development.

The Minnesota River corridor offers a wide variety of high value natural resources as well as opportunities for recreation. The DNR has worked with partners in the upper Minnesota River area since 2009 to identify conservation and recreation management concepts that will meet a variety of interests. These include the changing needs of outdoor recreationists, quality wildlife habitat in the Minnesota River Valley area and the many sensitive animals and plant communities. A key goal is to continue respecting private property rights while supporting diverse local economies and healthy human communities.

- **Opportunity:** With less than 1 percent of native prairie remaining, protecting grassland and wildlife habitat is one of the most critical environmental challenges facing Minnesota. Documents such as the Minnesota River Conservation and Recreation Comprehensive Plan aim to preserve this landscape through protection, restoration and enhancement, while balancing economic, recreation and cultural components. Easement or set-a-side programs may help protect the highest quality areas.
- **Opportunity:** Support ongoing local efforts focused on citizen engagement, outreach and promotional events showcasing the headwaters lakes area, Minnesota River Valley rock outcrops and dry hill prairies, and unique natural resources.
- **Opportunity:** Increase outreach and education regarding rare and natural animals in the watershed. Increase awareness of species, such as the five-lined skink and numerous pollinators, as well as habitat protection, restoration and biodiversity. Dovetail habitat goals with existing plans, such as the Minnesota Wildlife Action Plan 2015-2025 (www.dnr.state.mn.us/mnwap).
- **Opportunity:** Highlight unique attributes and recreation opportunities of the Minnesota River Corridor. High quality lakes, such as Eagle Lake north of Willmar, are found the upper part of the watershed. The Minnesota River mainstem draws catfish anglers from across the Midwest. The Minnesota River downstream of Granite Falls is a paddling destination. Interact with citizens to inform them about public lands and other recreational assets. Additional public parcels are controlled by local and federal partners.

Water Quality – Reduce nutrients and sediment loading to improve the biology, water chemistry, and health of the watershed.

Issue (1): Current water quality conditions for both lakes and streams point to a need for land use changes to reverse the pollutant loading trends. Address water quality goals established in Watershed Restoration and Protection Strategies (WRAPS) and TMDLs to prevent future surface water quality impairments and groundwater contamination. These will also improve fish habitat in lakes and streams, and promote the watershed's resilience to changing hydrology and climate, invasive species, and other stressors.

- **Opportunity:** Targeted BMP Implementation – Prime agricultural ground should be protected for agriculture, but significant benefits can be realized in the watershed from targeted conservation BMPs and addressing feedlot issues. Healthly soils protected by cover crops and reduced tillage reduces nutrients, increases residue, and increases water storage with the soil profile and reduces runoff. In addition to targeted BMP's, promote watershed wide nutrient application rates as approved by the MN Department of Agriculture.

Issue (2): Lakes and streams are under stress from climatic variability and land use changes. Certain lakes in the Hawk Creek Watershed are high priorities for protection or restoration because they have outstanding water quality, support diverse biological communities including fisheries. These lakes offer recreational resources, abundant native aquatic plant communities with high species diversity and improved water quality.

- **Opportunity:** Protection or restoration measures are needed to maintain or improve high public recreational value of the lakes that meet water quality guidelines for water recreation. The DNR would be able to provide additional

data sets with regards to lakes, including Phosphorus Sensitivity Significance and Biological Significance information.

-Eagle and Point Lakes (Protection) – These lakes are located in the headwaters area of the watershed, and have a higher sensitivity to nutrient loading while supporting a diverse native plant community. Nutrient management and other BMPs are important to maintain the character of the lakes.
-Lake Henderson (Protection) – This basin has a very small watershed area, and is also very sensitive to additional nutrient loading. It would benefit from shoreline management through land use zoning to prevent future degradation as well as nutrient management BMPs.
-Foot Lake - (Impaired-Restoration) Located immediately adjacent to the city of Willmar, this basin is significantly impacted by historic stormwater discharge into the lake as well as impacts from the upstream watershed. This basin has potential to respond well to urban water quality and stormwater BMPs as well as shoreland management.
-Long Lake – (Impaired – Restoration/Protection) This lake has an excellent biologically diverse aquatic community, with a history of significant and diverse zooplankton populations that help to prevent significant additional declines in water quality. This basin would benefit from further protection against degradation through shoreland management and nutrient management.
-Swan Lake (Sibley County) – (Protection) This basin displays outstanding biological diversity, and would benefit from nutrient management in its watershed, as well as continued enforcement of shoreland ordinance provisions to limit development in shoreland areas.

- **Opportunity:** Protection or restoration measures are needed to maintain or improve the high public recreational and resource value of the streams and rivers that meet water quality guidelines for water recreation and fish consumption.

  -Limbo Creek – (Protection) This watercourse is one the last remaining streams with numerous significant near-channel wetland areas located in the upstream portion of the watershed. These wetlands provide significant benefit to downstream water quality and are high value habitat areas.

Education and Outreach

Work with LGU staff to effectively engage area communities in order to protect natural resources.

Issue: The Hawk Creek and Middle Minnesota River watersheds have an existing network of local partners that are doing excellent work towards restoring and enhancing natural resource benefits for the area communities. This is accomplished through projects with multiple benefits while working with local land managers to maintaining agricultural prosperity for a net increase in overall watershed health. These efforts and programs build resistance to climate change, and to change in other stressors in the watershed, including terrestrial and aquatic invasive species. These programs and efforts also help to ensure surface water resources are restored, enhanced or protected from development pressures.

Opportunity: Many LGU partners have programs that are active primarily in rural areas. Additional partners are needed within the urban areas of the

watershed to coordinate additional efforts with existing partners to provide outreach to all watershed communities.

Opportunity: The DNR provides the Community-based Aquifer Management Partnership (CAMP) program to discuss water supply issues, infrastructure and water availability considerations for decision making. Identify ground water monitoring needs and use trends.

Opportunity: Expand outreach at a LGU/watershed level to better understand development pressures in the watersheds. Understanding development pressures near surface water resources will allow decision makers to influence development proposals to protect water resources.

Outreach

Issue (2): Citizen Engagement - Many active groups in the watersheds work to promote a high standard of living. Water Resources play a large part of this high standard of living, particularly with the Minnesota River. Our vision embraces sustained resource use based on wise use, protection, and restoration.

MINNESOTA POLLUTION CONTROL AGENCY

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June 26, 2019

Ms. Diane Mitchell
County Water Planner
Renville County
105 South 5th Street, Suite 311
Olivia, MN 56277

RE: Hawk Creek-Minnesota River- Mankato Comprehensive Watershed Management Plan 60 Day Review Period

Dear Ms. Mitchell:

The Minnesota Pollution Control Agency (MPCA) has received your invite to submit water management issues pertinent to the One Watershed One Plan (1W1P) for the Hawk Creek Watershed and a portion of the Minnesota River-River Mankato Watershed.

The MPCA appreciates the opportunity to provide input throughout your Hawk Creek-Minnesota River-Mankato Comprehensive Watershed Management Plan (Plan) development process. As part of the agency's review we are providing the following comments we would like to see addressed in the 1W1P, as part of the official 60-day Review and Comment Period.

The local partners worked hard with MPCA and other state agencies to gather useful information for the Watershed Restoration and Protection Strategies (WRAPS) process. The following pages of this letter contain a brief summary of the highlights of both WRAPS that are included in the 1W1P planning area. The MPCA requests you consider these issues during development of the 1W1P for this area.

The State of Minnesota employs a watershed approach to restoring and protecting Minnesota's rivers, lakes, and wetlands. Money to accelerate efforts to monitor, assess, and restore impaired waters, and to protect unimpaired waters was funded by Minnesota's Clean Water Legacy Act.

There are 80 major watersheds in Minnesota. Intensive water quality monitoring and assessments will be conducted in each of these watersheds every 10 years.

The Hawk Creek Watershed began intensive watershed monitoring (IWM) and assessment in 2010, and the portion of the Minnesota River-Mankato Watershed, addressed in this letter, began in 2013. After the assessment period, WRAPS reports were developed based largely on input from the local stakeholders. Some examples of local stakeholder input include source assessments, strategies, priority areas, and overall document review.

After a 30-day Public Notice, the Hawk Creek WRAPS Report was approved on September 11, 2017. The Total Maximum Daily Load (TMDL) Report for Hawk Creek was approved by the EPA on November 20, 2017. The Minnesota River- Mankato Watershed WRAPS and TMDL reports are scheduled to go on Public Notice in July 2019.

Monitoring and Assessment

Monitoring data are used to determine if water quality is supporting a water body's designated use. During the assessment process, data on the waterbody are compared to relevant standards. When pollutants/parameters in a waterbody do not meet the water quality standard, the waterbody is considered impaired. When pollutants/parameters in a waterbody meet the standard (e.g. when the monitored water quality is cleaner than the water quality standard), the waterbody is considered supporting. Data from three water quality monitoring programs enable water quality assessment and create a long-term data set to track progress towards water quality goals. These programs will continue to collect and analyze data in the watersheds as part of Minnesota's Water Quality Monitoring Strategy. IWM, the Watershed Pollutant Load Monitoring Network (WPLMN) and Citizen Stream and Lake Monitoring Program (CSMP and CLMP) data provide a periodic but an intensive "snapshot" of water quality conditions throughout the watershed. More detailed assessment information is provided in the Monitoring and Assessment Report for each watershed accessed through the respective links provided at the end of this letter.

Stressor Identification

The MPCA and several partners identified the stressors to aquatic life in the watersheds following the intensive water monitoring and assessment efforts. A map of identified impaired waterbodies in the 1W1P planning area is shown in Figure 1. A list of impaired/stressed waterbodies by pollutant/stressor is located in Table 1. Also in Table 1, stream reaches and lakes found to meet water quality standards, are listed as needing protection. More detailed stressor identification information is provided in the Stressor Identification Report for each watershed accessed through the respective links provided at the end of this letter.

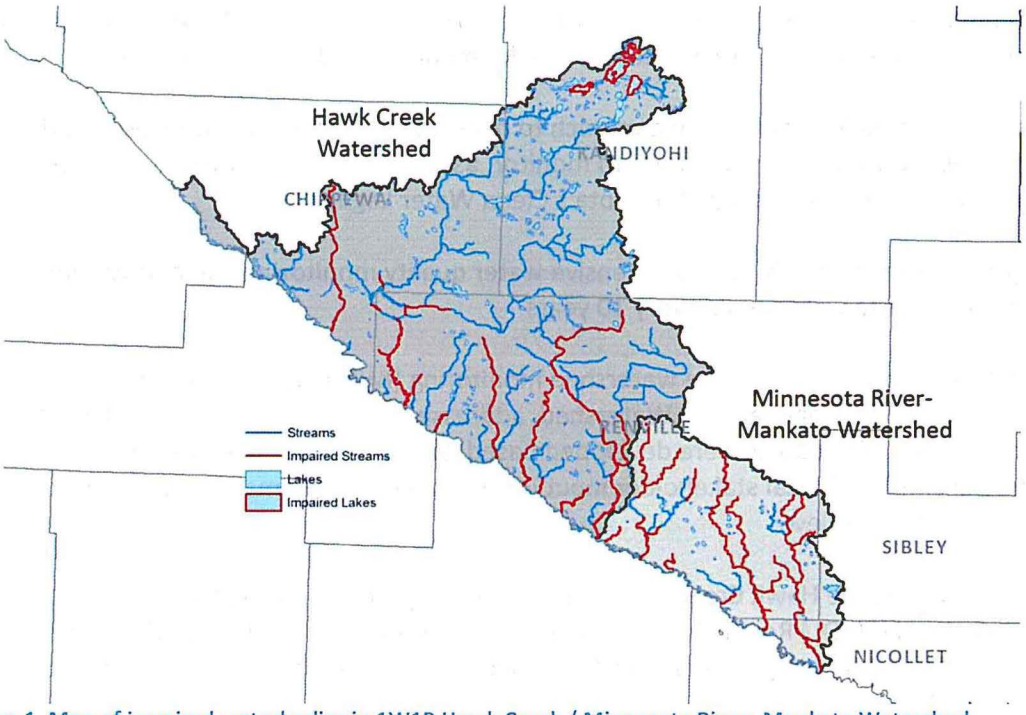


Figure 1. Map of impaired waterbodies in 1W1P Hawk Creek / Minnesota River- Mankato Watershed.

Table 1. Summary of waterbodies impacted by pollutants/stressors and designated for protection for 1W1P Hawk Creek/Minnesota Mankato.

Impairment / Stressor	Reach AUID	Reach Name
Altered Hydrology	07020004-566	Unnamed Creek
	07020004-687	County Ditch 119
	07020004-716	County Ditch 36
	07020007-687	Little Rock Creek (Judicial Ditch 31)
	07020007-666	Judicial Ditch 8
	07020007-587	Birch Coulee Creek
	07020007-588	Birch Coulee Creek
	07020007-670	County Ditch 124
	07020007-673	County Ditch 115
	07020007-686	Little Rock Creek (Judicial Ditch 31)
	07020007-688	County Ditch 106A (Fort Ridgely Creek)
	07020007-689	Fort Ridgely Creek
	07020007-704	Threemile Creek
	07020007-711	County Ditch 124
	07020007-716	Judicial Ditch 13
	07020007-717	Judicial Ditch 13
TSS	07020004-528	Beaver Creek
	07020004-566	Unnamed Creek
	07020004-568	Hawk Creek
	07020004-587	Hawk Creek
	07020004-589	Unnamed Ditch
Phosphorus	07020004-566	Unnamed Creek
	07020004-687	County Ditch 119
	07020004-716	County Ditch 36
	07020007-666	Judicial Ditch 8
	07020007-688	County Ditch 106A (Fort Ridgely Creek)
	07020007-670	County Ditch 124
	07020007-711	County Ditch 124

Table 1 continued. Summary of waterbodies impacted by pollutants/stressors and designated for protection for 1W1P Hawk Creek/Minnesota Mankato.

Impairment / Stressor	Reach AUID	Reach Name
Nitrogen	07020004-617	Smith Creek (CD 125A)
	07020004-687	County Ditch 119
	07020007-666	Judicial Ditch 8
	07020007-688	County Ditch 106A (Fort Ridgely Creek)
	07020007-670	County Ditch 124
	07020007-711	County Ditch 124
	07020007-673	County Ditch 115
	07020007-686	Little Rock Creek (Judicial Ditch 31)
	07020007-717	Judicial Ditch 13
	07020007-689	Fort Ridgely Creek
	07020007-687	Little Rock Creek (Judicial Ditch 31)
	07020007-588	Birch Coulee Creek
	07020007-587	Birch Coulee Creek
Bacteria	07020004-534	Palmer Creek (CD68)
	07020004-689	County Ditch 11
	07020004-568	Hawk Creek
	07020004-577	Chetomba Creek
	07020004-587	Hawk Creek
	07020004-687	County Ditch 119
	07020004-526	Sacred Heart Creek
	07020004-525	Timms Creek
	07020004-615	Middle Creek
	07020004-530	Beaver Creek, West Fork
	07020004-528	Beaver Creek
	07020004-586	Beaver Creek, East Fork
	07020004-617	Smith Creek (CD 125A)
	07020007-645	Purgatory Creek
	07020007-689	Fort Ridgely Creek
	07020007-687	Little Rock Creek (Judicial Ditch 31)
	07020007-587	Birch Coulee Creek
	07020007-704	Threemile Creek
Habitat	07020004-566	Unnamed Creek
	07020004-617	Smith Creek (CD 125A)
	07020004-687	County Ditch 119
	07020004-716	County Ditch 36
	07020007-666	Judicial Ditch 8
	07020007-688	County Ditch 106A (Fort Ridgely Creek)
	07020007-670	County Ditch 124
	07020007-711	County Ditch 124
	07020007-673	County Ditch 115
	07020007-686	Little Rock Creek (Judicial Ditch 31)
	07020007-716	Judicial Ditch 13
	07020007-687	Little Rock Creek (Judicial Ditch 31)

Table 1 continued. Summary of waterbodies impacted by pollutants/stressors and designated for protection for 1W1P Hawk Creek/Minnesota Mankato.

Impairment / Stressor	Reach AUID	Reach Name
Dissolved Oxygen	07020004-566	Unnamed Creek
	07020004-687	County Ditch 119
	07020004-716	County Ditch 36
	07020007-666	Judicial Ditch 8
	07020007-688	County Ditch 106A (Fort Ridgely Creek)
	07020007-670	County Ditch 124
	07020007-711	County Ditch 124
	07020007-686	Little Rock Creek (Judicial Ditch 31)
Fish IBI	07020004-566	Unnamed Creek
	07020004-577	Chetomba Creek
	07020004-687	County Ditch 119
	07020004-716	County Ditch 36
	07020007-665	County Ditch 100
	07020007-666	Judicial Ditch 8
	07020007-686	Little Rock Creek (Judicial Ditch 31)
	07020007-716	Judicial Ditch 13
	07020007-717	Judicial Ditch 13
	07020007-704	Threemile Creek
	07020007-687	Little Rock Creek (Judicial Ditch 31)
	07020007-689	Fort Ridgely Creek
	07020007-588	Birch Coulee Creek
	07020007-587	Birch Coulee Creek

Table 1 continued. Summary of waterbodies impacted by pollutants/stressors and designated for protection for 1W1P Hawk Creek/Minnesota Mankato.

Impairment / Stressor	Reach AUID	Reach Name
Macro-IBI	07020004-566	Unnamed Creek
	07020004-617	Smith Creek (CD 125A)
	07020004-687	County Ditch 119
	07020004-716	County Ditch 36
	07020007-670	County Ditch 124
	07020007-673	County Ditch 115
	07020007-666	Judicial Ditch 8
	07020007-686	Little Rock Creek (Judicial Ditch 31)
	07020007-717	Judicial Ditch 13
	07020007-687	Little Rock Creek (Judicial Ditch 31)
	07020007-689	Fort Ridgely Creek
	07020007-588	Birch Coulee Creek
	07020007-587	Birch Coulee Creek
	07020007-688	County Ditch 106A (Fort Ridgely Creek)
	07020007-711	County Ditch 124
Lakes	34-0192-00	Long Lake
	34-0266-00	Olson Lake
	34-0172-00	Ringo Lake
	34-0283-00	St. John's Lake
	34-0245-00	West Solomon Lake
	34-0186-00	Swan Lake
Streams For Protection	07020007-672	County Ditch 111
	07020007-707	Judicial Ditch 12
	07020007-663	Unnamed creek
	07020007-665	County Ditch 100
	07020007-668	Unnamed creek
	07020007-525	County Ditch 3
	07020007-664	County Ditch 115
	07020004-610	Brafees Creek
	07020004-675	County Ditch 45
Lakes for Protection	34-0171-00	Eagle Lake
	34-0181-00	Foot Lake
	34-0193-00	Point Lake
	34-0115-00	East Twin Lake
	34-0117-00	West Twin Lake
	34-0116-00	Henderson Lake

Pollutants or conditions contributing to degraded water quality include: altered hydrology, excess nitrogen, sediment/total suspended solids, phosphorus, low dissolved oxygen (DO), habitat, connectivity, temperature, and bacteria.

Source Assessment

Sources of the pollutants and stressors were estimated by the WRAPS Local Work Groups for both watersheds after examining multiple lines of evidence and applying their local knowledge and professional judgment.

Source assessments for hydrology, sediment, nitrogen and phosphorus for the Hawk Creek Watershed HUC-8 are represented in the pie charts (Figure 2):

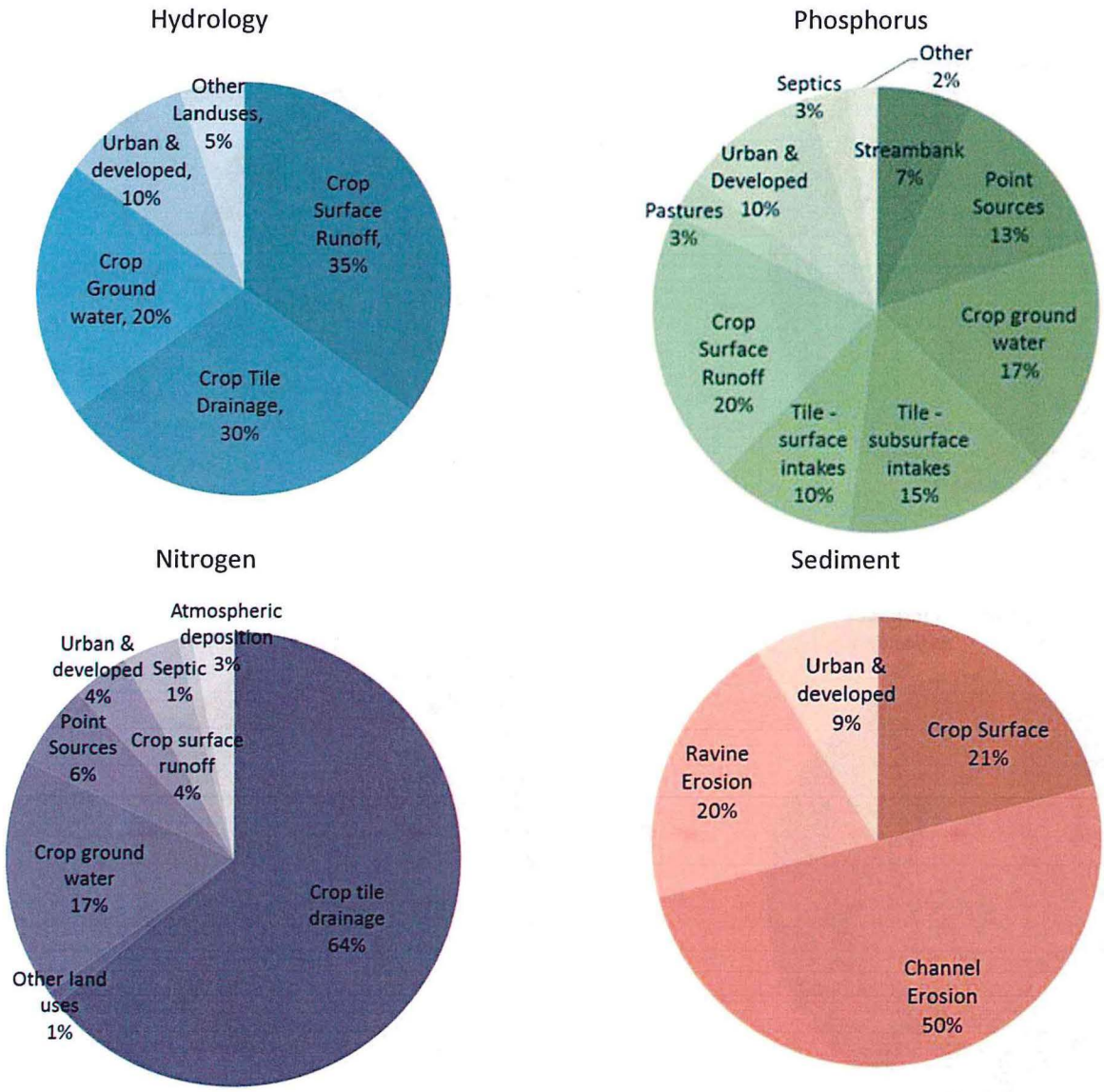
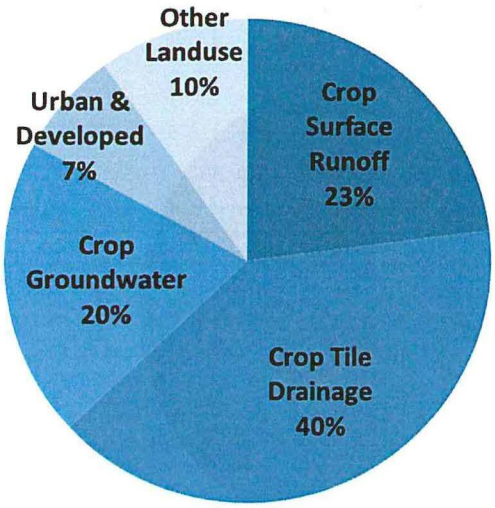


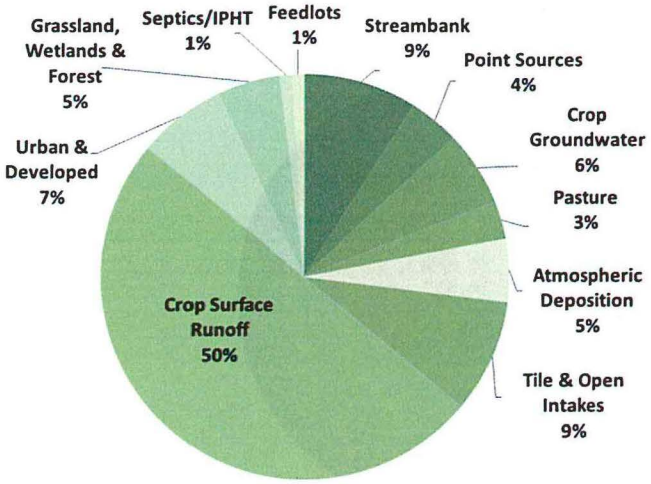
Figure 2. Source Assessment of pollutants in the Hawk Creek Watershed

Source assessments for hydrology, sediment, nitrogen and phosphorus for the Minnesota River-Mankato HUC-8 Watershed are represented in the pie charts (Figure 3).

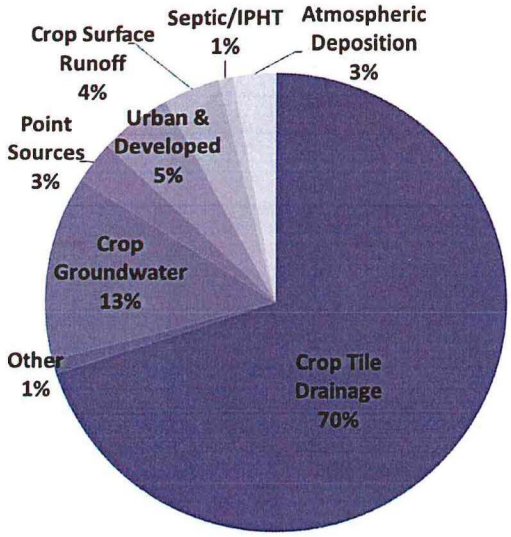
Hydrology



Phosphorus



Nitrogen



Sediment

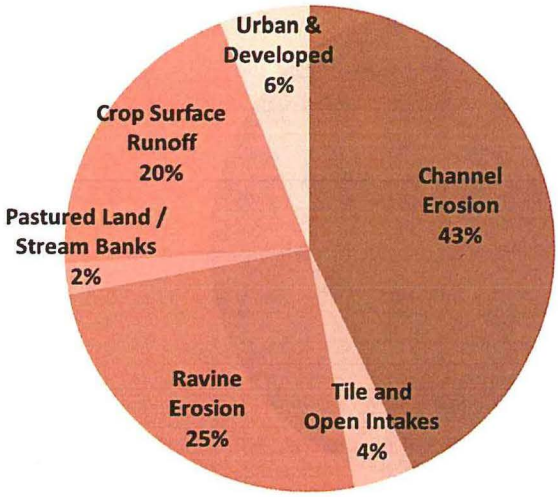


Figure 3. Source Assessment of pollutants in the Minnesota River- Mankato HUC- 8 Watershed

Non-point sources (urban and rural stormwater runoff) are the dominant source of pollutants/stressors. Surface runoff is not the only pathway that transports pollutants/stressors to water bodies. Subsurface tile drainage systems, which are typically designed to drain water from fields within a couple days of a precipitation event, also have the potential to carry and deliver pollutants and stressors to surface waters. Tile drainage has been identified as a primary cause of stream flow changes in heavily tiled landscapes.

Goals and 10-year Targets

Water quality goals apply to water bodies within the watersheds but are also intended to help restore and protect downstream waterbodies. Goals for the watersheds were set after analyzing WPLMN data,

Hydrological Simulation Program – Fortran (HSPF) model output, TMDL studies, and state-wide reduction goals. The selected watershed-wide goals integrate multiple levels of goals into one watershed-wide goal. The specific goal for every lake and stream reach is to meet water quality standards for all relevant parameters and to support downstream water quality goals. However, in order to more understandably communicate water quality goals and to make the identification of strategies and adoption rates more straight-forward, the multiple levels of goals were integrated into one average or surrogate watershed-wide goal for the major watershed. Likewise, because water quality standards do not include a specific method to calculate a reduction, surrogate goals for individual streams and lakes were calculated from TMDL data.

For parameters that are the effect of other pollutants/stressors (Fish-Index of Biotic Integrity (IBI), Macroinvertebrate-IBI, DO, eutrophication, and temperature), a numeric goal for the identified pollutants/stressors was estimated. For instance, in the case of bio-impaired streams (where the aquatic life impairment was due to a low fish or bug IBI score), the goal is to have the fish and/or bug populations meet the IBI score threshold. However, there is not a tool or model available to estimate the magnitude of change needed to meet this threshold. Therefore, numeric goals for the stressors causing the bio-impairments (altered hydrology, sediment, nitrogen, etc.) are the surrogate goal.

Interim water quality "10-year targets" and a proposed "Years to Reach Goal" were selected by consensus of the WRAPS Local Work Groups (Table 5 and Table 6). The 10-year targets allow opportunities to adaptively manage implementation efforts, while the years to reach the goals set reasonable timelines to meet water quality goals and should be integrated into 1W1P plans. See the complete WRAPS reports for each watershed for further information.

Table 2. WRAPS goals and 10-year target summary for the Hawk Creek Watershed.

Parameters (Pollutant/ Stressors)	**Watershed-Wide Goal** (Average for Watershed)	**10-year Target** (for 2029)	**Years to Reach Goal** (from 2019)
Altered Hydrology	25% reduction in peak & annual river flow	5%	50
	increase dry season river base flow where ID'd in SID by enough to support aquatic life	increase	25
Nitrogen	45% reduction in river concentrations/loads	12%	40
Habitat	45% increase in MSHA habitat score	9%	50
Phosphorus	50% reduction in lake and 60% stream concentrations/loads	20% Lakes 10% Streams	40
Sediment	50% reduction	10%	40
Bacteria	80% reduction in river concentrations/loads	25%	35
Parameters that are impacted/addressed by the above pollutants and stressors			
F-IBI & M-IBI	Each paramter's goal is to meet the water quality standard and support downstream goals. Because these parameters are a response to (caused by) the above pollutants/stressors, the above watershed-wide and subwatershed goals are indirect goals for these parameters and are more usable for selecting strategies than direct goals for these parameters.	meet other 10-year targets	50
Eutrophication			50
DO			50

Table 3. WRAPS goals and 10-year target summary for the Minnesota River- Mankato Watershed.

Parameters (Pollutant/ Stressors)	Watershed-Wide Goal (Average for Watershed)	Range of Subwatershed Goals (Estimated only when TMDL data are available)	10-year Target (for 2029)	Years to Reach Goal (from 2019)
Altered Hydrology	25% reduction in peak & annual river flow	not estimated (TMDLs not completed on this parameter)	5%	50
	increase dry season river base flow where ID'd in SID by enough to support aquatic life		increase	30
Nitrogen	60% reduction in river concentrations/loads	protect up to a 78% reduction	10%	55
Habitat	25% increase in MSHA habitat score	protect up to a 181% increase	9%	35
Phosphorus	50% reduction in lake and stream concentrations/loads	protect up to a 83% reduction	10%	50
Sediment	50% reduction in restoration areas (1/4 of watershed) No increase in protection areas (3/4 of watershed)	protect up to a 88% reduction	12%	40
Bacteria	60% reduction in river concentrations/loads	10% to 87% reduction	13%	40
Connectivity	Address human-caused issues (dams, culverts) as identified in SID and where practical/feasible	not estimated (TMDLs not completed on this parameter)	9%	45
Parameters that are impacted/addressed by the above pollutants and stressors				
F-IBI & M-IBI	Each paramter's goal is to meet the water quality standard and support downstream goals. Because these parameters are a response to (caused by) the above pollutants/stressors, the above watershed-wide and subwatershed goals are indirect goals for these parameters and are more usable for selecting strategies than direct goals for these parameters.	not estimated (TMDLs not completed on these parameters)	meet other 10-year targets	45
Eutrophication				50
DO				45
Temperature				45

Watershed Restoration and Protection Strategies:

Strategies to meet the water quality goals and 10-year targets are presented in Table 4 and Table 5 (10-year targets) for the watersheds. The tables provide a suite of strategies for land use and specific practices selected by the WRAPS Local Work Groups to meet the 10-year targets.

Data and models indicate that comprehensive and integrated BMP suites are necessary to bring waters in the 1W1P planning area into supporting status. These tables are useful for shorter-term planning, as strategies to meet the 10-year water quality targets are presented. The practices and adoption rates were selected by the WRAPS Local Work Groups and then the numeric adoption rates to meet the selected 10-year targets were estimated.

In order to restore impairments and protect threatened waters, strategies need to be implemented in the contributing watersheds of impaired water bodies (or supporting water bodies with declining trends). In the case of both Hawk Creek and the Minnesota River- Mankato Watersheds, impairments were found throughout the watersheds. Therefore, some practices will need to be implemented in nearly all regions of the watershed. Areas with higher reduction goals will likely need higher adoption of practices, and the specific practices used in any one area should address the identified sources in that area. Furthermore, not all strategies are appropriate for all locations.

The strategies and regional adoption rates should be customized during locally-led prioritizing and targeting work (see Prioritizing and Targeting section below for more information). Because the majority of land use in the 1W1P planning area is used for cultivated crop production, this land use has the greatest opportunity to improve water quality. However, there are additional suites of strategies specifically for urban/residential, pastures, feedlots, waterbodies, and point sources since all land uses/pollution sources have opportunities to reduce their contributions. Practices for cultivated crops are listed from highest recommended adoption rate to lowest. Generally, practices with the highest adoption rates should be considered highest priority. While these practices may not be the most effective at reducing pollutants/stressors *per acre* adopted compared to other practices, these practices are generally more palatable to producers, recommended by conservation staff, and more cost effective at reducing pollutants and stressors. High priority agricultural practices are soil health practices: improved fertilizer and manure management, cover crops, and conservation tillage (strip-till, no till etc.).

Water bodies that meet water quality standards should be protected to maintain or improve water quality. Furthermore, water bodies that have not been assessed should not be allowed to degrade. The strategies presented – set at the major watershed scale - are intended to not only restore but also protect waters in the watersheds. Similar to customizing regional adoption rates of the watershed-wide strategies, strategies and adoption rates should reflect the relative amount of protection needed and any site-specific considerations. The highest priority aspects of water quality protection in the watersheds include:

- Maintain a high level of perennial vegetation on the landscape, especially adjacent to water bodies, in areas with high slopes, and in areas with highly-erodible soils.
- Mitigate altered hydrology by adding storage, infiltration, and evapotranspiration. There are several ways to accomplish this including: adding more living vegetation to the landscape in early summer and late fall by using cover crops, implementing no-till and strip till, adding water retention structures or wetlands to intercept and infiltrate water from drainage projects, diversifying crop rotations, and restoring stream buffers, wetlands, and grasslands.
- Maintain and spread the good things happening on the landscape: keep practices and BMPs in place, and work to spread their adoption.

Table 4. WRAPS strategy table for Hawk Creek Watershed. The table presents information relevant for local planning efforts including the specific strategies and actions, and adoption rates to meet the 10-year targets.

Land use/Source Type	Watershed Restoration and Protection Strategies estimated to meet 10-year target at specified adoption rates	Adoption Rate		Practice Effectiveness					
		% watershed to newly treat	Acres to newly treat	Flow	TSS	Phosphorus	Nitrogen	Bacteria	Habitat ‡
Cultivated Crops	Nutrient management (for P & N)	7%	43,800			o	x		
	Cover crops	5%	31,300	x	x	o	x	X	-
	Reduced tillage	5%	31,300	o	x	o	x	o	-
	Crop rotation (including small grain)	4%	25,000	o	-	-	o		-
	Buffers, border filter strips*	3%	18,800	-	o	-	-	o	-
	Alternative tile intakes*	2%	12,500		x	x		o	
	Treatment wetland (for tile drainage system)*	2%	12,500	-		o	x		-
	Improved manure application	1%	6,300	o		o	x	X	-
	Conservation cover	1%	6,300	X	x	x	X	x	-
	Grassed waterway*	1%	6,300	-	o	-	-		-
	WASCOBS, terraces, flow-through basins*	1%	6,300	-	o	-	-	-	-
	Controlled drainage, drainage design*	1%	6,300	-		-	x		-
	Saturated buffers*	1%	6,300	-		-	x		-
	Wood chip bioreactor*	1%	6,300			-	x		
	Livestock integration	1%	6,300	x	x	x	X	X	-
	Wetland Restoration	1%	6,300	X	x	x	X	x	-
	Wind Breaks*	1%	6,300		-	-			
	In/near ditch retention/treatment*	1%	6,300		o	-			
	Retention Ponds	0.1%	600	X	x	x	X	x	-
	Contour strip cropping (50% crop in grass)	0.1%	600	x	x	x	x	x	-
	Mitigate new ag drainage projects†	All new projects		n/a (protection)					
	Maintain existing BMPs, CRP, RIM, etc. †	All current BMPs		n/a (protection)					
Pastures	Rotational grazing	0.1%	600			x		X	-
	Livestock exclusion and watering facilities	0.1%	600			x		X	x

* = strategy footprint is much smaller than treated area
† = strategy is important for protection and in some cases reflects preventing current condition degradation
‡ Practices with some impact on flow are assumed to have a minimal impact on habitat, while those that are directly applicable to riparian areas are assumed very effective

Practice Effectiveness Key

calculated % of goal addressed if 1% new watershed adoption

X = >2% x = >1% o = >0.5% - = >0% <blank> = ~0%

Table 4 Continued. WRAPS strategy table for Hawk Creek Watershed. The table presents information relevant for local planning efforts including the specific strategies and actions, and adoption rates to meet the 10-year target.

Land use/Source Type	Watershed Restoration and Protection Strategies estimated to meet 10-year target at specified adoption rates	Adoption Rate	Pollutants/ Stressor addressed by strategy					
			Flow	TSS	Phosphorus	Nitrogen	Bacteria	Habitat
Cities & Yards	Nutrient/fertilizer and lawn mgt.	sufficient to reduce current city and residential contributions by 20%	√	√	√	√	√	√
	Infiltration/retention ponds, wetlands							
	Rain gardens, rain barrels							
	Street sweeping & storm sewer mgt.							
	Trees/native plants							
	Snow pile management							
	Golf course nutrient mgt.							
	Permeable pavement for new construction							
	Construction site erosion control							
Streams, ditches, & ravines	Protect and restore buffers, natural features†	buffers per law; no loss of natural	√	√	√	√	√	√
	Reduce or eliminate ditch clean-outs	all ditches		√	√			√
	Bridge/culvert design	all new projects		√	√			√
	Streambank stabilization	as needed to protect property or for extreme erosion		√	√			√
	Ravine/stream (grade) stabilization			√	√			√
	Stream channel habitat, shape, pattern, and slope restoration	priority projects	√	√	√	√	√	√
Lakes, wetland	Protect and restore near-water vegetation†	sufficient to reduce/consume 2% of P load	√	√	√	√	√	v
	In-water management and species control				√			
Forest, prairie	Protect and restore areas in these landuses, increase native species populations†	all forests and prairies	√	√	√	√	√	√
SSTS	Maintenance and replacement/upgrades	sufficient to reduce current contributions by 20%			√		√	
Feed lots	Feedlot runoff controls including: buffer strips, clean water diversions, etc.				√	√	√	
Social Dimension (strategies other than physical practices)	Facilitate relationship-building between ag producers and conservation professionals	sufficient to address barriers to adopting all other strategies at specified adoption rates	no direct impacts to pollutants and stressors. however, these strategies are critical to get the physical practices adopted					
	Facilitate relationship-building between ag industry and conservation professionals							
	BMP education programs: ag soil health and altered hydrology, residential stormwater, septic system, manure management							
	Networking and educational opportunities for agricultural producers, demo projects							
	Change Farm Bill to: support alternative crops, small farms, perennials, rural communities; remove incentives that result in environmental damage							
	Restructure funding and crop insurance to: ensure income for farmers when transitioning - and eliminate obstacles - to implementing sustainable practices							
	New ordinances/ordinance review (septic compliance upon property transfer, well head protection)							
	Existing ordinance compliance/enforcement: manure application, shoreland†							
	Permit compliance for regulated sources†							

Table 5 (Strategies Table B, page 1 of 2): This portion of the strategies table presents a suite of strategies and practices that are cumulatively capable of meeting the 10-year targets for the Middle Minnesota River Watershed. The strategies are presented by land use and provide target adoption rates by both watershed area and the equivalent number of acres. Adoption rates are for new projects and assume existing practices will be maintained. See key on bottom of page 2 for details on table.

Land use/Source Type	Middle Minnesota River Watershed Restoration and Protection Strategies and BMPs estimated to meet 10-year targets at specified adoption rates	Adoption Rate		Effectiveness of practice on parameter - per acre comparison						
		% of Watershed Area	Watershed Acres	Sediment	Flow	Nitrogen	Phosphorus	Bacteria	Habitat‡	Connectivity
Cultivated Crops	**Decrease fertilizer use:** nutrient management, eliminate fall anhydrous application	10%	82,600			x	-			
	Add cover crops for living cover in fall/spring: cover crops on corn/beans, cover crops on early-harvest crops	10%	82,600	x	x	X	X	x	-	
	Decrease tillage: conservation tillage, no-till, strip till, ridge till	5%	41,300	-	-	-	X	x		
	Reduce and treat cropland surface runoff*: water and sediment control basins, grade stabilizations, terraces, grassed waterways	3%	24,800	x	-	-	X	x		
	Reduce and treat cropland tile drainage*: Treatment wetlands, saturated buffers, bioreactors, controlled drainage	3%	24,800		-	X	-			
	Replace open tile intakes*: blind, rock, sand filter, perforated pipe riser, etc. intakes	0.5%	4,100	X			X			
	Diversify crops: small grains, perennial crops, conversion to	0.5%	4,100	x	x	X	x	x	-	
	Convert/protect land for critical habitat (replacing marginally productive cropped areas): Restore wetlands and drained lake beds, conservation cover/CRP, prairie, habitat	0.5%	4,100	X	X	X	X	X	X	
	Mitigate new ag drainage projects by adding basin/wetland	All new projects		n/a						
	Maintain existing BMPs, CRP, RIM, etc. †	All current BMPs		n/a						
	Education and outreach: peer-to-peer (farmer forums, field days, conservation tours), leadership/elected officials, school curriculum, coffee shop visits. Strategically target audiences (e.g. canning crops). Topics: nutrient management, soil health, drainage water management, cover crops	sufficient to achieve the physical strategies listed above		n/a						
	Networking and relationships: one-on-one conversations, cold calls, peer-to-peer networking, younger and older farmer connection, partnering with ag groups/crop advisors									
	Conservation practice targeting: collaboratively develop targeted plans									
	Flexible and available funding: increased cost share cap, stack funding, tax credits, federal programs, plain language requirements									
	Available/paid staff time: to do outreach work									
Manure Application	**Improve manure application**: improve: uniformity (necessitates equipment upgrade in cases), placement (further from water/flow path), timing and integration (right before planting cover crop, not on snow (necessitates feedlot manure storage upgrades in cases), incorporation (<24 hours), target surface appliers for improvements	2%	16,500		-	x	x	X		
	Education and outreach: educate producers on financial benefits (less fertilizer purchase) of application timing and scavenging cover crops and on proper application/requirements	sufficient to achieve the physical strategies listed above		n/a						
	Plain language: simplify manure management plan language									
	Permit/local ordinance: strengthen and ensure compliance									

Table 5 (Strategies Table B, page 1 of 2 continued): This portion of the strategies table presents a suite of strategies and practices that are cumulatively capable of meeting the 10-year targets for the Middle Minnesota River Watershed. The strategies are presented by land use and provide target adoption rates by both watershed area and the equivalent number of acres. Adoption rates are for new projects and assume existing practices will be maintained. See key on bottom of page 2 for details on table.

Pastures	**Improve pasture/grazing management**: convert conventional pasture to rotational grazing, use alternative grazing areas/cover crops, pasture improvement/vegetation diversification	0.3%	2,500	X			X	X
	Restrict livestock access to water bodies: exclusions, crossings, watering facilities	0.3%	2,500	X			X	X
	Education and outreach: on economics of managed grazing (increase forage capacity), cost share for exclusion practices	sufficient to achieve the physical strategies listed above		n/a				
	Marketing: to consumers of benefits/value of grazed							
	Flexible and adequate funding: Provide adequate funding and increase flexibility in standards for cost share							
Feedlots	**Reduce/treat feedlot runoff:** feedlot runoff (vegetative) treatment	sufficient to reduce current contributions by 50%			√	√	√	
	Optimize manure storage: rainwater diversion (prevent from entering manure storage system), feedlot manure storage addition, use deep bedding (for less runoff from storage piles)				√	√	√	
	Optimize feedlot siting: increase distance between livestock and water, move feedlots out of sensitive areas				√	√	√	
	Integrate livestock onto the landscape: transition confined livestock to grazed systems				√	√	√	
	Reduce total number of livestock: produce higher value (grazed, organic) livestock to reduce total number of livestock while maintaining producer income				√	√	√	
	Education, outreach and build social norms to encourage producers to graze livestock	sufficient to achieve the physical strategies listed above		n/a				
	Flexible and adequate funding: Provide adequate funding							
	Permit/local ordinance: strengthen and ensure compliance, identify all feedlots with any runoff							

Table 5 (Strategies Table B, page 2 of 2): This portion of the strategies table presents a suite of strategies and practices that are cumulatively capable of meeting the 10-year targets for the Middle Minnesota River Watershed. The strategies are presented by land use and provide target adoption rates by both watershed area and the equivalent number of acres. Adoption rates are for new projects and assume existing practices will be maintained. See key on bottom of page 2 for details on table.

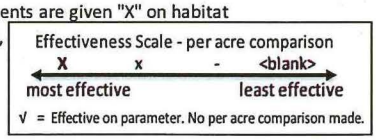
Land use/Source Type	Middle Minnesota River Watershed Restoration and Protection Strategies and BMPs estimated to meet 10-year targets at specified adoption rates	Adoption Rate	Pollutants/ Stressor addressed by strategy						
			TSS	Flow	Nitrogen	Phosphorus	Bacteria	Habitat	Connectivity
Stream, ditches, & riparian	**Install/expand riparian buffer**: 16t, 50ft, 100ft buffers and/or riparian tree planting	All stream/ditches have req'd buffer	√	√	√	√	√	√	
	Reduce ditch impacts: reduce ditch clean-outs, install side-inlets, install grade stabilizations, etc.	All stop/reduce cleanouts. Install erosion control	√			√	√	√	
	Improve stream/ditch channels, banks, and habitat: re-meander channelized stream reaches, 2-stage ditches, stream habitat improvement and management, re-connect/restore flood plains, streambank stabilization	On 160 river miles (~10%): assess and implement new projects where	√	√	√	√		√	
	Address fish barriers: dam removal, replace/properly size culverts and bridges	10% of barriers addressed. Properly design all new							√
	Education and outreach: demo and benefits of reducing ditch clean-outs, peer-to-peer, watershed tours, school curriculum, AIS	sufficient to achieve the physical strategies listed above							
	Work with state/county/city engineers to improve designs								
	Flexible and adequate funding: Provide adequate funding and increase flexibility in standards for cost share								
Lakes, wetlands, & shoreland	**Restore/protect shoreland**: stabilize/restore shoreline with vegetation, increase distance (buffer) between waterbody and impacts	On 8 lakes (~10%): assess and address shoreland and in-lake management where needed				√		√	
	Manage in-lake: Drawdowns, internal load controls (dredging, alum, rough fish control)					√		√	
	Regulations/zoning: improved/enforced shoreland ordinance/easement, targeted no development areas	sufficient to achieve the physical strategies listed above							
	Targeted communication and relationship building								
	Education: landowners, peer-to-peer, AIS awareness, watershed tours, school curriculum								
	Flexible and adequate funding: Provide adequate funding and increase flexibility in standards for cost share								
Urban and rural residential	**City/neighborhood-scale water management:** retention and infiltration areas, stormwater ponds, swales, rain gardens, wetlands, etc.	sufficient adoption to reduce current contributions by 20%	√	√	√	√	√		
	Improve soil health: reduce nutrient use, diversify lawns, add trees/shrubs/prairie/forest, no-till and cover crop gardens, etc.		√	√	√	√	√		
	Improve street construction and management: permeable pavement on new construction, improved street sweeping frequency and timing, strategic and decreased salt use		√	√	√	√	√		
	Resident-scale water management: rain gardens, barrels, pet waste, lawn diversification		√	√	√	√	√		
	Well head sealing and vegetative protection								
	Education: residential practices, stormwater management, road/sidewalk salt	sufficient to achieve the physical strategies listed above							
	Planning: Urban forestry green infrastructure, impact zones for climate change, incorporate urban/residential practices								

Table 5 (Strategies Table B, page 2 of 2 continued): This portion of the strategies table presents a suite of strategies and practices that are cumulatively capable of meeting the 10-year targets for the Middle Minnesota River Watershed. The strategies are presented by land use and provide target adoption rates by both watershed area and the equivalent number of acres. Adoption rates are for new projects and assume existing practices will be maintained. See key on bottom of page 2 for details on table.

Subsurface Treatment Systems (Septics)	**Maintenance and replacement:** scheduled maintenance and replace failing	sufficient adoption to reduce current contributions by 20%			√	√	√
	Eliminate Imminent Public Health Threat systems				√	√	√
	Improved septic solids application: increase buffers, application rates				√	√	√
	Alternative systems: aerobic treatment units, graywater systems, holding tanks, etc.				√	√	√
	Loans and grants: targeted to low income households	sufficient to achieve the physical strategies listed above					
	Uniform rules: adopted by all counties (e.g. sale and transfer, alternative systems)						
	Education: of pumpers and appliers, system owners						
	Enforcement: increase enforcement of existing rules						
Point Sources	**Facility upgrades** when required by regulating party	Follow regulatory requirements			√	√	√
	Maintain permit compliance						
	Technical assistance and funding for village and small town treatment facilities						

* = strategy footprint is much smaller than treated area (e.g. a grassed waterway treats many more acres than the practice footprint)

† = strategy is important for protection and reflects a key strategy to prevent current condition degradation
‡ Practices with "x" effect on flow are given a "-" on habitat. Practices that target riparian zone improvements are given "X" on habitat
Effectiveness was estimated using 1% adoption. While some practices are most effective at 1% adoption, the total effectiveness is limited by the watershed area contributing to the source.



Prioritizing and Targeting

Local conservation implementation plans that are developed subsequent the WRAPS report should prioritize and target the strategies and set measurable goals. Prioritizing is the process of selecting priority areas or issues based on justified water quality, environmental, or other concerns. Priority areas can be further refined by considering additional information: other water quality, environmental, or conservation practice effectiveness models or concerns; ordinances and rules; areas to create habitat corridors; areas of high public interest/value; and many more that can be selected to meet local needs. The Hawk Creek and Minnesota River – Mankato WRAPS reports identified several priority areas for planning consideration through development of the goals maps, the HSPF model maps, and the GIS estimated altered hydrology maps. Table 20 in the Minnesota River- Mankato WRAPS and Table 13 in the Hawk Creek WRAPS summarize many of these priority areas identified by the WRAPS Local Work Groups and should be considered for 1W1P planning efforts.

See the following links for more information:

Hawk Creek Assessment/Strategy Reports:
https://www.pca.state.mn.us/water/watersheds/minnesota-river-yellow-medicine-river-hawk-creek

Minnesota River- Mankato Assessment/Strategy Reports:
https://www.pca.state.mn.us/water/watersheds/minnesota-river-mankato

Again, thank you for the opportunity to review and comment on the draft Plan. If we may be of further assistance, please contact Mike Weckwerth (Hawk Creek) at 507-476-4267 or Bryan Spindler (Minnesota River- Mankato) at 507-344-5267.

Sincerely,

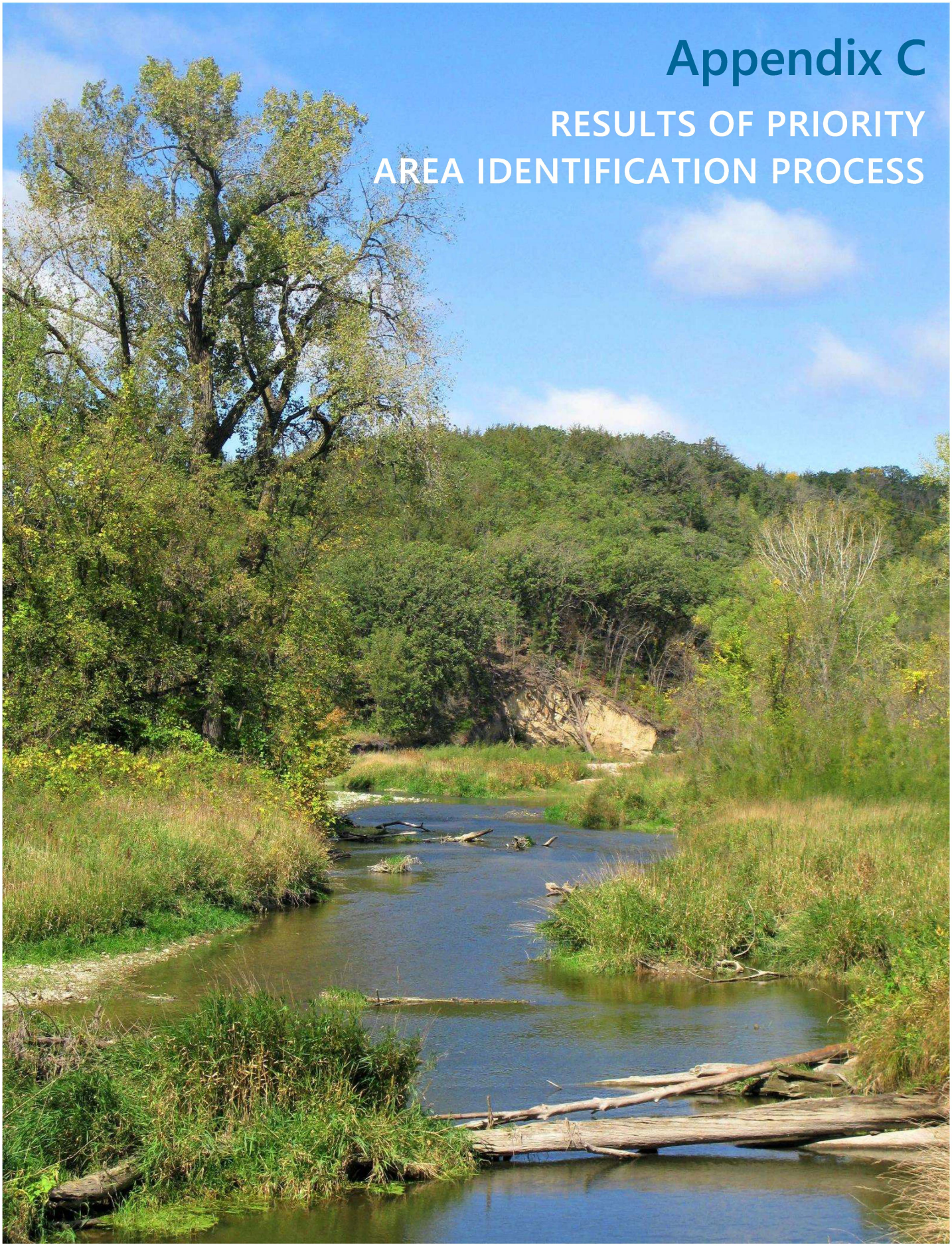
Scott MacLean

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

MW/BS:jdf

cc: Jeremy Maul, Board Conservationist, BWSR
Katrina Kessler, Assistant Commissioner, MPCA



Appendix C

RESULTS OF PRIORITY AREA IDENTIFICATION PROCESS

PLAN APPENDIX C – RESULTS OF PRIORITY AREA IDENTIFICATION PROCESS

This appendix includes the Priority Area summary maps generated by the Steering Team, Advisory Committee, and Policy Committee in January/February of 2020. As these maps illustrate, the darker green subwatersheds (HUC-10's) are higher priority (were assigned more votes) than the lighter green subwatershed which were assigned less votes and were therefore classified as being lower priority. The call-out boxes include the data layers or other sources of informtion which informed people's decisions as they selected their top three (3) subwatersheds for this planning process.

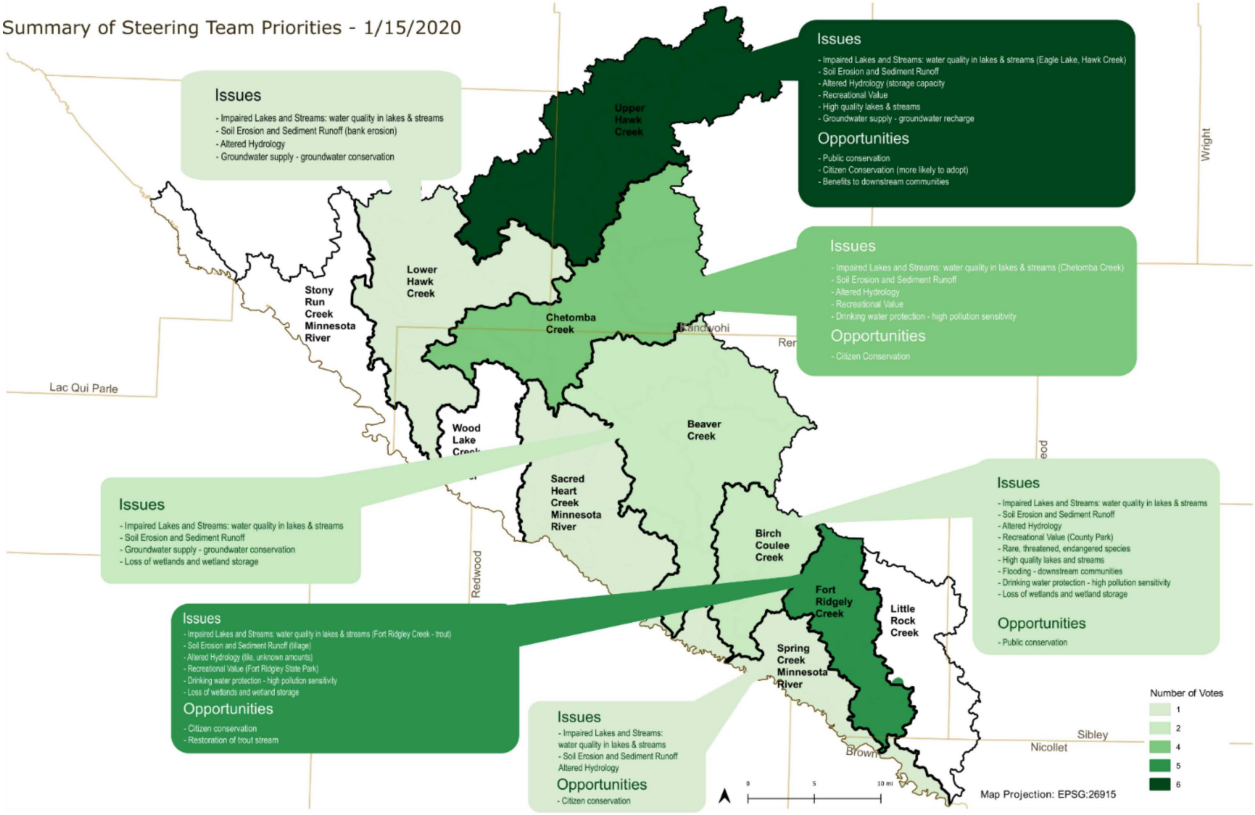


Figure 1C. Results of the Steering Team Meeting workshop (January 2020)

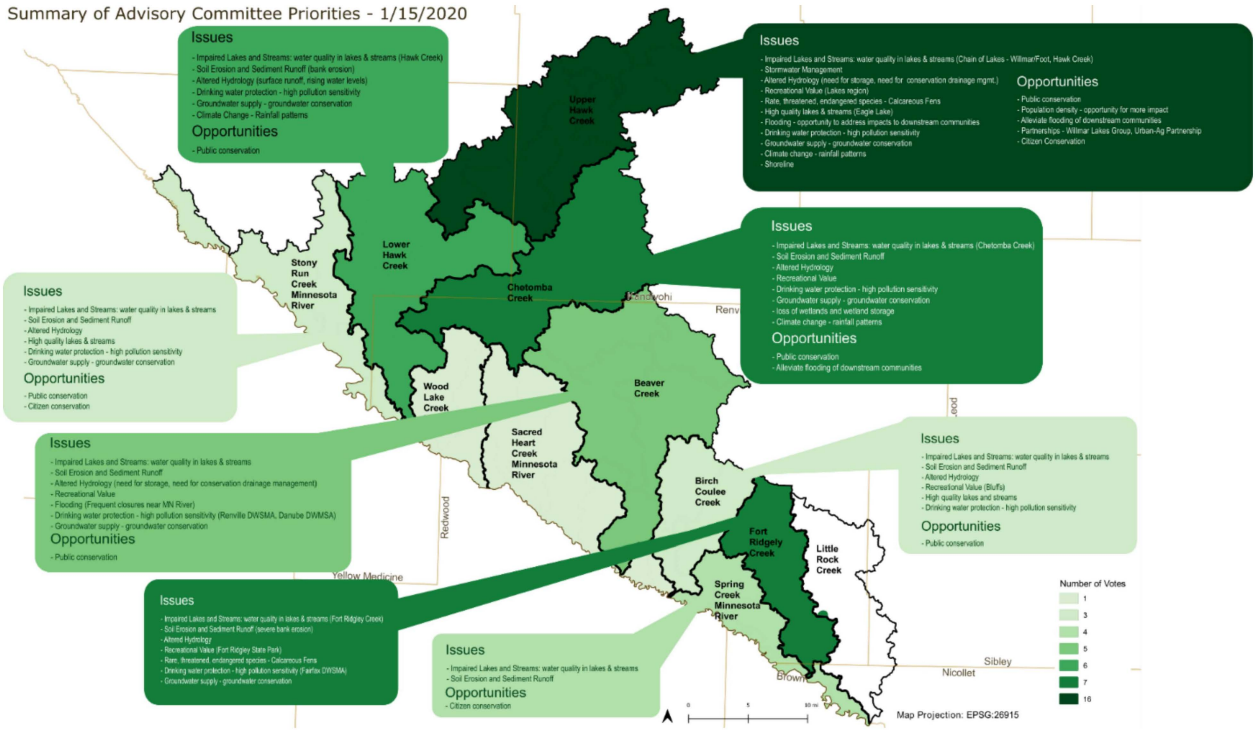


Figure 2C. Results of the Advisory Committee Meeting workshop (January 2020)

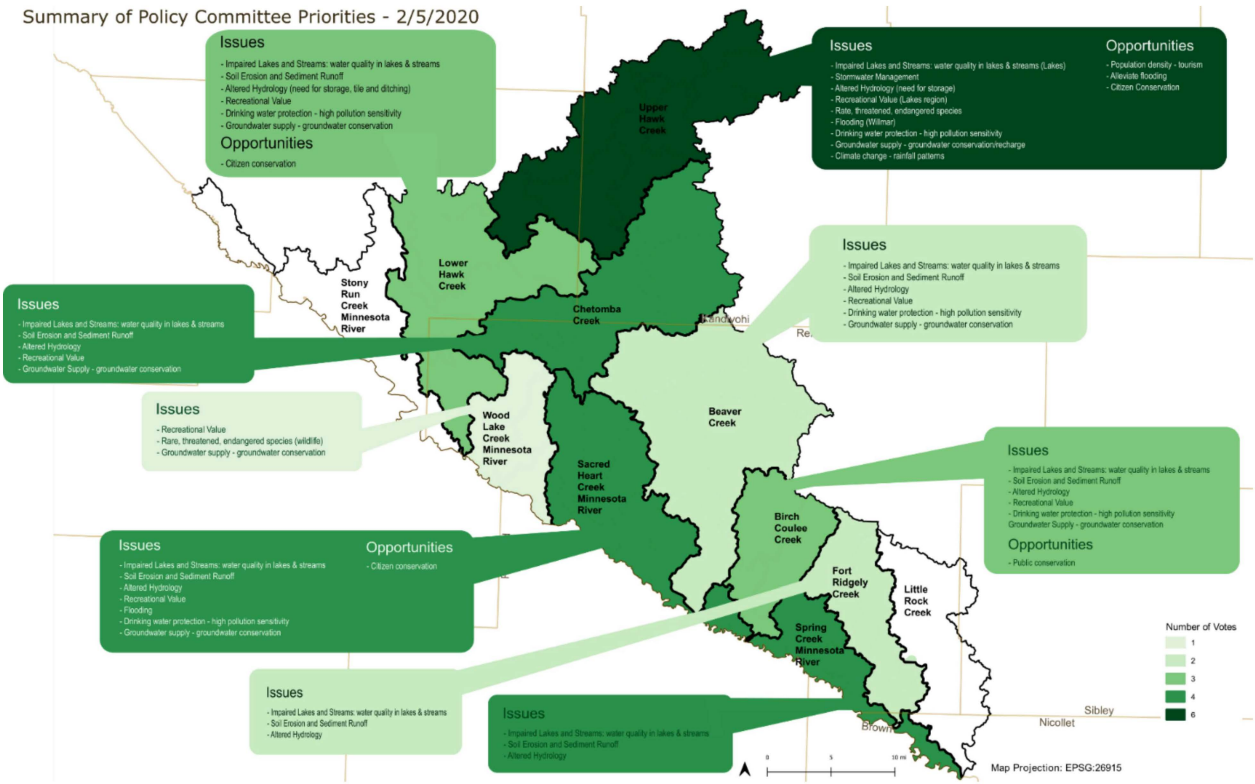


Figure 3C. Results of the Policy Committee meeting workshop (January 2020)

Appendix D

HSPF-SAM MEMO

memo

Project Name |	Hawk Creek-Middle Minnesota 1W1P	**Date** |	5/12/2020 Revised 5/26/2020
To / Contact info |	Steering Team		
Cc / Contact info |			
From / Contact info |	Camilla Correll, Rosie Russell, and Meghan Funke		
Regarding |	Targeting and Setting Measurable Goals – Version 2.0		

Note: This version of the memorandum contains additional information than the previous version reviewed by the Steering Team in previous workshops. New content has been included as red text.

Targeting and Setting Measurable Goals

Step by Step process for modeling BMP scenarios using HSPF-SAM in priority HUC10 subwatersheds [Chetomba Creek, Beaver Creek, Upper Hawk Creek, & Fort Ridgley Creek] in the Hawk Creek-Middle Minnesota watershed.

"The SAM decision-support tool provides a user-friendly, comprehensive approach to identify means for achieving the water quality improvement goals that were set by TMDL assessments, protection strategies, and watershed restoration programs. SAM assists in understanding watershed conditions and identifying priority areas and best management practices (BMPs) that will provide the greatest water quality benefits for each dollar invested. SAM simplifies complex hydrologic and water quality model applications into transparent estimates of the significant pollutant sources in the watershed. Users apply their knowledge and expertise of BMP implementation with the tool's interpretation of model results."

Step 1. Document Existing Conditions (what has been accomplished in the last 5 years?)

During the period of 2013-2018, what TP, TN, TSS and flow reduction rates are currently being achieved from BMPs that have already been adopted in this subwatershed?

Note: BMPs though 2012 are already included in the calibrated HSPF-SAM model. The period 2013-2018 was selected to reflect the level of implementation tracked in the MPCA database over the last five years. At this point in time, MPCA data is not available beyond December 31, 2018.

a. Go to the MPCA BMP Database and identify the current adoption rates for each practice you want to model in HSPF. Based on guidance from Brian Spindler at MPCA, the BMPs from the Middle Minnesota-Mankato HSPF Scenario were selected for this watershed since they had already been vetted and identified as BMPs that are most likely to be adopted in a similar agricultural setting. These BMPs are identified in Column 2 labeled HSPF-SAM BMPs in Table 1 through Table 4 below. You will need to first select the appropriate HUC8 watershed from the dropdown menu (Minnesota-Yellow Medicine River for Upper Hawk, Chetomba, and Beaver, and Minnesota River-Mankato for Fort Ridgley) and move the timeline to the right of the dropdown menu so it is set to 2013-2018. Then, select each HUC12 subwatershed in the HUC10 subwatershed of focus to get the total adoption rates (see Figure 1 for an example for Chetomba Creek). Record these numbers in a table, which will look like **column E of the accompanying spreadsheet.** *To minimize*

discrepancies in collecting this information from the MPCA database, these values have been provided for the Steering Team to use in scenario planning (see Table 1 through Table 4).

Table 1. 2013 - 2018 BMP Adoption Rates for Chetmoba Creek HUC-10 from MPCA Database

CHETOMBA CREEK		*HSPF total cropland area*	*HSPF suitable cropland area for implementation*	*2013-2018 adopted*	*percent of suitable acres adopted*	*percent of cropland acres adopted*
MPCA BMP Database Practice	***HSPF-SAM BMP***					
		acres	acres	acres	%	%
Nutrient Management	Nutrient Management	90,291	83,612	NA	0.000%	0.000%
Residue and Tillage Management, Reduced Till or No-Till	Reduced Tillage (30% residue cover)	90,291	13,181	550.0	4.173%	0.609%
Subsurface Drain and Grade Stabilization Structure (tile inlet improvements)	Alternative Tile Intakes**	90,291	57,857	NA	0.000%	0.000%
Drainage Water Management	Controlled Tile drainage (assumed impacted acres 16.97, Table 5-1 of BMP manual)**	90,291	38,239	203.6	0.533%	0.226%
NA	Riparian Buffers, 100 ft wide (replacing row crops)	90,291	21,914	NA	0.000%	0.000%
Filter Strip	Filter strips, 50 ft wide (cropland field edge)	90,291	17,044	120.0	0.704%	0.133%
Conservation crop rotation	Conservation crop rotation	90,291	90,291	NA	0.000%	0.000%
Water & Sediment Control Basins	WASCOBs (assumed impacted acres 50.96, Table 5-1 of BMP manual)**	90,291	13,839	101.9	0.736%	0.113%
Wetland restoration	Restore tiled wetlands	90,291	18,469	NA	0.000%	0.000%
Cover crop	Corn & Soybean with cover crop	90,291	76,241	494.0	0.648%	0.547%
NA	Riparian Buffers, 16 ft wide (replacing row crops)	90,291	11,736	589.2*	5.020%*	0.653%*

* Adoption rates for 2013-2018 based on the MDNR Buffer Layer which reports the width of buffer on public watercourses. Acres of buffer was calculated by converting feet of buffer width to miles, multiplied by 2 (to account for the buffer on both sides), multiplied by stream length in miles. This was then converted to acres. While the years of adoption are not included in this layer, the buffer compliance law was put into place in 2015 and the value reflects compliance to date.

** For those BMPs in the MPCA Database where adoption rates are not reported directly as acres, an assumption needs to be made about how many acres equate to one unit. Assumptions were made based on the "impacted acres" estimates from the HSPF-SAM BMP Reference Manual.

Table 2. 2013 - 2018 BMP Adoption Rates for Beaver Creek HUC-10 from MPCA Database

BEAVER CREEK		HSPF cropland	HSPF suitable	2013-2018 actual	percent of suitable acres adopted	percent of cropland acres adopted
MPCA BMP	HSPF-SAM BMP** (assumptions based on impacted areas estimates from BMP Reference Manual)	acres	acres	acres	%	%
Nutrient Management	Nutrient Management	107,827	106,282	224.0	0.2%	0.2%
Residue and Tillage Management, Reduced Till or No-Till	Reduced Tillage (no-till)	107,827	17,278	1,047.0	6.1%	1.0%
Subsurface Drain and Grade Stabilization Structure (tile inlet improvements)	Alternative Tile Intakes	107,827	48,058	NA	0.0%	0.0%
Drainage Water Management	Controlled Tile drainage	107,827	31,305	NA	0.0%	0.0%
NA	Riparian Buffers, 100 ft wide (replacing row crops)	107,827	17,121	NA	0.0%	0.0%
Filter Strip	Filter strips, 50 ft wide (cropland field edge)	107,827	13,317	565.0	4.2%	0.5%
Conservation crop rotation	Conservation crop rotation	107,827	107,827	NA	0.0%	0.0%
Water & Sediment Control Basins	WASCOBs (assumed impacted acres 50.96, Table 5-1 of BMP manual)	107,827	21,264	101.9	0.5%	0.1%
Wetland restoration	Restore tiled wetlands	107,827	25,063	1.0	0.0%	0.0%
Cover crop	Corn & Soybean with cover crop	107,827	86,606	3,621.0	4.2%	3.4%
NA	Riparian Buffers, 16 ft wide (replacing row crops)	107,827	9,169	473.4*	5.2%*	0.4%*
NA	Riparian Buffers, 50 ft wide (replacing row crops)	107,827	13,317	364.4*	2.7%*	0.3%*

* Adoption rates for 2013-2018 based on the MDNR Buffer Layer which reports the width of buffer on public watercourses. Acres of buffer was calculated by converting feet of buffer width to miles, multiplied by 2 (to account for the buffer on both sides), multiplied by stream length in miles. This was then converted to acres. While the years of adoption are not included in this layer, the buffer compliance law was put into place in 2015 and the value reflects compliance to date.

** For those BMPs in the MPCA Database where adoption rates are not reported directly as acres, an assumption needs to be made about how many acres equate to one unit. Assumptions were made based on the "impacted acres" estimates from the HSPF-SAM BMP Reference Manual.

Table 3. 2013 - 2018 BMP Adoption Rates for Fort Ridgley Creek HUC-10 from MPCA Database

FORT RIDGLEY CREEK		HSPF cropland	HSPF suitable	2013-2018 actual	percent of suitable acres adopted	percent of cropland acres adopted
MPCA BMP	HSPF-SAM BMP** (assumptions based on impacted areas estimates from BMP Reference Manual)	acres	acres	acres	%	%
Nutrient Management	Nutrient Management	39,731	38,080	NA	0.0%	0.0%
Residue and Tillage Management, Reduced Till or No-Till	Reduced Tillage (30% residue cover)	39,731	9,566	NA	0.0%	0.0%
Subsurface Drain and Grade Stabilization Structure (tile inlet improvements)	Alternative Tile Intakes	39,731	22,260	NA	0.0%	0.0%
Drainage Water Management	Controlled Tile drainage	39,731	10,766	NA	0.0%	0.0%
NA	Riparian Buffers, 100ft wide (replacing row crops)	39,731	8,970	NA	0.0%	0.0%
Filter Strip	Filter strips, 50 ft wide (cropland field edge)	39,731	6,977	313.0	4.5%	0.8%
Conservation crop rotation	Conservation crop rotation	39,731	39,731	NA	0.0%	0.0%
Water & Sediment Control Basins	WASCOBs (assumed impacted acres 50.96, Table 5-1 of BMP manual)	39,731	9,683	NA	0.0%	0.0%
Wetland restoration	Restore tiled wetlands	39,731	8,178	6.0	0.1%	0.0%
Cover crop	Corn & Soybean with cover crop	39,731	36,963	129.0	0.3%	0.3%
NA	Riparian Buffers, 16ft wide (replacing row crops)	39,731	4,804	283.1*	5.9%*	0.7%*
NA	Riparian Buffers, 50ft wide (replacing row crops)	39,731	6,977	92.0*	1.3%*	0.2%*

* Adoption rates for 2013-2018 based on the MDNR Buffer Layer which reports the width of buffer on public watercourses. Acres of buffer was calculated by converting feet of buffer width to miles, multiplied by 2 (to account for the buffer on both sides), multiplied by stream length in miles. This was then converted to acres. While the years of adoption are not included in this layer, the buffer compliance law was put into place in 2015 and the value reflects compliance to date.

** For those BMPs in the MPCA Database where adoption rates are not reported directly as acres, an assumption needs to be made about how many acres equate to one unit. Assumptions were made based on the "impacted acres" estimates from the HSPF-SAM BMP Reference Manual.

b. Open HSPF-SAM, load the project folder for the HUC-8 watershed of focus (*only Fort Ridgley will need to load Middle MN project, all others will need to load the Hawk Yellow Medicine project)* and select the sub basins within the HUC 10 subwatershed of interest (Figure 2).

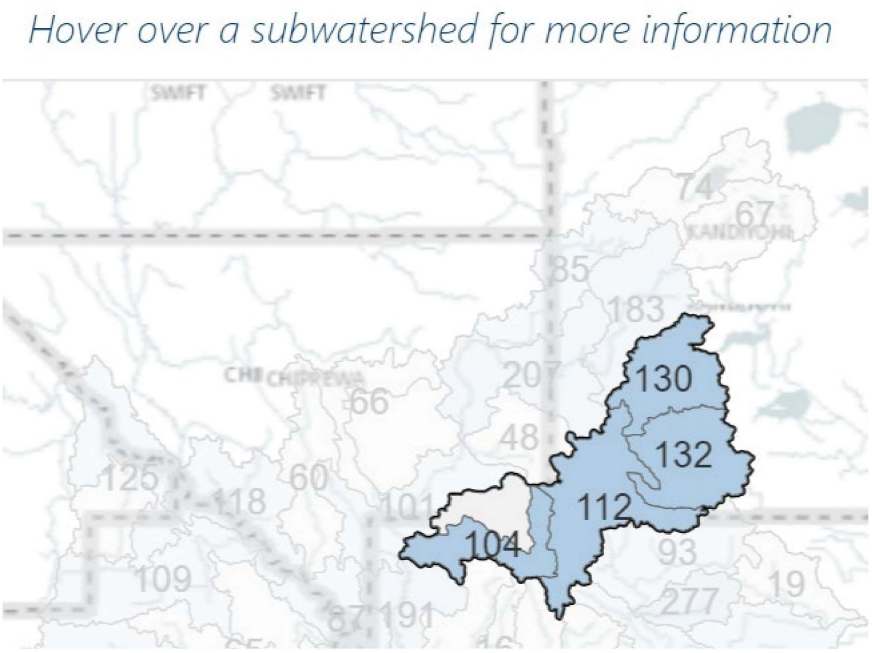


Figure 1. MPCA BMP database, use ctrl function to select all HUC12s

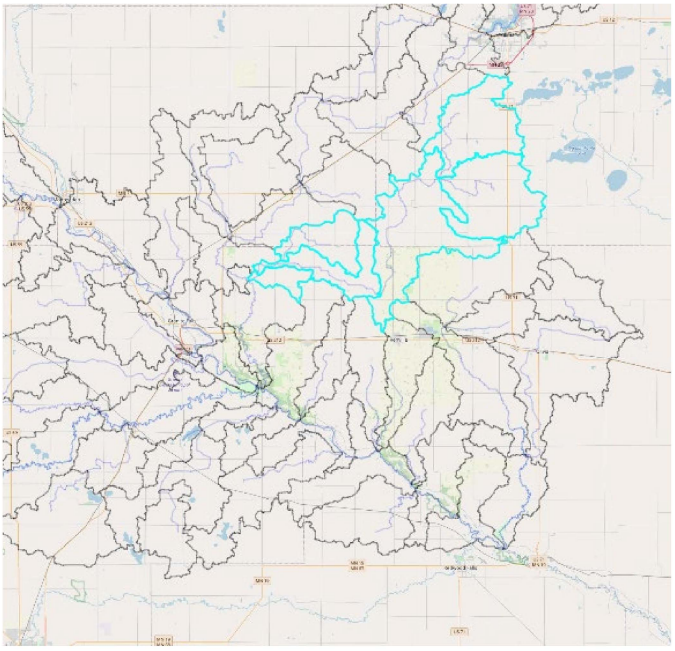


Figure 2. Selection of HSPF sub-basins in Chetomba Creek HUC10 in HSPF-SAM

c. In the "Design tab", select each BMP from the spreadsheet in Step 3. In Step 3a, click the "Apply suitability estimate" and then set the participation level to 100%. (*This is to simply extract the data within HSPF-SAM of the total suitable acres and to put into a new spreadsheet. This is not for the purpose of running HSPF-SAM*).

d. Then, take the "cropland area (acres)", the "percent suitability", and the "treated acres" for EACH BMP and place it into a table and rename the "treated acres" to "suitable acres" (Figure 3). Suitable acres are determined in HSPF-SAM based on two factors: suitability on the landscape and previous implementation from 2004-2015. Suitability factors and their sources can be found in Chapter 5 of the SAM BMP Reference Manual in Table 5-3. It is also shown in Figure 5 below.

e. Once you have all the information for all the BMPs, sum up the "suitable acres" for each of the BMPs as well as the cropland acres and put those numbers into the table, as shown in **columns C and D of the accompanying spreadsheet** as "HSPF cropland" and "HSPF suitable".

f. Using this information, calculate the % of the suitable acres that have already been adopted from 2014-2019 (as well as the % of cropland). Both can be used in HSPF-SAM (see **columns F and G of the accompanying spreadsheet.**)

g. Create a scenario with the "adoption rates" (as defined in the MPCA BMP Database) to date to determine what reductions have already been achieved in this particular subwatershed.

    1. Open HSPF-SAM, load the project folder for the HUC-8 watershed of focus (*only Fort Ridley will need to load Middle MN project)* and select the sub basins within the HUC 10 subwatershed of interest (Figure 2).

    2. In the "Design tab" in Step 3, select the BMP of interest.

    3. In step 3a, apply the adoption rates to all the sub basins within the subwatershed from Column F of the spreadsheet. Be sure to KEEP "suitability estimates" checked. If you do NOT keep "suitability estimates" checked, use Column G of the spreadsheet.

    4. In Step3b, keep all the default efficiencies and select from the drop-down menu "Yellow Medicine" for flow (Figure 4). *Flow efficiencies are not provided in the default values for HSPF-SAM. However, the Yellow-Medicine 1W1P process included a modeling scenario with customized values for flow which were identified based on literature values.*

    5. Click on "add current practice" in Step 3c until all BMPs are listed, then click "add designs to scenario" in Step 5 and make sure all the BMPs are listed.

    6. In Step 6, name the scenario using the following code: [subwatershed name]_2020

    7. Click "Create Scenario" and let the model run.

    8. Go to the "project tab" and click the "save" button for the project.

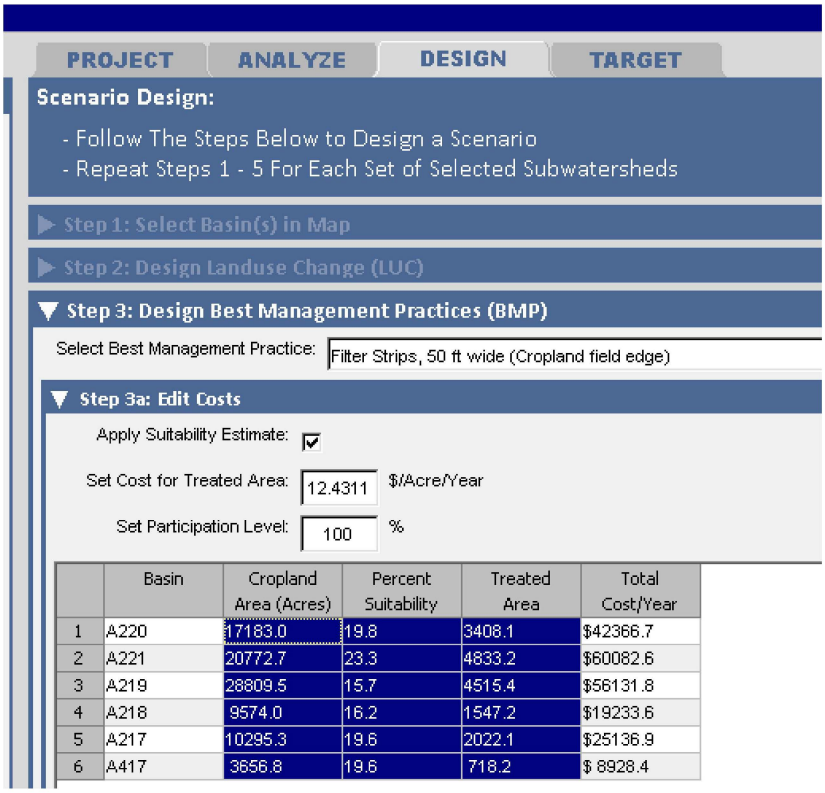


Figure 3. Step 3a in the Design tab of HSPF-SAM

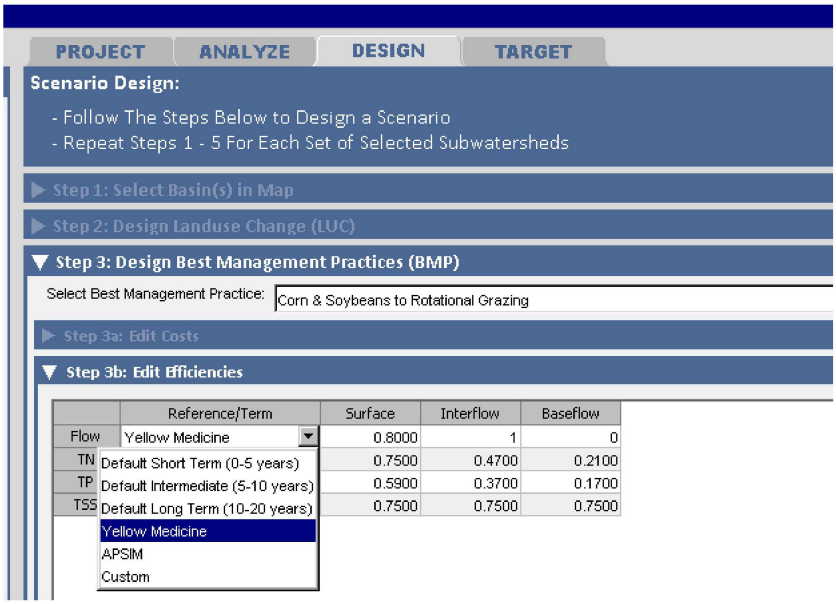


Figure 4. Step 3b in the Design tab of HSPF-SAM

Decision Point ***(refer to cells I17, J17, K17, and L17 in the Chetomba Creek spreadsheet):*** How much progress has already been made in the subwatershed in the last 5 years, and does this rate of progress meet the expectations for the stakeholders in this subwatershed for the next 5 years?

Table 5-3. Methodology Employed to Determine Suitable Acres Available for All Best Management Practices Represented Within the SAM Application

SAM Practice	Available Acres Methodology	Acres Previously Implemented	Impacted to Implementation Area Factor
Nutrient Management	Total Cropland Acres	Acres Implemented by NRCS Practice 590	1
Nutrient Management + Manure Incorporation	Total Cropland Acres	Acres Implemented by NRCS Practice 590	1
Restore Tiled Wetlands (cropland)	Minnesota Restorable Wetland Inventory	2012 NLCD Wetland Acres	10.6
Tile Line Bioreactors	Total Drained Cropland – found by: (1) cropland planted to corn, beans, wheat, or sugarbeets (2) in proximity (1/4 mile) to artificial drainages, canal ditches, or streams (3) SSURGO Hydrologic Soil Group C or D (4) 0–3% slopes	Acres Implemented by NRCS Practice 747	80[a]
Controlled Tile Drainage	Total Drained Cropland – found by: (1) cropland planted to corn, beans, wheat, or sugarbeets (2) in proximity (1/4 mile) to artificial drainages, canal ditches, or streams (3) SSURGO Hydrologic Soil Group C or D (4) 0–1% slopes	Acres Implemented by NRCS Practice 554	80[a]
Riparian Buffers, 16 ft wide (replacing row crops)	16 ft buffer either side of all streams and ditches adjacent to cropland	Acres Implemented by NRCS Practice 391 and 472	15
Riparian Buffers, 50 ft wide (replacing row crops)	50 ft buffer either side of all streams and ditches adjacent to cropland	Acres Implemented by NRCS Practice 391 and 472	7
Riparian Buffers, 100 ft wide (replacing row crops)	100 ft buffer either side of all streams and ditches adjacent to cropland	Acres Implemented by NRCS Practice 391 and 472	4.5
Filter Strips, 50 ft wide (cropland field edge)	50 ft wide filter strip	Acres Implemented by NRCS Practice 386 and 393	7
Conservation Crop Rotation	Total Cropland Acres	Acres Implemented by NRCS Practice 328	1
Conservation Cover Perennials	Total Cropland Acres	Acres Implemented by NRCS Practice 327	1
Corn & Soybeans with Cover Crop	Total Corn & Soybean Acres	Acres Implemented by NRCS Practice 340	1
Short-Season Crops with Cover Crop	Total Short Season (barley, wheat, rye, oats, millet, canola, flaxseed, silage corn, peas, sweet corn)	Acres Implemented by NRCS Practice 340	1
Reduced Tillage (30% + residue cover)	Total Cropland Acres > 2% slope	Acres Implemented by NRCS Practice 329, 345, and 346	1
Reduced Tillage (no-till)	Total Cropland Acres > 2% slope	Acres Implemented by NRCS Practice 329, 345, and 346	1
Alternative Tile Intakes	Total Drained Cropland – found by: (1) cropland planted to corn, beans, wheat, or sugarbeets (2) in proximity (1/4 mile) to artificial drainages, canal ditches, or streams (3) SSURGO Hydrologic Soil Group C or D (4) 0–3% slopes	N/A	44[a]
Riparian Buffers, 50 ft wide (pasture)	50 ft buffer either side of all streams and ditches adjacent to Pasture	Acres Implemented by NRCS Practice 391 and 472	7
Corn & Soybeans to Rotational Grazing	Total Corn & Soybean Acres	Acres Implemented by NRCS Practice 528	1
Water and Sediment Control Basin (cropland)	Total Cropland Acres > 2% slope	Acres Implemented by NRCS Practice 638	10
Constructed Stormwater Pond	Total of NLCD Developed Categories 22–24	N/A	46
Constructed Wetland	Total of NLCD Developed Categories 22–24	N/A	33
Infiltration Basin	Total of NLCD Developed Categories 22–24	N/A	42
Bioretention/Biofiltration	Total of NLCD Developed Categories 22–24	N/A	24

(a) Impacted area factor represents the area treated by one implemented count of the BMP entity.

Figure 5. HSPF-SAM Table 5-3 of the BMP Reference Manual

Step 2. Document Maximum Reductions and Cost-Effectiveness of Individual BMPs (100% Adoption of Individual BMPs)

What Nitrogen, Phosphorus, TSS or Flow reductions can be achieved from maximum adoption of the BMPs from the Middle MN WRAPS? -- *Create a scenario to determine what reduction can be achieved from a 100% adoption of each practice (performing on its own)*

a. Open HSPF-SAM, load the project folder for the HUC-8 watershed of focus (*only Fort Ridley will need to load Middle MN project)* and select the sub basins within the HUC 10 subwatershed of interest (Figure 2).

b. In the "Design tab" in Step 3, select the BMP of interest.

c. In step 3a, apply a 100% adoption to all the sub basins within the subwatershed. Be sure to KEEP "suitability estimates" checked.

d. In Step3b, keep all the default efficiencies and select from the drop-down menu "Yellow Medicine" for flow.

e. Click on "add current practice" in Step 3c and make sure only one BMP is listed, then click "add designs to scenario" in Step 5 and make sure only one BMP is listed.

f. Name the scenario using the following code: [subwatershed name]_100[abbreviated BMP].

g. Run the scenario.

h. Go to the "project tab" and click the "save" button for the project.

i. Complete steps **h through o** for each BMP.

j. Once all the 100% adoption BMP scenarios have been run, go into the "Analyze" tab and select the sub basin that is at the most downstream end of the HUC10 subwatershed (e.g. A417 for the Chetomba Creek HUC10).

k. Click % reduction for Total Phosphorus, Total Nitrogen, and Total Sediment and record these numbers in **columns I, J, K, and L of the accompanying spreadsheet**

l. Lastly, go into the "project" tab and click the "scenario report" for each scenario and record the total cost of that specific scenario.

Decision Point ***(****refer to rows 7-16 in columns I, J, K, and L in the Chetomba Creek spreadsheet****):*** How much treatment can you get from each BMP at 100% adoption on all suitable acres? Which BMPs are most cost-effective and in which subbasins?

Step 3. Document Best-Case Scenario (100% Adoption of Combined BMPs)

What Nitrogen, Phosphorus, TSS or Flow reductions can be achieved from maximum adoption of ALL BMPs from the Middle MN WRAPS (running them together)? -- *Create a scenario to determine what reduction can be achieved from 100% adoption of each practice across the subwatershed.*

a. Open HSPF-SAM, load the project folder for the HUC-8 watershed of focus (*only Fort Ridley will need to load Middle MN project)* and select the sub basins within the HUC 10 subwatershed of interest (Figure 2).

b. In the "Design tab" in Step 3, select the BMP of interest.

c. In step 3a, apply a 100% adoption to all the sub basins within the subwatershed. Be sure to KEEP "suitability estimates" checked .

d. In Step3b, keep all the default efficiencies and select from the drop-down menu "Yellow Medicine" for flow.

e. Click on "add current practice" in Step 3c until all BMPs are listed, then click on "add designs to scenario" in Step 5 and make sure all BMPs selected from Step 2 are listed.

f. Name the scenario using the following code: [subwatershed name]_100All.

g. Run the scenario.

h. Go to the "project tab" and click the "save" button for the project.

i. Go into the "Analyze" tab and select the sub basin that is at the most downstream end of the HUC10 subwatershed.

j. Click % reduction for Total Phosphorus, Total Nitrogen, and Total Sediment and record these numbers in the table.

k. Lastly, go into the "project" tab and click the "scenario report" for the scenario and record the total cost (*it should be the sum of all the costs of the 100% scenarios run to answer question #2*).

Check-in point ***(****refer to cells I18, J18, K18, and L18 in the Chetomba Creek spreadsheet****):*** How much treatment is provided by applying all BMPs to the landscape at 100% adoption rate? What are the maximum feasible adoption rates for the BMPs that were selected for this subwatershed? This should be based on expectations of landowner participation based on stakeholder knowledge of the region of interest. What is the maximum amount of money you are willing to spend in this specific subwatershed? Keep in mind, this is just one of the four "priority" subwatersheds.

Step 4. Optimize the BMP Scenario for the HUC10 or a smaller portion of the subwatershed

What combination of BMPs and at what adoption rate are the most cost effective at achieving a measurable goal for Nitrogen, Phosphorus, TSS or Flow?

a. To begin this process, a list of BMPs should be identified based on pollutant reduction efficiency and cost-effectiveness information for each BMP derived from the previous steps.

b. Using the list of BMPs, work with the Advisory Committee to identify a feasible maximum adoption rate for each of the BMPs. Record these adoption rates in the spreadsheet and clearly outline the process that was used to obtain that feedback from the Advisory Committee.

c. Open HSPF-SAM, load the project folder for the HUC-8 watershed of focus (*only Fort Ridley will need to load Middle MN project)* and select the sub basins within the HUC 10 subwatershed of interest (Figure 2).

d. In the "Design tab" in Step 3, select the BMPs of interest that were identified in the steps above in order of priority (cost-effectiveness and/or pollutant reduction efficiency).

e. In step 3a, apply the appropriate adoption rate to all the sub basins within the subwatershed based on discussions with the Advisory Committee. There is no need to keep "suitability estimates" checked, but keep in mind that if you do not check it, the adoption rate is based on the percent of suitability, not the percent of the cropland (see Table 1 through Table 3 for the suitable acres of implementation for each BMP by HUC10).

f. In Step3b, keep all the default efficiencies and select from the drop-down menu "Yellow Medicine" for flow.

g. Go into the "Target" tab and select the sub basin that is at the most downstream end of the HUC10 subwatershed of interest, click on "reach load", and select the parameter of interest for optimization and the percent reduction. Using the information in Table 4 start with the WRAPS 10-year reduction goal of 10% TSS reduction.

Table 4. HUC10 stream assessments and HSPF sub basins (most downstream sub basin in each HUC10 in bold)

HUC10	Impairments	HSPF Subbasin	TMDL reduction goal	WRAPS long-term reduction goal	WRAPS 10-year reduction goal
Olson Lake (34-0266-00)	Nutrients	A220	38% TP	50% TSS	10% TSS
Chetomba Creek (-577)	***E. coli,* FIBI (TSS)**	**A217**	35% TSS 85% *E. coli*		
Beaver Creek, East Fork (-586)	*E. coli,* FIBI, MIBI, Turbidity	A234	59% *E. coli*	50% TSS	10% TSS
CD 59 (-677)	IF (DO)	A233	n/a		
CD 37 (-531)	IF (DO)	A231	n/a		
Beaver Creek (-530)	*E. coli*, DO, Turbidity	A231	82% *E. coli*		
Beaver Creek (-528)	**Turbidity, *E. coli***	**A230**	48% TSS		
CD 106A (-688)	MIBI	A171	n/a	60% TSS	10% TSS
CD 115, headwaters (-673)	MIBI	A173	n/a		
CD 115, lower (-664)	FS AQL	A173	n/a		
CD 3 (-525)	FS AQL	A177	n/a		
Unnamed creek (trib to Fort Ridgely Creek, -663)	FS AQL	A179	n/a		
Fort Ridgely Creek (-689)	**MIBI, FIBI, *E. coli***	A179	47% *E. coli*		

h. You also have the option to choose a cost – it is up to you if you use this or not, <u>but it may result in a report of very low reductions.</u>

i. Click on the "run optimization" and look at the cost of the scenario.

Check-in point ***(refer to cells I19, J19, K19, and L19 in the Chetomba Creek spreadsheet):*** Is the cost of this scenario manageable or within a range that seems "achievable" by the watershed stakeholders? Is the reduction high enough to achieve a 10-year significant measurable goal (i.e. at least 5%)?

j. Next, select a subbasin that is higher up in the subwatershed and apply the same BMPs, adoption rates, and % reductions.

Check-in point: Iterative process – how does the cost of the second scenario compare to the first scenario? Where is the "goldilocks" subbasin, where the goal can be achieved at a reasonable cost with a significant enough reduction?

k. Click on "add designs to scenario", and it will bring you to Step 5 of the "Design" tab.

l. Name the scenario using the following code: [subwatershed name]_[TP, TN, or TSS][% reduction].

m. Run the scenario.

n. Go to the "project tab" and click the "save" button for the project.

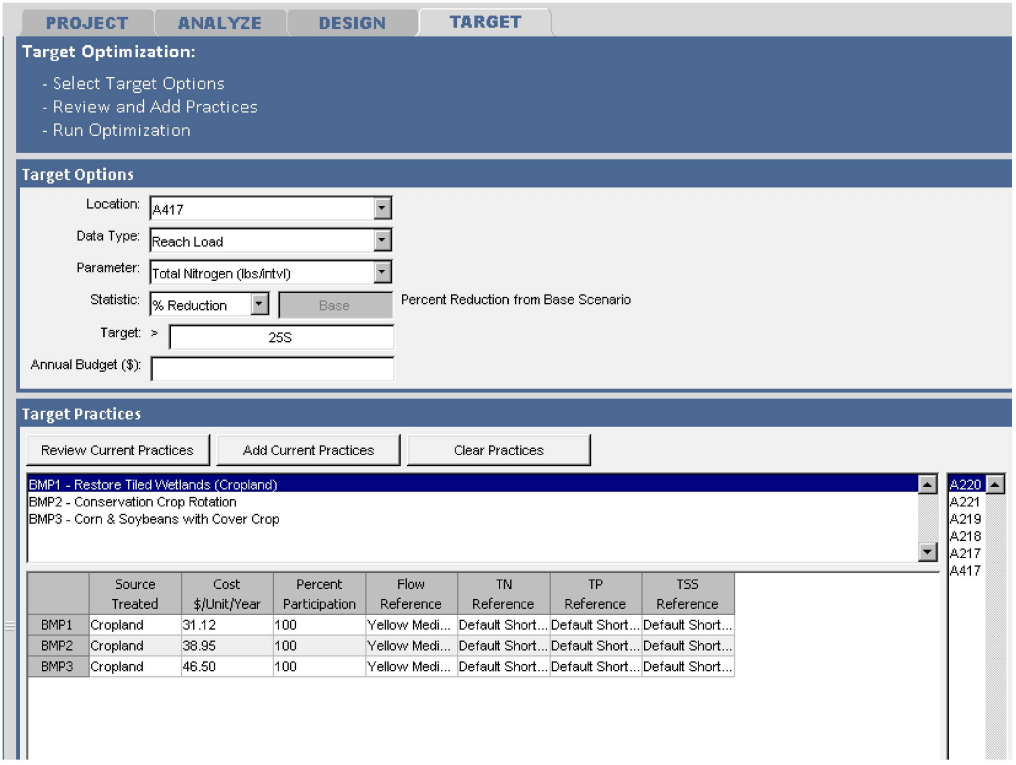


Figure 6. Target optimization in HSPF-SAM

o. Go into the "Analyze" tab and select the sub basin that is at the most downstream end of the HUC10 subwatershed.

p. Click % reduction for Total Phosphorus, Total Nitrogen, and Total Sediment and record these numbers in the table (spreadsheet provided).

q. Lastly, go into the "project" tab and click the "scenario report" for the scenario and record the total cost

Decision Point: Does this achieve the level of treatment needed for all the parameters (is the goal measurable)? Do you need to reevaluate the area it is being applied to (select a smaller, more targeted area), change the BMPs applied to the landscape, change the adoption rate? This is an iterative process.

CHETOMBA CREEK		HSPF cropland	HSPF suitable	2014-2019 actual	percent of suitable	percent of cropland	Middle MN participation for 50% P reduction	100% adoption of each practice				Total cost
								N (lbs/yr)	P (lbs/yr)	TSS (tons/yr)	Flow (ac-ft/yr)	
MPCA BMP list	BMP List	acres	acres	acres	%	%	%	% reduction from baeline/ year	% reduction from baeline/ year	% reduction from baeline/ year	% reduction from baeline/ year	$
Nutrient Management	Nutrient Management	90,291	83,622	7,572.0	9.1%	8.4%	82.00%	8.80%	2.56%	0.00%	0.00%	$706,364
Residue and Tillage Management, Reduced Till	Reduced Tillage (30% residue cover)	90,291	13,174	933.0	7.1%	1.0%	11.00%	2.85%	2.49%	3.12%	0.48%	$257,301
All tile inlet improvements	Alternative Tile Intakes (assumed Grade stabilization structure takes up 0.1 acres)	90,291	57,879	619.2	1.1%	0.7%	2.00%	31.59%	21.96%	23.20%	0.00%	$394,480
Drainage Water Management	Controlled Tile drainage (assumed 0.1 acres)	90,291	38,245	1.2	0.0%	0.0%	12.00%	13.20%	9.19%	0.00%	0.28%	$648,815
-	Riparian Buffers, 100ft wide (replacing row crops)	90,291	21,933	0.0	0.0%	0.0%	23.00%	10.70%	9.56%	8.85%	0.05%	$511,779
Filter stip	Filter strips, 50 ft wide (cropland field edge)	90,291	17,051	958.0	5.6%	1.1%	18.00%	7.00%	6.15%	6.42%	0.00%	$211,880
-	Conservation crop rotation	90,291	90,291	0.0	0.0%	0.0%	13.00%	22.48%	14.94%	21.41%	1.51%	$3,516,666
Water & Sediment Control Basins	WASCOBs (assumed to take up 0.1 acres)	90,291	13,836	0.4	0.0%	0.0%	15.00%	7.24%	6.57%	5.75%	0.03%	$705,231
Wetland Restoration	Restore tiled wetlands	90,291	18,464	280.0	1.5%	0.3%	20.00%	9.32%	7.00%	9.47%	3.03%	$574,767
Covercrop	Corn & Soybean with covercrop	90,291	76,210	579.0	0.8%	0.6%	1.00%	13.14%	12.55%	27.84%	2.60%	$3,545,482
							Existing adoption rates	1.99%	1.21%	1.24%	0.10%	$137,074
							100% adoption of all practices	70.80%	56.29%	43.80%	4.78%	$11,072,764
							Optimization scenario using practices that achieve the greatest reduction (25% reduction N selecting three top practices)	26.70%	18.00%	25.00%	4.14%	$3,007,279

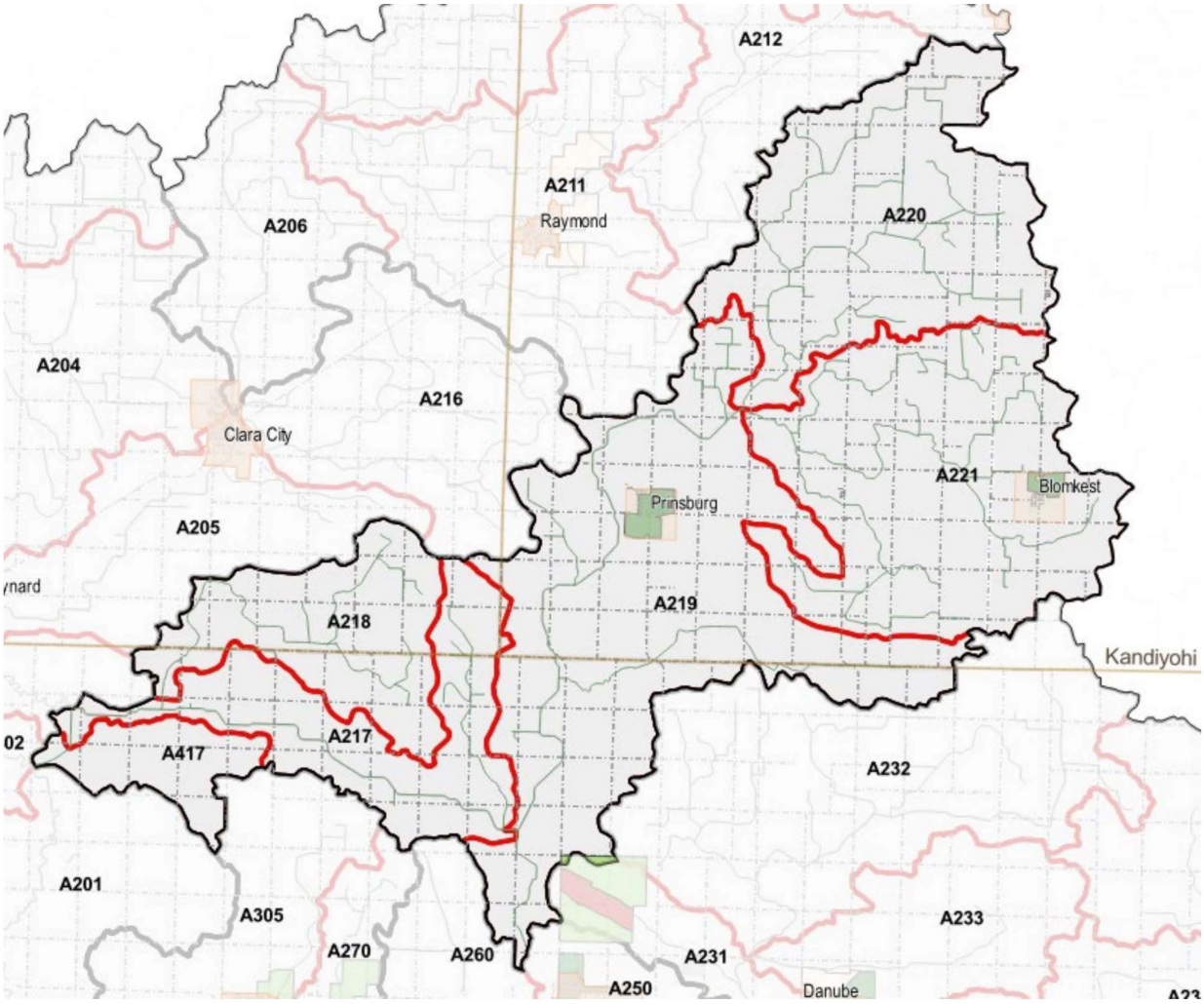


Figure 7. HSPF subbasins for Chetomba Creek

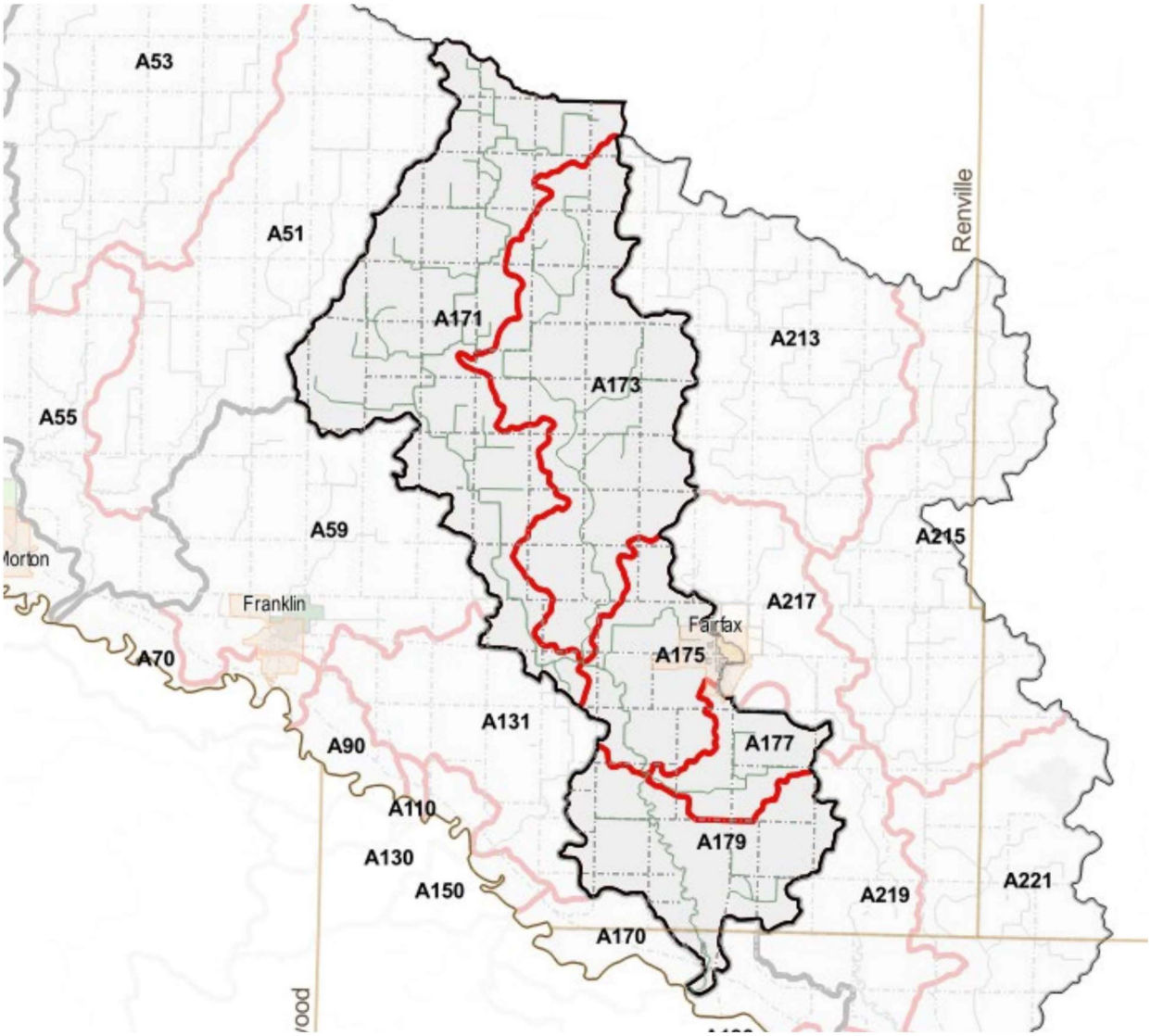


Figure 8. HSPF subbasins for Fort Ridgley Creek

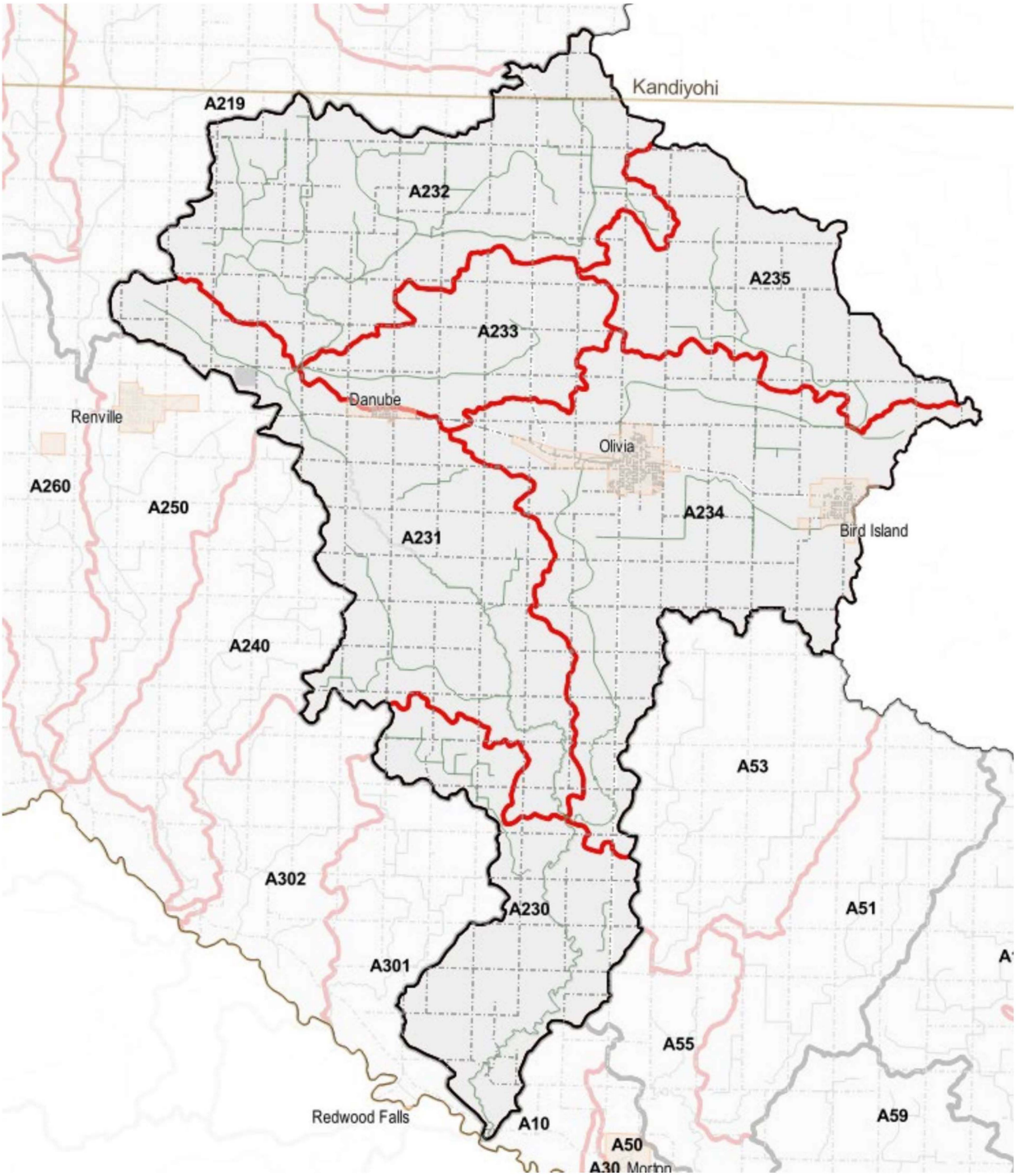


Figure 9. HSPF subbasins for Beaver Creek

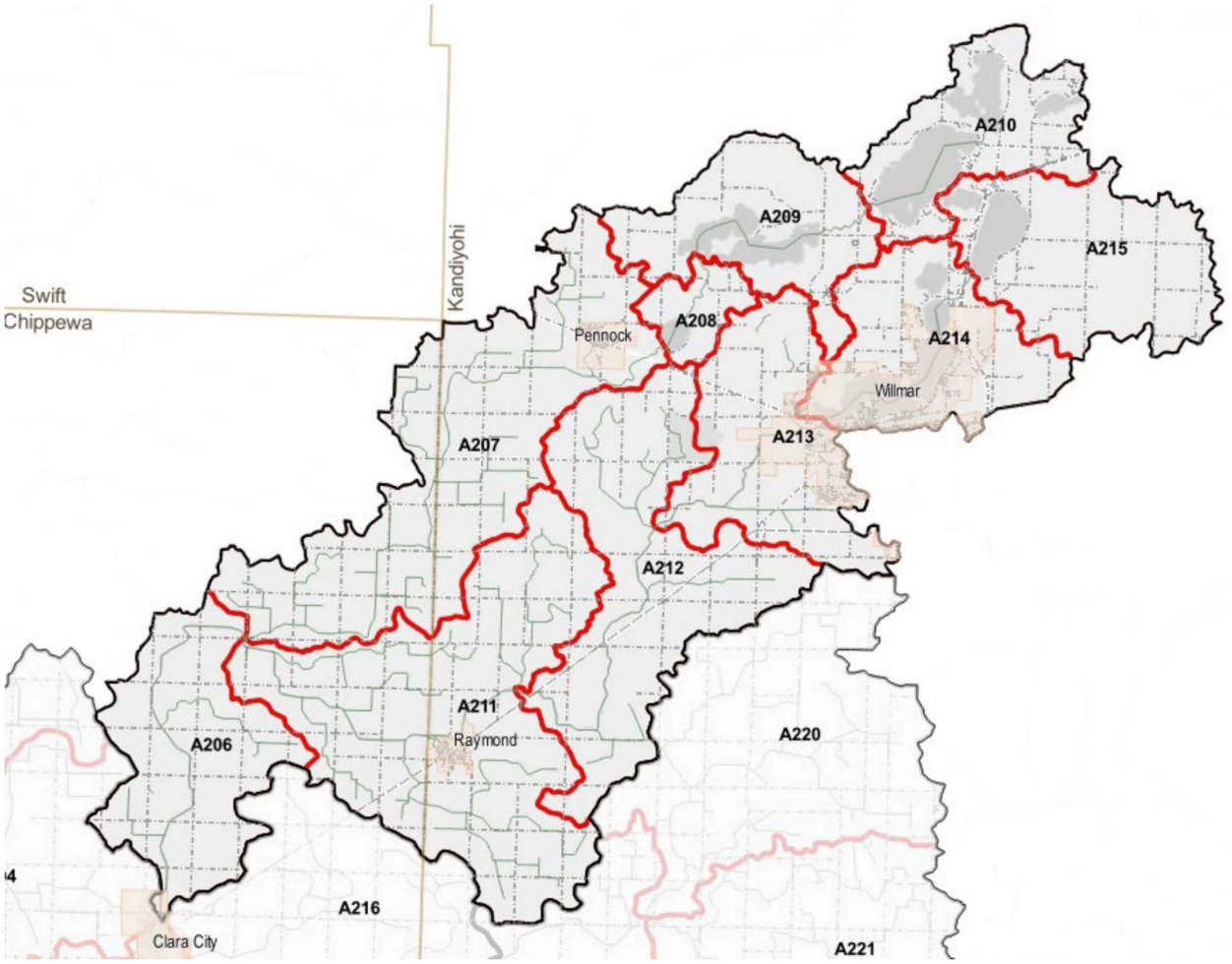


Figure 10. HSPF subbasins for Upper Hawk Creek

Only select subbasins A206, A207, A211, A212, and A213

Appendix E

BATHTUB MODELING

technical memo

Project Name |	Hawk Creek-Middle Minnesota Comprehensive Watershed Management Plan	**Date** |	1-29-2021
To / Contact info |	Project File		
Cc / Contact info |			
From / Contact info |	Meghan Funke, PhD		
Regarding |	Upper Hawk Creek Lake BATHTUB supporting information		

Existing Modeling Efforts

The 2017 Hawk Creek Watershed TMDL include BATHTUB modeling results for Swan Lake (34-0186-00) and the 2020 Upper Hawk Creek and Willmar Chain of Lakes Section 319 Nine Key Element Plan includes BATHTUB modeling results for Willmar Lake (34-0180-01). These model results were discussed with MPCA and used to guide calibration of the BATHTUB models developed as part of this Plan for Eagle, Swan, Willmar, Middle Basin and Foot Lakes.

Lake Response Model

The modeling software BATHTUB (Version 6.1) was selected to link phosphorus loads with in-lake water quality. A publicly available model, BATHTUB was developed by William W. Walker for the U.S. Army Corps of Engineers (Walker 1999). It has been used successfully in many lake studies in Minnesota and throughout the United States. BATHTUB is a steady-state annual or seasonal model that predicts a lake's summer (June through September) mean surface water quality. BATHTUB's timescales are appropriate because watershed phosphorus loads are determined on an annual or seasonal basis, and the summer season is critical for lake use and ecological health. BATHTUB has built-in statistical calculations that account for data variability and provide a means for estimating confidence in model predictions. The heart of BATHTUB is a mass-balance phosphorus model that accounts for water and phosphorus inputs from tributaries, watershed runoff, the atmosphere, sources internal to the lake, and groundwater; and outputs through the lake outlet, water loss via evaporation, and phosphorus sedimentation and retention in the lake sediments.

System Representation in Model

In typical applications of BATHTUB, lake and reservoir systems are represented by a set of segments and tributaries. Segments are the basins (lakes, reservoirs, etc.) or portions of basins for which water quality parameters are being estimated, and tributaries are the defined inputs of flow and pollutant loading to a particular segment. For this study, the direct drainage area, major tributaries and outflow from an upstream lake were defined as separate tributaries to each lake (i.e., segment).

Model Inputs

The input required to run the BATHTUB model includes lake geometry, climate data, and water quality and flow data for runoff contributing to the lake. Observed lake water quality data are also entered into the BATHTUB program to facilitate model verification and calibration. Lake segment inputs are listed in Table 1, and tributary inputs are listed in Table 2. Average annual precipitation rates are based on the 2000-2013 PRISM average for Willmar, MN, and average annual evaporation rates are based on the 2017 USGS estimates of average evapotranspiration rates for Willmar, MN based on an empirical regression calibrated with long-term water balance data from 679 gages

(2000-2013) across the continuous United States. Precipitation and evaporation rates apply only to the lake surface areas. The existing in-lake water quality conditions were based on the most recent 10-year June-September surface average from the MPCA Surface Water Assessment portal (2008-2017; https://webapp.pca.state.mn.us/surface-water/search).

Average phosphorus atmospheric deposition loading rates were estimated to be 0.42 kg/ha/yr for the Minnesota River Basin (Barr 2007 Detailed Assessment of Phosphorus Sources to Minnesota, Appendix J, Table 7) applied over each lake's surface area (Table 1).

Table 1. BATHTUB segment input data for modeled lakes

Modeled Lake	Average Annual Precipitation (in/yr)	Average Annual Evaporation (in/yr)	Surface area (ac)	Lake fetch (ft)	Mean depth (ft)	Total Phosphorus (µg/L)
Eagle (34-0171-00)	29.1	19.8	849.6	10,044	24.9	38
Swan (34-0186-00)			202.6	4,100	5.0*	111
Willmar (34-0180-01)			446.9	7,200	5.7	130
Middle Basin (34-0180-02)			189.6	4,917	8.3	61
Foot (34-0181-00)			503.1	8,100	4.8	69

** Lake depth information was not available for Swan Lake at the time of modeling. An estimate of 5 feet average depth was selected based on professional judgement to approximate the lake volume.*

Table 2. Existing upstream phosphorus loads to modeled lakes

Modeled Lake	Upstream Lake or Subwatershed	Drainage Area (ac)	TP (µg/L)	Flow (ac-ft/yr)	TP Load (lb/yr)
Eagle (34-0171-00)	NE Tributary	7,270	370.2	1,982	**1,994.4**
	SE Tributary	1,777	459.5	431	**537.9**
	Direct Drainage	1,804	189.6	636	**327.9**
	Point Lake (34-0193-00)	477	27.0	251	**18.4**
Swan (34-0186-00)	Direct Drainage	704	145.0	296	**116.8**
	Eagle Lake (34-0171-00)	12,177	38.0	3,299	**340.8**
	Skataas Lake (34-0196-00)	1,292	102.0	945	**262.1**
Willmar (34-0180-01)	Direct Drainage	3,410	197.3	1,689	**906.0**
	NE Tributary	761	416.3	202	**228.4**
	NW Tributary	1,510	390.3	544	**577.7**
	Swan Lake	14,376	111.0	4,541	**1,370.2**
Middle Basin (34-0180-02)	Direct Drainage	647	256.4	215	**150.1**
	Willmar Lake (34-0180-01)	20,504	130.0	6,976	**2,465.3**
Foot (34-0181-00)	Direct Drainage	1,636	280.8	533	**406.9**
	Middle Basin (34-0180-02)	21,341	64.0	7,192	**1,251.2**

Model Equations

BATHTUB allows a choice among several different phosphorus sedimentation models. The Canfield-Bachmann Lake phosphorus sedimentation model (Canfield and Bachmann 1981) best represents the lake water quality response of Minnesota lakes and is the model used by the majority of lake TMDLs in Minnesota. In order to perform a uniform analysis, Canfield-Bachmann Lakes (model) was selected as the standard equation for the study. However, the Canfield-Bachmann Lakes phosphorus sedimentation model tends to under-predict the amount of internal loading in shallow, frequently mixing lakes. Therefore, an explicit internal load is often added to shallow lake models to improve the lake water quality response of the Canfield-Bachmann Lakes phosphorus sedimentation model.

Model Calibration

The models were calibrated to existing water quality data, found in Table 1, and then were used to determine the phosphorus loading capacity of each lake. When the predicted in-lake total phosphorus concentration was lower than the average observed (monitored) concentration, an explicit additional load was added to calibrate the model. It is widely recognized that Minnesota lakes in agricultural regions have histories of high phosphorus loading and/or very poor water quality. For this reason, it is reasonable that internal loading may be higher than that of the lakes in the data set used to derive the Canfield-Bachmann lakes formulation. When the predicted in-lake total phosphorus concentration was higher than the average observed (monitored) concentration, the phosphorus sedimentation factor was increased. Increased sedimentation is often found in shallow lakes that have high treatment capacity due to a clear water, aquatic plant-dominated state. Calibration mode and values for the modeled lakes are listed in Table 3.

Table 3. Model calibration summary for the modeled lakes

Impaired Lake or Upstream Lake	Uncalibrated Predicted In-lake P (µg/L)	Calibration Mode	Calibration Value (mg/m^2-yr)
Eagle (34-0171-00)	46.0	Increased sedimentation factor	1.25
Swan (34-0186-00)	41.0	Additional excess/ internal load	2.65
Willmar (34-0180-01)	84.3	Additional excess/ internal load	1.72
Middle Basin (34-0180-02)		Increased sedimentation factor	1.66
Foot (34-0181-00)	51.0	Additional excess/ internal load	0.51

Determination of Lake Load Reductions to Achieve Plan Goals

Using the calibrated existing conditions model as a starting point, the phosphorus concentrations associated with upstream lakes or subwatersheds were reduced according to Table 4 to achieve the in-lake phosphorus goals listed in Table 5. In Swan Lake, excess internal loads were also reduced to achieve the in-lake phosphorus goals.

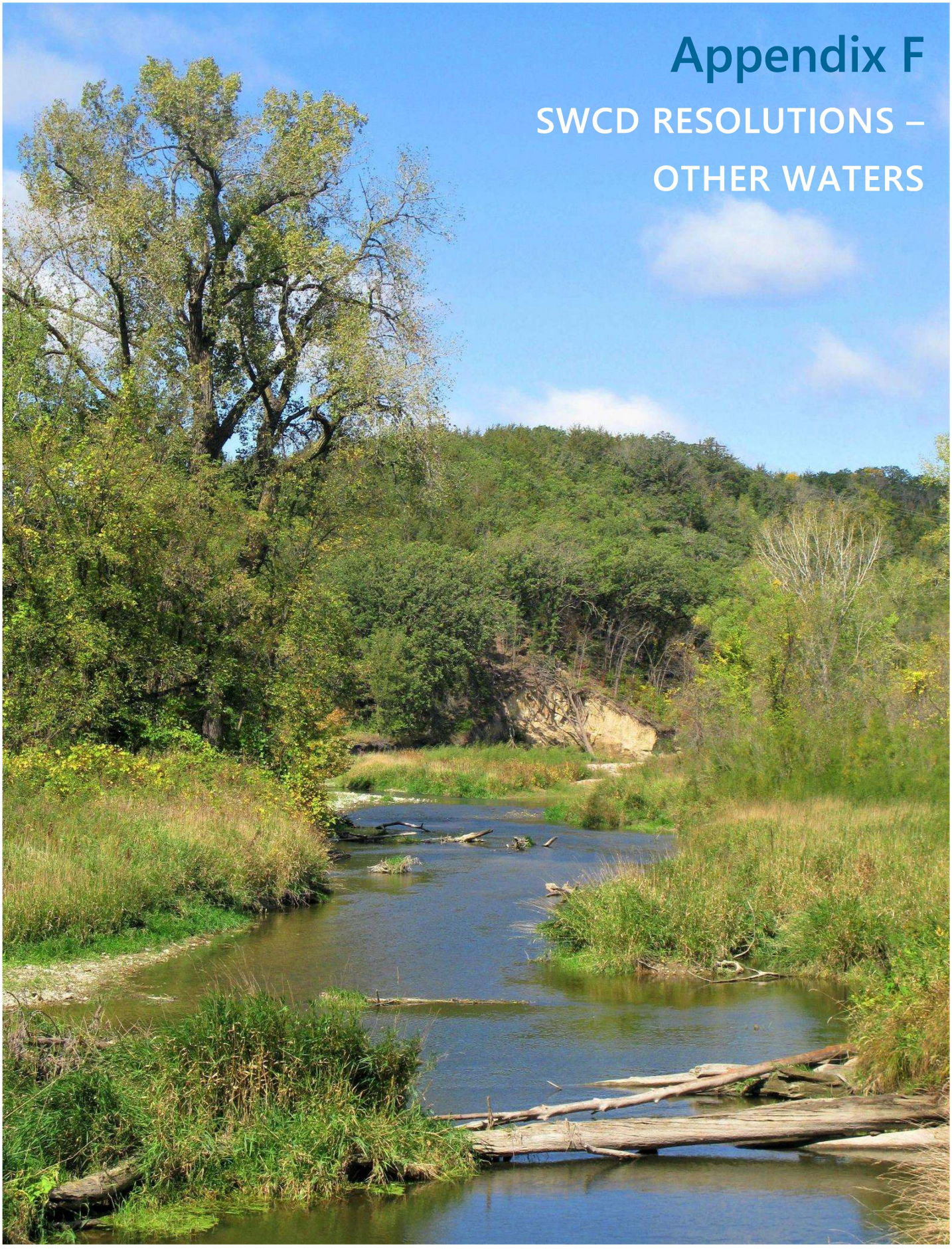
Table 4. Existing and goal in-lake TP concentrations

Modeled Lake	Existing In-lake TP (µg/L)	Goal In-lake TP (µg/L)	% Reduction
Eagle (34-0171-00)	38	35	8%
Swan (34-0186-00)	111	90	19%
Willmar (34-0180-01)	130	119	8%
Middle Basin (34-0180-02)	64	63	2%
Foot (34-0181-00)	69	65	6%

Table 5. Phosphorus source reduction scenarios to achieve in-lake phosphorus goals.

		Existing		Goal	
Modeled Lake	Phosphorus Source	TP Conc. or Internal Load (µg/L or mg/m2)	TP Load (lb/yr)	TP Conc. or Internal Load (µg/L or mg/m2)	TP Load (lb/yr)
Eagle (34-0171-00)	NE Tributary	370.2	**1,994.4**	295.0	**1,589.2**
	SE Tributary	459.5	**537.9**	459.5	**537.9**
	Direct Drainage	189.6	**327.9**	189.6	**327.9**
	Point Lake (34-0193-00)	27.0	**18.4**	27.0	**18.4**
Swan (34-0186-00)	Direct Drainage	145.0	**116.8**	145.0	**116.8**
	Eagle Lake (34-0171-00)	38.0	**340.8**	38.0	**340.8**
	Skataas Lake (34-0196-00)	102.0	**262.1**	102.0	**262.1**
	Excess Internal Load	2.65	**1,749.5**	1.75	**1,155.4**
Willmar (34-0180-01)	Direct Drainage	197.3	**906.0**	157.9	**906.0**
	NE Tributary	416.3	**228.4**	312.3	**228.4**
	NW Tributary	390.3	**577.7**	292.7	**577.7**
	Swan Lake	111.0	**1,370.2**	90.0	**1,370.2**
	Excess Internal Load	1.72	**2,505.1**	1.72	**2,505.1**
Middle Basin (34-0180-02)	Direct Drainage	256.4	**150.1**	150.0	**87.8**
	Willmar Lake (34-0180-01)	130.0	**2,465.3**	130.0	**2,465.3**
Foot (34-0181-00)	Direct Drainage	280.8	**406.9**	150.0	**217.3**
	Middle Basin (34-0180-02)	64.0	**1,251.2**	64.0	**1,251.2**
	Excess Internal Load	0.51	**836.1**	0.51	**836.1**

Sources with reductions are shaded in blue.



Appendix F

SWCD RESOLUTIONS – OTHER WATERS

Resolution to Incorporate the Summary of Watercourses into the Chippewa County Comprehensive Local Water Management Plan

Whereas; Minnesota Statutes Chapter 103F.48 requires Soil and Water Conservation Districts (SWCDs) in consultation with Local Water Management authorities, to develop, adopt, and submit to each Local Water Management authority within its boundary a summary of watercourses.

Whereas; The Board of Water and Soil Resources has adopted Buffer Law Implementation Policy #6 'Local Water Resources Riparian Protection ("Other Watercourses")' which identifies steps SWCDs are required to take in developing said inventory.

Whereas; Chippewa SWCD has adopted a descriptive inventory and a map, to be used as a reference, of other watercourses and provided it to Chippewa County on May 1, 2016.

Whereas; Chippewa County recommends that implementation of buffers or other practices on these waters be voluntary in nature through the Comprehensive Local Water Management Plan.

Whereas; Minnesota Statutes Chapter 103F.48 requires a local water management authority that receives a summary of watercourses identified under this subdivision must incorporate an addendum to its Comprehensive Local Water Management Plan or Comprehensive Watershed Management Plan to include the SWCD recommendations by July 1, 2018.

Whereas; Minnesota Statutes Chapter 103F.48 does not require a plan amendment as long as a copy of the included information is distributed to all agencies, organizations, and individuals required to receive a copy of the plan changes.

Therefore be it resolved that; The summary of watercourses or "other waters" for Chippewa County shall be incorporated as an addendum in its current Local Water Management Plan under Appendices.

Be it further resolved that; Chippewa County authorizes staff to provide a copy of the addendum and any supporting information to be distributed to all agencies, organizations, and individuals required to receive a copy of the plan changes.

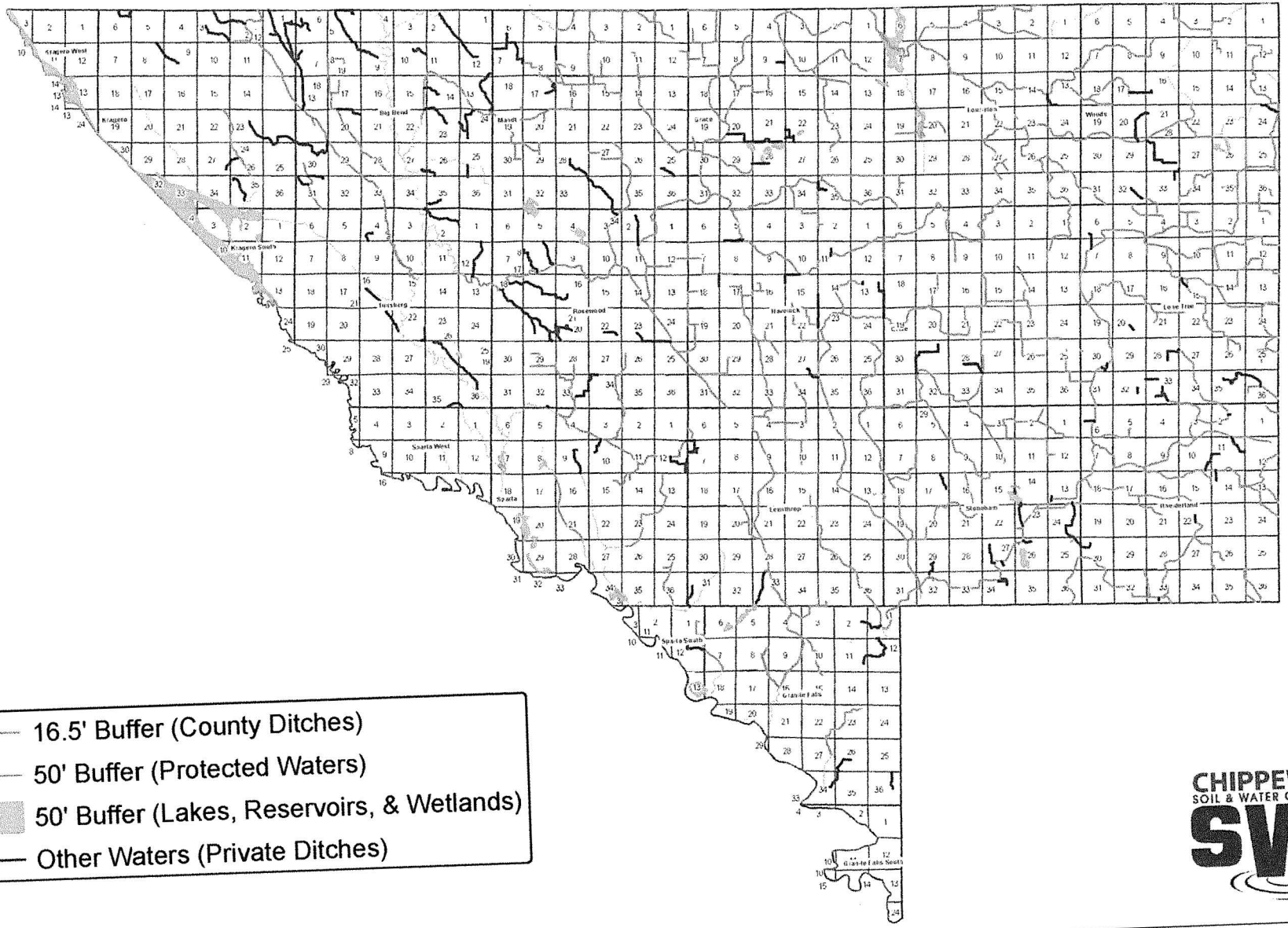
WHEREUPON the above resolution was adopted at a regular meeting of the Chippewa County Board of Commissioners this 20th day of March, 2018.

Jeffrey Lopez, Chairman

Michelle May, Auditor/Treasurer

(SEAL)

Chippewa County Buffer Map



16.5' Buffer (County Ditches)

50' Buffer (Protected Waters)

50' Buffer (Lakes, Reservoirs, & Wetlands)

Other Waters (Private Ditches)

CHIPPEWA
SOIL & WATER CONSERVATION DISTRICT
SWCD

Chippewa Soil and Water Conservation District
Resolution
To Adopt Summary of Watercourses
For inclusion into the Chippewa County Local Water Management Plan

Whereas; Minnesota statues 103F.48 requires SWCDs in consultation with local water management authorities, to develop, adopt, and submit to each local water management authority within its boundary a summary of watercourses for inclusion in the local water management plan.

Whereas; The Board of Water and Soil Resources has adopted the Local Water Resources Riparian Protection ("Other Watercourses") Policy August 25, 2016 which identifies steps SWCDs are required to take in developing said inventory.

Whereas; Chippewa SWCD has met with local water management authorities within its jurisdiction on May 1st, 2017.

Whereas; Chippewa SWCD and the water management authorities within its jurisdiction discussed watershed data, water quality data and land use information as a criteria in development of this list.

Whereas; Chippewa SWCD has assessed the water quality benefits that buffers and alternative practices could provide and determine that State and Federal programs have eligibility criteria for watercourses where water quality would benefit from the installation of a buffer or filter strip.

Whereas; The Chippewa SWCD determined that the rational for inclusion of "other watercourses" is to be inclusive of all watercourses where water quality would benefit from the voluntary installation of a buffer or filter strip.

Whereas; producing a map of all the watercourses meeting the eligibility criteria would be time consuming and may not be inclusive of all watercourses where water quality would benefit from the voluntary installation of a buffer or filter strip.

Therefore be it resolved that; The summary of watercourses or "other waters" for Chippewa County shall be descriptive in format instead of solely in map format.

Be it further resolved that; the description of watercourses to be included in the summary of watercourses or "other waters" **shall be**; all watercourses deemed eligible for the adjacent land to be voluntarily enrolled into a buffer or filter strip practice under the eligibility criteria for government programs. Excluding those watercourses depicted on the DNR buffer protection map.

A list of watercourses included in this descriptive inventory are;
Perennial streams, Seasonal streams depicted on USGS topographic maps,
Perennial streams, Seasonal streams depicted on soil survey maps and LiDar data,
Other watercourses identified by onsite visits,
And
Drainage ditches that are perennial or seasonal streams.
And, as a reference, the attached map of private ditches/other watercourses can be used to characterize watercourses depicted in this summary. The map is not to be used for any future regulatory use and is contingent on corrections, additions, or subtractions.

CHIPPEWA SOIL AND WATER CONSERVATION DISTRICT

629 NORTH 11TH STREET
COURTHOUSE
MONTEVIDEO, MINNESOTA 56265

Telephone 320-269-2139

Chippewa Soil and Water Conservation District
Regular Board Meeting
May 1, 2017

Minutes of the Chippewa Soil and Water Conservation District, Courthouse, NRCS/SWCD office, Montevideo, MN 56265.

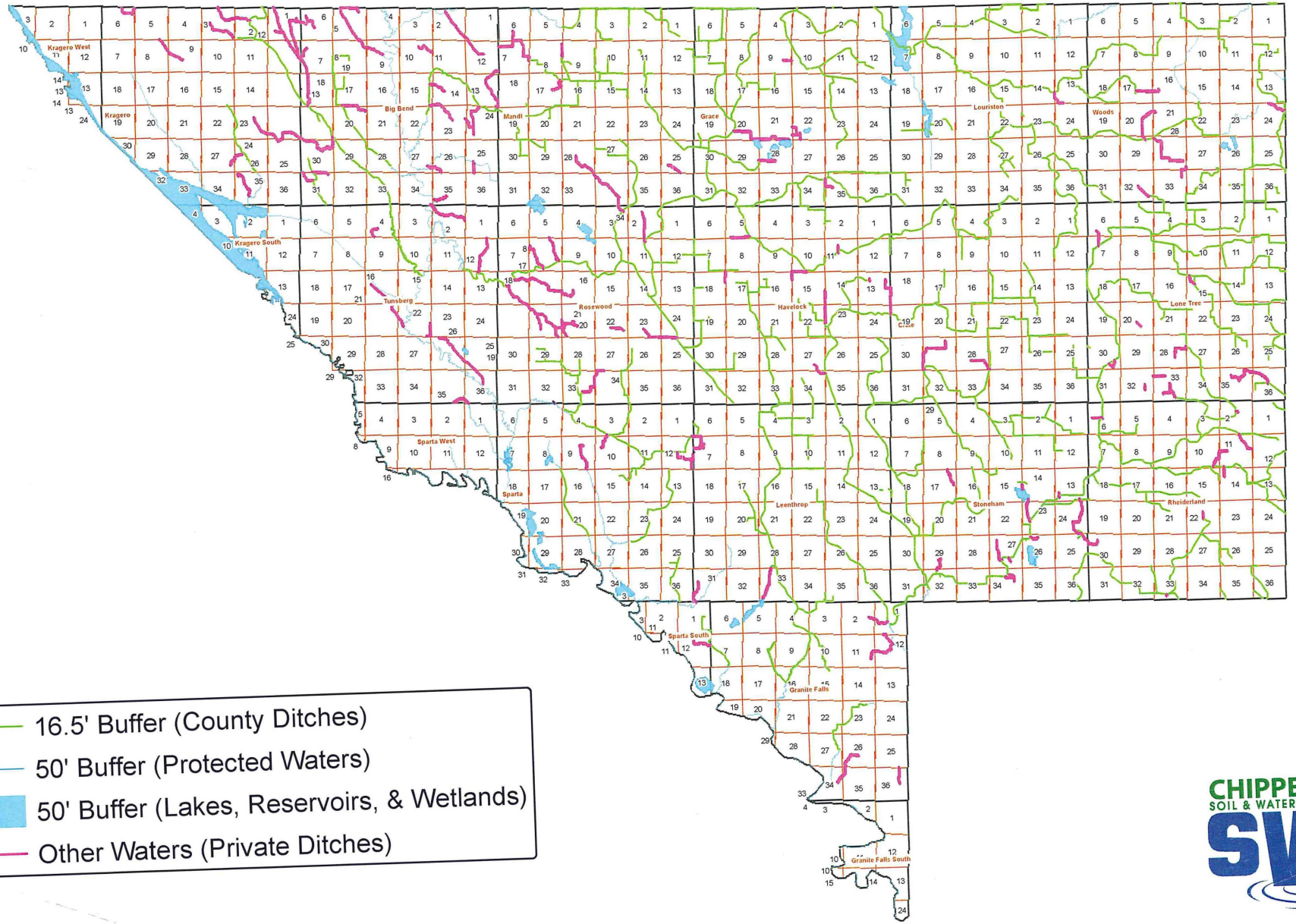
1. Meeting was **called to order** by Chairman Scott Roelofs at 3 p.m.
   - Members **present**: Schuler, Roelofs, Eisenlohr, Sunderland
   - Others **present**: SWCD staff: Desirae Sharp, Zach Bothun, Tom Sletta, Tom Warner; NRCS: Shantel Lozinski; County Commissioners: Matt Gilbertson, Jeff Lopez
2. M/S/P Schuler, Sunderland approve the agenda/with additions.
3. M/S/P Schuler, Eisenlohr approve the April minutes with corrections.
4. The Treasurer gave the **Treasurer's report** and the supervisors placed it on file subject to audit and authorized payment of the bills as presented.
5. **New Business:**

- District 1 Supervisor: The board discussed potential supervisors.
  - M/S/P Schuler, Sunderland motion to appoint Ray Trager to fill the District 1 Supervisor spot until the next general election.
- Audit: Two bids for completing our 2016 audit were discussed.
  - M/S/P Schuler, Sunderland motion to have Michael D. Peterson Company LTD perform our audit.
- Cost Share J. Mulder: Tom W. discussed a cost share project for a 412 grassed waterway in Rosewood Section 18. The estimated total project cost is $16,540.
  - M/S/P Sunderland, Eisenlohr approve cost share project with state cost share to not exceed $12405 or 75%.
- J. Lee project update: Discussed some possible funding issues with this project as bids are coming in much higher than estimated. Board agrees to redistribute funds in DRAP to make this project work. Could use local capacity funding to cover moved DRAP funds at a later date. Board will wait for all bids to be in to make a motion.

6. **Old Business:**

- Trailer: Zach presented 2 bids for a 24' trailer. One bid from Felling Trailers and one from Renville Sales. Board also discussed what to do with old trailer: will sell via Craigslist or upper court house parking lot when new trailer arrives.
  - M/S/P Sunderland, Eisenlohr motion to purchase 2018 PJ 24' skidloader trailer from Renville Sales Inc. for $6190.00.
- "Other Waters": Discussion was held on the waterplans committee's thoughts whether to use a resolution or the "other waters" map that Zach created. It was decided that the Water Plan would use the resolution but would also add the map as a reference.
  - M/S/P Sunderland, Schuler approve to accept the proposed resolution.

Chippewa County Buffer Map



16.5' Buffer (County Ditches)

50' Buffer (Protected Waters)

50' Buffer (Lakes, Reservoirs, & Wetlands)

Other Waters (Private Ditches)

CHIPPEWA
SOIL & WATER CONSERVATION DISTRICT
SWCD

Renville COUNTY
Service · Stewardship · Shared Responsibility

Randy Kramer, Chair
Renville County Board of Commissioners
Renville County Government Services Center
Suite 315
105 South 5th Street
Olivia, MN 56277-1484

Phone: 320-523-3710

RENVILLE COUNTY BOARD OF COMMISSIONERS
RESOLUTION NO. 9-18
A RESOLUTION TO INCORPORATE THE SUMMARY OF WATERCOURSES INTO THE RENVILLE COUNTY COMPREHENSIVE LOCAL WATER MANAGEMENT PLAN

WHEREAS, Minnesota Statutes Chapter 103F.48 requires soil and water conservation districts (SWCDs) in consultation with local water management authorities to develop, adopt, and submit to each local water management authority within its boundary a summary of watercourses; and

WHEREAS, the Board of Water and Soil Resources has adopted Buffer Law Implementation Policy #6 'Local Water Resources Riparian Protection ("Other Watercourses"),' which identifies steps SWCDs are required to take in developing said summary; and

WHEREAS, the Renville SWCD has met with local water management authorities within its jurisdiction to develop criteria for "Other Watercourses"; and

WHEREAS, the Renville SWCD and the water management authorities within its jurisdiction have developed comprehensive water management strategies to address the water management issues in watersheds within Renville County; and

WHEREAS, the Renville SWCD determined that the rationale for inclusion of "Other Watercourses" is to be a descriptive summary instead of a mapped inventory and shall be inclusive of all watercourses where water resources would benefit from the voluntary installation of riparian grass buffers and upland erosion control practices that stabilize the ground, trap nutrients, and provide upland water storage; and

WHEREAS, Renville County recommends that implementation of buffers or other practices on these watercourses be voluntary in nature through the Comprehensive Local Water Management Plan; and

WHEREAS, the description of watercourses to be included in the summary of watercourse or "Other Watercourses" shall be: all watercourses deemed eligible for the adjacent land to be voluntarily enrolled into a buffer, filter strip, or other comparable upland best management practice under the current eligibility criteria for state and federal programs, including perennial streams, seasonal streams depicted on the Renville County Soil Survey maps, and streams that originate or pass through sensitive landscape features where land use may impact surface or groundwater quality; wellhead protection areas (WPA); and areas identified by Renville County or Renville SWCD staff during onsite visits, excluding those watercourses depicted on the DNR Buffer Protection Map; and

WHEREAS, Minnesota Statutes Chapter 103F.48 requires that a local water management authority that receives a descriptive summary of "Other Watercourses" identified under this subdivision must incorporate an addendum to its Comprehensive Local Water Management Plan or Comprehensive Watershed Management Plan to include the SWCD recommendations by July 1, 2018; and

Renville COUNTY
Service · Stewardship · Shared Responsibility

Randy Kramer, Chair
Renville County Board of Commissioners
Renville County Government Services Center
Suite 315
105 South 5th Street
Olivia, MN 56277-1484

Phone: 320-523-3710

WHEREAS, Minnesota Statutes Chapter 103F.48 does not require a plan amendment as long as a copy of the included information is distributed to all agencies, organizations, and individuals required to receive a copy of the plan changes.

NOW, THEREFORE, BE IT RESOLVED, that the description of watercourses or "Other Watercourses" for Renville County shall be incorporated as an addendum in its current Comprehensive Local Water Management Plan; and

BE IT FURTHER RESOLVED, that Renville County authorizes staff to provide a copy of the addendum and any supporting information to be distributed to all agencies, organizations, and individuals required to receive a copy of the plan changes.

WHEREUPON the above Resolution was adopted at regular meeting of the Renville County Board of Commissioners this 22nd day of May, 2018.

Randy Kramer, Chair
Renville County Board of Commissioners

STATE OF MINNESOTA)
COUNTY OF RENVILLE)

I, Lisa Herges, do hereby certify that I am the custodian of the minutes of all proceedings had and held by the Renville County Board of Commissioners, that I have compared the above Resolution with the original passed and adopted by the Renville County Board of Commissioners at a regular meeting thereof held on this 22nd day of May, 2018, that the above constitutes a true and correct copy thereof, that the same has not been amended or rescinded and is in full force and effect.

IN WITNESS WHEREOF, I have hereunto placed my hand and signature this 22nd day of May, 2018, and have hereunto affixed the seal of the Renville County Commissioners.

Lisa Herges, Renville County Administrator

(SEAL)

Renville Soil & Water Conservation District
1008 West Lincoln, Olivia MN 56277
Phone: 320-523-1550 ext. 3 Fax: 320-523-2389
http://www.renvilleswcd.com

Resolution 01-2018 to Adopt a Summary of an "Other Watercourses Inventory" for Inclusion in the Comprehensive Local Water Management Plan

Whereas; Minnesota statutes 103F.48 requires SWCDs in consultation with local water management authorities, to develop, adopt, and submit to each local water management authority within its boundary a summary of watercourses for inclusion in the local water management plan.

Whereas; The Board of Water and Soil Resources has adopted Buffer Law Implementation Policy #6 'Local Water Resources Riparian Protection ("Other Watercourses")' which identifies steps SWCDs are required to take in developing said inventory.

Whereas; Renville SWCD has met with local water management authorities within its jurisdiction to develop a list of "Other Waters Inventory"

Whereas; Renville SWCD and the water management authorities within its jurisdiction have developed comprehensive water management strategies to address the water management issues in watersheds within Renville County.

Whereas; These Comprehensive Watershed Plans incorporate known resources, tools and local knowledge to develop a strategy for implementing a suite of water management practices that will improve water quality in Renville County and downstream water resources.

Whereas; Renville SWCD has assessed the water quality benefits that buffers and alternative practices could provide and determined that current State and Federal programs have eligibility criteria for watercourses where water quality would benefit from the installation of a buffer, filter strip or comparable upland best management practice.

Whereas; The Renville SWCD determined that the rationale for inclusion of "other watercourses" is to be inclusive of all watercourses where water resources would benefit from the voluntary installation of riparian grass buffers and upland erosion control practices that stabilize the ground, trap nutrients and provide upland water storage.

Whereas; producing a map of all the watercourses meeting the eligibility criteria would be time consuming and may not be inclusive of all watercourses where water quality would benefit from the installation of a buffer, filter strip or comparable upland best management practice.

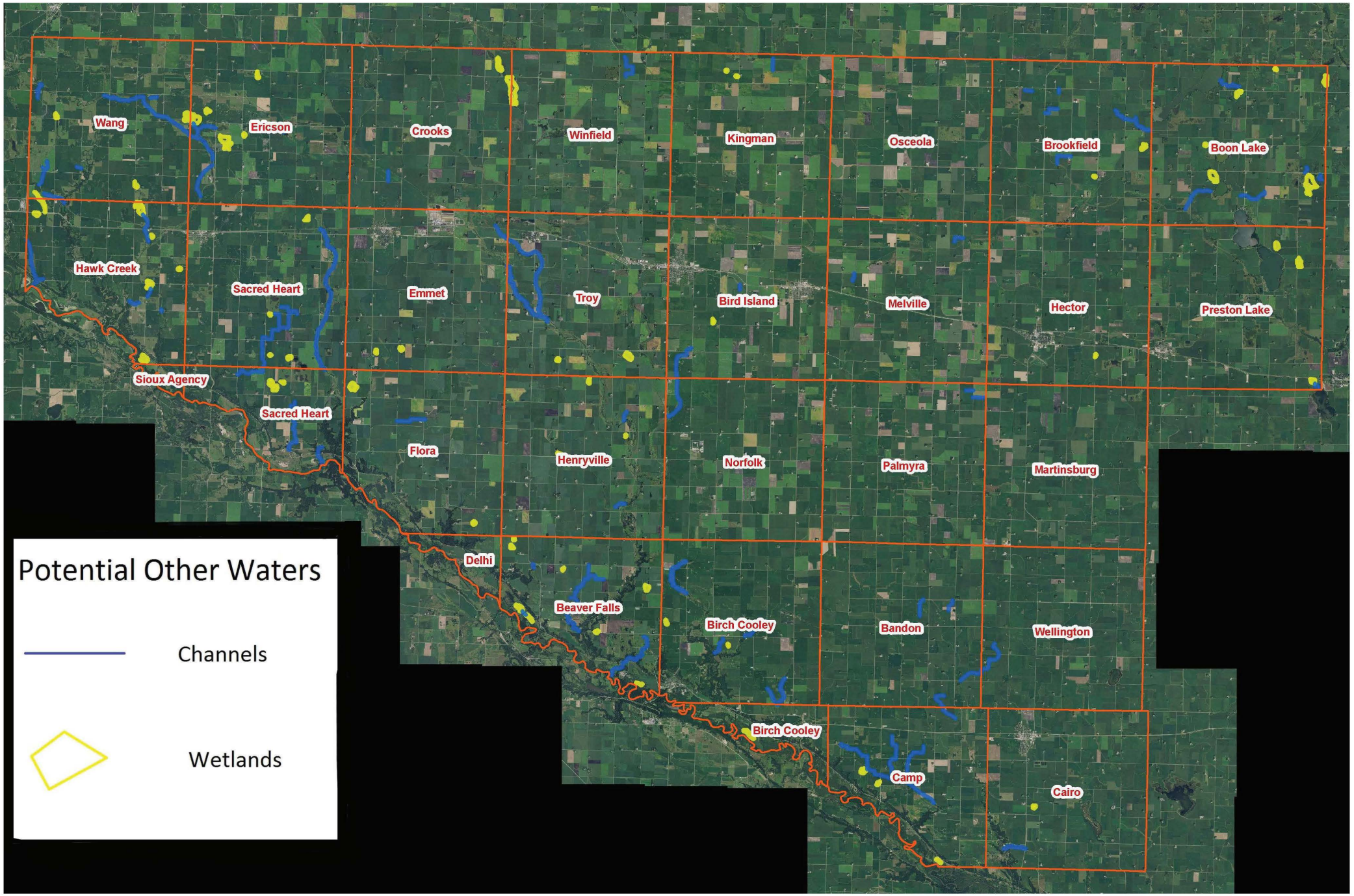
Therefore be it resolved that; the summary of watercourse or "other waters" for Renville County shall be descriptive in form instead of in map format.

Be it further resolved that; the description of watercourses to be included in the summary of watercourse or "other waters" **shall be**; All watercourses deemed eligible for the adjacent land to be voluntarily enrolled into a buffer, filter strip or other comparable upland best management practice under the current eligibility criteria for state and federal programs, including perennial streams, seasonal streams depicted on the Renville County Soil Survey maps, streams that originate or pass through sensitive landscape features where land use may impact surface or groundwater quality, wellhead protection areas (WPA), and areas identified by Renville County or Renville SWCD staff during onsite visits, excluding those watercourses depicted on the DNR Buffer Protection Map.

Adopted this 12 day of April, 2017 By: Kevin S. Kohesch
Chair of Board of Supervisor

Resolution No. 2018-1: Offered by Supervisor Hebrink, Seconded by supervisor Koenig,
Adopted by a votes of 5-0 at the regular meeting of the Renville County Soil & Water Conservation District on April 12, 2018

Attest: Holly Hatlewick
Holly Hatlewick District Administrator


Wang
Ericson
Crooks
Winfield
Kingman
Osceola
Brookfield
Boon Lake
Hawk Creek
Sacred Heart
Emmet
Troy
Bird Island
Melville
Hector
Preston Lake
Sioux Agency
Sacred Heart
Flora
Henryville
Norfolk
Palmyra
Martinsburg
Delhi
Beaver Falls
Birch Cooley
Bandon
Wellington
Birch Cooley
Camp
Cairo
Potential Other Waters
Channels
Wetlands

Appendix G

BWSR ORDER OF APPROVAL