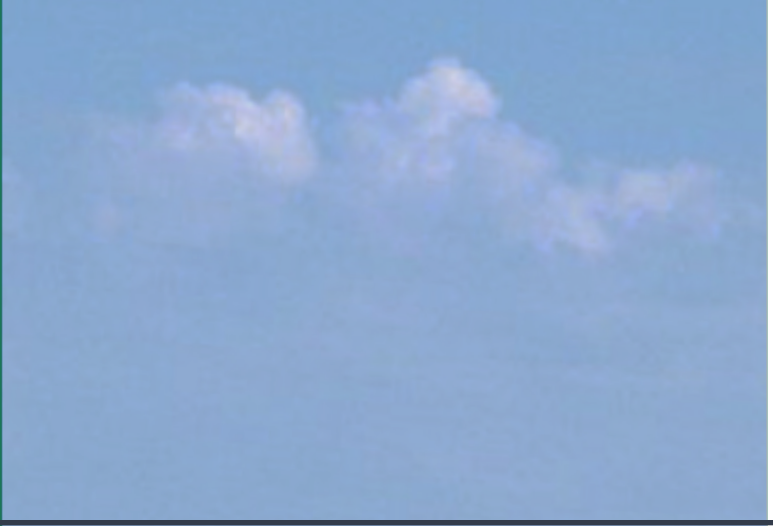


Appendix A: Planning MOA

MEMORANDUM OF AGREEMENT

This Agreement ("Agreement") is made and entered into by and between:

The Counties of Brown, Cottonwood, Lyon, Murray, and Redwood by and through their respective County Board of Commissioners, (Counties) and

The Brown, Cottonwood, Lyon, Murray and Redwood Soil and Water Conservation Districts ("SWCDs"), by and through their respective Soil and Water Conservation District Board of Supervisors,

The Area II Minnesota River Basin Projects and Redwood-Cottonwood Rivers Control Area Joint Powers Organizations, by and through their respective Board of Directors, and

The City of Springfield, by and through its City Council,

Collectively referred to as the "Parties."

WHEREAS, the Counties of this Agreement are political subdivisions of the State of Minnesota, with authority to carry out environmental programs and land use controls, pursuant to Minnesota Statutes Chapter 375 and as otherwise provided by law; and

WHEREAS, the SWCDs of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out erosion control and other soil and water conservation programs, pursuant to Minnesota Statutes Chapter 103C and as otherwise provided by law; and

WHEREAS, Area II Minnesota River Basin Projects is a political subdivision of the State of Minnesota, with authority to carry out conservation of natural resources with floodwater retention and retardation, pursuant to Minnesota Statutes Chapter 103F.171-103F.187 and as otherwise provided by law; and

WHEREAS, Redwood-Cottonwood Rivers Control Area is a political subdivision of the State of Minnesota, with authority to carry out conservation of natural resources, pursuant to Minnesota Statutes Chapter 471, Section 471.59 and as otherwise provided by law; and

WHEREAS, the City of Springfield is a municipal corporation of the State of Minnesota, with statutory authority to control, regulate and/or prevent stormwater pollution along with soil erosion and sedimentation within its boundary, and to establish standards and specifications for conservation practices and planning activities that minimize stormwater pollution, soil erosion and sedimentation, pursuant to Minnesota Rules Chapter 7001 and 7090; and with authority to carry out land use controls, pursuant to Minnesota Statutes Chapter 462 and as otherwise provided by law; and

WHEREAS, the Parties of this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in the Cottonwood-Middle Minnesota Watershed to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

WHEREAS, with matters that relate to coordination of water management authorities pursuant to Minnesota Statutes Chapters 103B, 103C, and 103D with public drainage systems pursuant to Minnesota Statutes Chapter 103E, this Agreement does not change the rights or obligations of the public drainage system authorities; and

WHEREAS, the Parties have formed this Agreement for the specific goal of developing a plan pursuant to Minnesota Statute § 103B.801, Comprehensive Watershed Management Planning, also known as *One Watershed, One Plan*.

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties recognize the importance of partnerships to plan and implement protection and restoration efforts for the Cottonwood-Middle Minnesota Watershed as illustrated in Attachment A. The purpose of this Agreement is to collectively develop and adopt, as local government units, a coordinated watershed management plan for implementation per the provisions of the plan. Parties signing this agreement will be collectively referred to as Cottonwood-Middle Minnesota One Watershed, One Plan Partnership.

2. **Term:** This Agreement is effective upon signature of all Parties in consideration of the Board of Water and Soil Resources (BWSR) Operating Procedures for One Watershed, One Plan; and will remain in effect until adoption of the plan by all parties, unless cancelled according to the provisions of this Agreement or earlier terminated by law.

3. **Adding Additional Parties:** A qualifying party desiring to become a member of this Agreement shall indicate its intent by adoption of a board resolution prior to December 30, 2022. The party agrees to abide by the terms and conditions of the Agreement; including but not limited to the bylaws, policies and procedures adopted by the Policy Committee.

4. **Withdrawal of Parties:** A party desiring to leave the membership of this Agreement shall indicate its intent in writing to the Policy Committee in the form of an official board resolution. Notice must be made at least 30 days in advance of leaving the Agreement.

5. **General Provisions**:

    a. **Compliance with Laws/Standards:** The Parties agree to abide by all federal, state, and local laws; statutes, ordinances, rules, and regulations now in effect or hereafter adopted pertaining to this Agreement or to the facilities, programs, and staff for which the Agreement is responsible.

    b. **Indemnification:** Each party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of any other party, its officers, employees, or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties. To the full extent permitted by law, actions by the Parties, their respective officers, employees, and agents pursuant to this Agreement are intended to be and shall be construed as a "cooperative activity." It is the intent of the Parties that they shall be deemed a

"single governmental unit" for the purpose of liability, as set forth in Minnesota Statutes § 471.59, subd. 1a(a). For purposes of Minnesota Statutes § 471.59, subd. 1a(a) it is the intent of each party that this Agreement does not create any liability or exposure of one party for the acts or omissions of any other party.

c. **Records Retention and Data Practices:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules that have been reviewed and approved by the State in accordance with Minnesota Statutes § 138.17. The Parties further agree that records prepared or maintained in furtherance of the Agreement shall be subject to the Minnesota Government Data Practices Act. At the time this Agreement expires, all records will be turned over to the Redwood-Cottonwood Rivers Control Area for continued retention.

d. **Timeliness:** The Parties agree to perform obligations under this Agreement in a timely manner and keep each other informed about any delays that may occur.

6. **Administration:**

a. **Establishment of Committees for Development of the Plan.** The Parties agree to designate one representative, who must be an elected or appointed member of the governing board, to a Policy Committee for development of the watershed-based plan and may appoint one or more technical representatives to an Advisory Committee for development of the plan in consideration of the BWSR Operating Procedures for One Watershed, One Plan.

i. The Policy Committee will meet as needed to decide on the content of the plan, serve as a liaison to their respective boards, and act on behalf of their Board. Each representative shall have one vote.

ii. Each governing board may choose one alternate to serve on the Policy Committee as needed in the absence of the designated member.

iii. The Policy Committee will establish bylaws within 90 days of execution of this document to describe the functions and operations of the committee(s).

iv. The Steering Team will meet monthly or as needed to assist and provide technical support and make recommendations to the Policy Committee on plan development and content.

v. The Steering Team will consult with the Advisory Committee as needed to provide public comments and recommendations. This will occur no less than once per year until the plan is approved. Members of the Advisory Committee may not be a current board member of any of the Parties.

b. **Submittal of the Plan.** The Policy Committee will recommend the plan to the Parties of this Agreement. The Policy Committee will be responsible for initiating a formal review process for the

watershed-based plan conforming to Minnesota Statutes Chapters 103B and 103D, including public hearings. Upon completion of local review and comment, and approval of the plan for submittal by each party, the Policy Committee will submit the watershed-based plan jointly to BWSR for review and approval.

c. **Adoption of the Plan.** The Parties agree to adopt and begin implementation of the plan within 120 days of receiving notice of state approval and provide notice of plan adoption pursuant to Minnesota Statutes Chapters 103B and 103D.

7. **Fiscal Agent:** The Redwood-Cottonwood Rivers Control Area will act as the fiscal agent for the purposes of this Agreement and agrees to:

   a. Accept all responsibilities associated with the implementation of the BWSR grant agreement for developing a watershed-based plan.

   b. Perform financial transactions as part of grant agreement and contract implementation.

   c. Annually provide a full and complete audit report.

   d. Provide the Policy Committee with the records necessary to describe the financial condition of the BWSR grant agreement.

   e. Retain fiscal records consistent with the Fiscal Agent's records retention schedule until termination of the Agreement.

   f. The Scope of Services provided to the Cottonwood-Middle Minnesota One Watershed, One Plan Partnership is outlined in Attachment B.

8. **Grant Administration**: The Redwood-Cottonwood Rivers Control Area will act as the grant administrator for the purposes of this Agreement and agrees to provide the following services:

   a. Accept all day-to-day responsibilities associated with the implementation of the BWSR grant agreement for developing a watershed-based plan, including being the primary BWSR contact for the *One Watershed, One Plan* Grant Agreement and being responsible for BWSR reporting requirements associated with the grant agreement.

   b. Provide the Policy Committee with the records necessary to describe the planning condition of the BWSR grant agreement.

   c. The Scope of Services provided to the Cottonwood-Middle Minnesota One Watershed, One Plan Partnership is outlined in Attachment C.

9. **Authorized Representatives:** The following persons will be the primary contacts for all matters concerning this Agreement:

Brown County
Allison Kletscher, or successor
14 S. State Street, New Ulm, MN 56073
Email: Allison.kletscher@co.brown.mn.us
Telephone: (507) 233-6640

Brown SWCD
Melanie Krueger, or successor
300 2nd Ave SW, Sleepy Eye, MN 56085
Email: melanie.krueger@brownswcdmn.org
Telephone: (507) 794-2553

Cottonwood County
Kay Gross, or successor
220 10th Street, Windom, MN 56101
Email: kay.gross@co.cottonwood.mn.us
Telephone: (507) 832-8287

Cottonwood SWCD
David Bucklin, or successor
220 10th Street, Windom, MN 56101
Email: david.bucklin@co.cottonwood.mn.us
Telephone: (507) 832-8287

Lyon County
John Biren, or successor
1424 E. College Dr, Ste 600, Marshall, MN 56258
Email: johnbiren@co.lyon.mn.us
Telephone: (507) 532-8207 x 3

Lyon SWCD
Courtney Snyder, or successor
1424 E. College Dr, Ste 600, Marshall, MN 56258
Email: courtneysnyder@co.lyon.mn.us
Telephone: (507) 532-8207 x 3

Murray County
Sarah Soderholm, or successor
2500 28th Street, Slayton, MN 56172
Email: ssoderholm@co.murray.mn.us
Telephone: (507) 836-1165

Murray SWCD
Devin Ryan, or successor
2740 22nd Street, Slayton, MN 56172
Email: dryan@co.murray.mn.us
Telephone: (507) 836-6690

Redwood County
Scott Wold, or successor
403 S. Mill Street, Redwood Falls, MN 56283
Email: scott_w@co.redwood.mn.us
Telephone: (507) 637-4023

Redwood SWCD
Kurt Mathiowetz, or successor
1241 E. Bridge St, Ste C, Redwood Falls, MN 56283
Email: kurt_m@co.redwood.mn.us
Telephone: (507) 637-2427 x 3

Area II Minnesota River Basin Projects
Kerry Netzke, or successor
1424 East College Dr, Ste 300, Marshall MN 56258
Email: kerry.netzke@area2.org
Telephone: (507) 537-6369

Redwood-Cottonwood Rivers Control Area
Kerry Netzke, or successor
1424 East College Dr, Ste 300, Marshall MN 56258
Email: kerry.netzke@rcrca.com
Telephone: (507) 532-1325

City of Springfield
Joe Stremcha, or successor
2 E. Central Street, Springfield, MN 56087
Email: joe.stremcha@springfieldmn.org
Telephone: (507) 723-3524

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **BROWN COUNTY**

APPROVED:

BY: Anthony J. Berg 12-20-22
Board Chair Date

ATTEST: Sam Hansen County Admin. 12-20-22
Name Title Date

APPROVED AS TO FORM *(use if necessary)*

BY: _____
County Attorney Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **BROWN SWCD**

APPROVED:

BY: Mark Wolfe 12/27/2022

~~Board Chair~~ Vice-Chair Date

BY: Melissa 12/22/2022

District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **COTTONWOOD COUNTY**

APPROVED:

BY: Donna L. Crowley 12/20/2022
Board Chair Date

ATTEST: Donna Thelen 12/20/22
Name Title Date
Auditor Treasurer

APPROVED AS TO FORM *(use if necessary)*

BY: 12-20-22
County Attorney Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **COTTONWOOD SWCD**

APPROVED:

BY: _____ 12-20-2022
Board Chair Date

BY: _____ 12:20:2022
District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **LYON COUNTY**

APPROVED:

BY: _____ 12/8/2022
Board Chair Date

ATTEST: Teresa Stanley Admin 12-8-22
Name Title Date

APPROVED AS TO FORM *(use if necessary)*

BY: _____
County Attorney Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **LYON SWCD**

APPROVED:

BY: Mark D Mendenhall 12/19/22
Board Chair Date

BY: [signature] 12/19/22
District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **MURRAY COUNTY**

APPROVED:

BY: _____ 12/8/2022
Board Chair Date

ATTEST: Carolyn McDonald County Administrator 12-8-2022
Name Title Date

APPROVED AS TO FORM *(use if necessary)*

BY: _____ 12/12/22
County Attorney Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **MURRAY** SWCD

APPROVED:

BY: _____ 12-6-22
Board Chair Date

ATTEST: Shelly Lewis District Administrator 12/6/2022
Name Title Date

APPROVED AS TO FORM *(use if necessary)*

BY: _____
County Attorney Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **REDWOOD COUNTY**

APPROVED:

BY: _____
Board Chair Date

ATTEST: _____ Administrator 12-13-22
Name Title Date

APPROVED AS TO FORM *(use if necessary)*

BY: _____ 12.13.2022
County Attorney Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **REDWOOD SWCD**

APPROVED:

BY: _____ 12/21/22
Board Chair Date

BY: Scott Wold by Nick Bozek 12/29/22
District Manager/Administrator Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **AREA II MINNESOTA RIVER BASIN PROJECTS**

APPROVED:

BY: _____ 12/1/2022
Board Chair Date

BY: _____ 12/1/2022
Executive Director Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **REDWOOD-COTTONWOOD RIVERS CONTROL AREA**

APPROVED:

BY: _____ 12-1-22
Board Chair Date

BY: _____ 12/1/2022
Executive Director Date

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: **CITY OF SPRINGFIELD**

APPROVED:

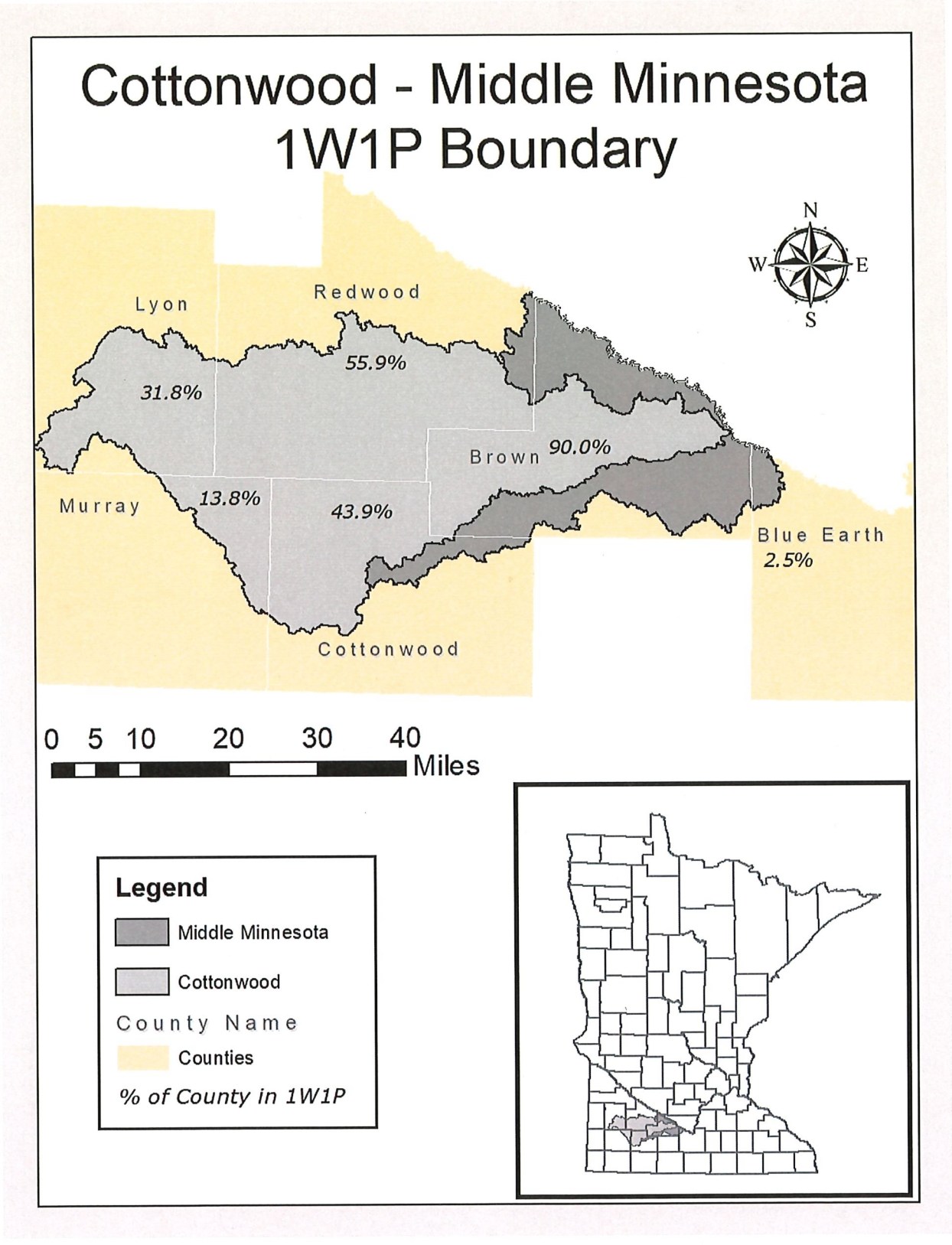
BY: Lowell Kelyt
Mayor Date

BY: 12/19/22
City Manager Date

APPROVED AS TO FORM *(use if necessary)*

BY: _____
City Attorney Date

Attachment A



Attachment B

Scope of Services Provided by the
REDWOOD-COTTONWOOD RIVERS CONTROL AREA (RCRCA)

RCRCA will have the following fiscal duties:

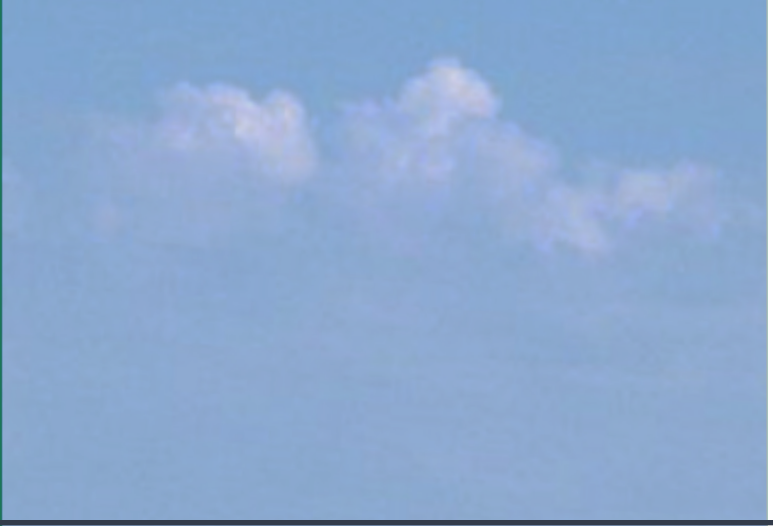
1. Account for grant funds and provide prompt payment of bills incurred,
2. Complete annual eLINK reporting,
3. Present an annual audit of grant funds and their usage,
4. Maintain all financial records and accounting,
5. Contract for Services with the chosen consultant for plan preparation and writing of the watershed-based plan, including:
    a. Execute the services agreement, and
    b. Oversee expenditures incurred by the consultant.
6. Administer the grant with BWSR for the purposes of developing a watershed-based plan, including:
    a. Submit this Agreement, work plan, budget, and other documents as required, and
    b. Execute the grant agreement.

Attachment C

Scope of Services Provided by the
REDWOOD-COTTONWOOD RIVERS CONTROL AREA (RCRCA)

RCRCA will have the following administrative duties:

1. Coordination of Policy Committee meetings, including:
    a. Provide advance notice of meetings,
    b. Prepare and distribute the Agenda and related materials,
    c. Prepare and distribute Policy Committee Minutes,
    d. Maintain all records and documentation of the Policy Committee,
    e. Provide public notices to the counties for publication, and
    f. Coordinate public meetings as required by Minnesota Statutes Chapter 103B as part of the formal review process for the watershed-based plan, gather public comments from public hearings, and prepare document for submittal.
2. Coordination of Steering Team meetings, Technical and Advisory subcommittees, including:
    a. Provide advance notice of meetings,
    b. Prepare and distribute the Agenda and related materials,
    c. Prepare and distribute Minutes, and
    d. Maintain all records and documentation of the committees.



Appendix B: Agency Letter

BOARD OF WATER AND SOIL RESOURCES

670 W Main Street
#103
Marshall, MN 56258

June 16, 2023

Kerry Netzke
RCRCA
1424 East College Drive, Suite 300
Marshall, MN 56258
Kerry.netzke@rcrca.com

Dear Kerry,

Thank you for providing the opportunity to provide priority issues and plan expectations for the development of the watershed name comprehensive watershed management 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 2.1, adopted by the BWSR Board on March 24, 2021, available on the BWSR website: https://bwsr.state.mn.us/one-watershed-one-plan-policies. 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 2.2, adopted by the BWSR Board on December 15, 2022, available on the BWSR website: https://bwsr.state.mn.us/one-watershed-one-plan-policies. 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:

- **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 Cottonwood, Little Cottonwood and Middle Minnesota River watershed and lake sheds 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. BWSR believes the watershed plan should examine these causes and identify specific areas within the watershed where implementation of BMPs could help contribute to the reduction of peak flows, frequency of flooding events, and streambank/riparian erosion and sedimentation. Significant artificial drainage that has occurred in the watershed, primarily for more productive agricultural land and infrastructure; this should be examined for impacts to increased peak flows and flooding as well as opportunities for wetland restorations in targeted areas as one component. 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.

- **Drainage** - The drainage authorities within the planning boundary should be included as stakeholders in the plan development process. Additionally, the planning partners are strongly encouraged to include projects and activities consistent with multipurpose drainage criteria outlined in Minnesota Statutes §103E.011, Subd. 1a and §103E.015, Subd. 1. As the 1W1P plan is formulated, BWSR suggests the following:

    - Chapter 103E drainage authorities (who are also water planning authorities) be fully engaged from the early stages of the planning process. Use Section 103E.015 CONSIDERATIONS BEFORE DRAINAGE WORK IS DONE and other provisions of drainage law identified below to capture both the extent and limitations of drainage authority responsibility, authority and opportunity for participating in the planning and implementation of conservation practices involving public drainage systems and their associated drainage areas.
    - Prioritization within the watershed include identification of Chapter 103E drainage systems and their drainage areas; consider using or encouraging the development of a separate planning to systematically prioritize select 103E systems that will accelerate plan goals the greatest. Multipurpose drainage management be included in the approach for targeting best management practices (BMPs) within the drainage area of Chapter 103E drainage systems

- Lay out a coordinated approach for how implementation of multipurpose drainage management practices identified in the plan can be coordinated with, and/or integrated early into Chapter 103E processes and proceedings. When projecting funding needs for BMP implementation along, or within the drainage area of, public drainage systems, incorporate applicable Sections of Chapter 103E.

- **Groundwater**

  - **Groundwater Coordination and Prioritization**: Work with BWSR staff and agency partners (MDH, DNR, MDA, and MPCA) to outline any groundwater – related priority issues for the planning area. Take into account identified Groundwater Management Areas, Drinking Water Supply Management Areas, wellhead protection areas, areas with direct connection to the water table, and other areas of groundwater concern. Address specific concerns about groundwater contamination and overuse identified and documented. Groundwater and surface water interactions in Drinking Water Supply Management Areas (DWSMAs) should be considered, as this can be a pathway for pollutants to reach groundwater. Special consideration should be made for the all DWSMAs that intersect with the Cottonwood and Little Cottonwood River all groundwater sources for all communities and municipalities within the planning boundaries.
  - **Groundwater References**: The Cottonwood Middle Minnesota planning region has a number of references and data available. Be sure to make use of existing groundwater data and publications. These include maps, data layers, and publications available from the Minnesota Geological Survey, Mn DNR, Mn Dept. of Health, US Geological Survey, and other sources.

- **Wetlands-** Protection and restoration of wetlands provides benefits for water quality, peak flow reduction, habitat and wildlife. 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 one resource that can be used to help identify areas for wetland restoration. 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 statewide plan in the future.

- **Conservation Easements** – The State's Re-Invest in Minnesota (RIM) reserve easement program considers several site specific and landscape scale factors when funding applications. In addition, BWSR has established a program for RIM easements that accomplish water quality and habitat priorities in comprehensive watershed management plans. Getting specific about habitat goals will improve eligibility for this funding. 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. Another factor to consider is the acres of Conservation Reserve Program (CRP) practices are schedule to expire within the partnership's counties. The plan should recognize the potential impact of these expiring contracts may have in the planning area and consider prioritizing working with producers regarding the management of those acres.

- **Lakes**- Lakes in the watershed are a major component to the overall land area relative to other southwest Minnesota watersheds. 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 Nonpoint Priority Funding Plan (NPFP). Clear, Boise, Rock, Altermatt, and Bean are currently impaired and therefore should be considered restoration lakes. Non-impaired lakes in the watershed with high recreation value – specifically Lake Laura, Wellner-Hageman Reservoir, and Sleepy Eye Lake. Sleepy Eye Lake was recently removed from the impaired waters list due to improved water quality conditions in recent years and therefore should be considered a high priority protection lake. There are four designated wildlife lakes within the Cottonwood River Watershed that should be considered high priority for protection: Augusta, Round, Long, and Mahlke Marsh

General Comments:

- **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.
- **GRAPS** - The Groundwater Restoration and Protection Strategies (GRAPS) will be available in the 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. The Department of Natural Resources (DNR) now hosts groundwater and drinking water information in their Watershed Health Assessment Framework (WHAF) tool https://arcgis.dnr.state.mn.us/ewr/whaf2/which provides an organized approach for understanding natural resource conditions and challenges.
- **WRAPS** - The Watershed Restoration and Protection Strategies (WRAPS) for the Cottonwood River Watershed is complete and is available from the MPCA. The WRAPS outlines water quality reduction goals for excess sediment, phosphorus, nitrogen, and E. coli Bacteria. It also identifies areas for protection within the watershed and goals to address degraded stream habitat. These recommended strategies to meet restoration goals and protection targets, should be reviewed and incorporated into your planning effort. A reference to how WRAPS Reports can be incorporated within your One Watershed One Plan effort can be found: Using WRAPS Reports in Local Water Planning
- **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. BWSR suggest aligning goals and partnering with all state and nonstate agencies to maximize common resource restoration and protection goals. 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 ordinance and regulations across the watershed with the purpose of identifying commonalities, significant differences as well as opportunities for coordination. Gaps or inconsistencies within local ordinances, policies, or enforcement could affect the success of your plan's implementation. Examples of this evaluation include (but are not limited to) redetermination of ditches, SSTS compliance inspection requirements (property transfer, variance, etc.), shoreland regulations, level III feedlot inventories. The purpose of this effort is to identify commonalities, 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. BWSR suggest aligning goals and partnering with all state and nonstate agencies to maximize common resource restoration and protection goals. Most of the land use in the Cottonwood, Middle Minnesota Rivers 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.
- **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. BWSR also has a BWSR Pollinator Toolbox that provides guidance for project planning, implementation and management.
- **Aquatic and Terrestrial Invasive Species**- A cooperative approach across the watershed is recommended for invasive species management to address both aquatic and terrestrial invasive species and weed issues across the planning boundary. 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 New Ulm within the planning area. The MS4 permit holder 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-** 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. As part of the plan, devise methods that the planning group can follow to ensure adherence to the planned activities and reassess the plan as implementation occurs in the future.
- **Natural Habitat Protection/Restoration:** Protecting and restoring diverse prairies and other habitats has multiple benefits including water quality protection for groundwater and surface water, stable plant community composition to resist invasive species, protecting pollinator populations, and wildlife habitat and increasing resiliency to weather extremes. The plan should identify high priority natural habitats including wildlife and water quality complexes and corridors, and promote a combination of conservation plantings, wetland projects and riparian activities that will protect, restore and link water quality and habitat corridors.

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 John.Shea@state.mn.us or Mark.Hiles@state.mn.us, or via telephone at (507-838-9423).

Sincerely,

John Shea
Board Conservationist

Mark Hiles
Clean Water Specialist

cc: Rachel Olm Huston Engineering (via email)
Barbara Weisman, Clean Water Operations Consultant DNR (via email)
Korey Woodley, Regional Manager DNR (via email)
Ryan Bjerke, Area Hydrologist DNR (via email)
Kyle Jarcho, Area Hydrologist DNR (Via email)
Kevin Hauth, Soil Scientist, MDA (via email)
Margaret Wagner, Pesticides and Fertilizer Management Section Manager, MDA (via email)
Carrie Raber, Groundwater Restoration and Protection Strategies Coordinator, MDH (via email)
Amanda Strommer, Regional Planner, MDH (via email)
Jeff Risberg, Watershed Unit Coordinator, PCA (via email)
Mike Weckwerth, Watershed Project Manager, PCA (via email)
Catherine Neuschler, MN Environmental Quality Board* (via email)

Julie Westerlund, 1W1P Program Coordinator BWSR (via email)

Ed Lenz, Southern Region Manager BWSR (via email)

Equal Opportunity Employer

DEPARTMENT OF NATURAL RESOURCES

04/17/2023

Kerry Netzke, Redwood-Cottonwood River Control Area (RCRCA) Director
1424 E. College Drive
Marshall, MN 56258

Dear Kerry,

Thank you for inviting the Minnesota Department of Natural Resources (DNR) to provide input in developing your Comprehensive Watershed Management Plan. I am writing on behalf of DNR Commissioner Sarah Strommen to share our priorities and convey that we are committed to supporting the plan development process.

Attached are natural resource priority concerns we encourage you to incorporate into the comprehensive plan. We encourage you to spend time discussing and prioritizing water quality and storage, land use and management, and outdoor recreation opportunities during the planning process for the Cottonwood River and Middle Minnesota Watersheds.

The DNR can supply scientific data and information related to the attached priorities. We also offer tools and services that can help stakeholders get to know the watershed and explore water resource values.

Our lead staff person for this One Watershed One Plan (1W1P) project is Kyle Jarcho, Area Hydrologist, (507) 537-7258, kyle.jarcho@state.mn.us. Kyle reports from the DNR office in Marshall and can be contacted if you have questions, or want more information about the attached priorities or types of technical support we can provide.

Also, feel free to contact me directly if needed. As the DNR's Regional Director, I am committed to ensuring that DNR staff in the region are organized to support 1W1P planning efforts and the resulting plans. We greatly value the opportunity to contribute to the process and hope the information we provide is helpful.

Sincerely,

Scott W. Roemhildt
South Region Director
Minnesota Department of Natural Resources

cc: Korey Woodley, Tim Gieseke, Ethan Jenzen, Barbara Weisman, John Shea, Mike Weckwerth, Aicam Laacouri and Amanda Strommer

DNR Priorities for the Cottonwood Middle Minnesota watersheds

The priorities below were identified in consultation with an interdisciplinary team of DNR natural resource management specialists from multiple DNR Divisions whose work areas include this watershed. The priorities are grouped around four high-level issues: Altered Hydrology & Drainage; Surface Water Quality & Groundwater Protection; Land Use & Management, and Biology & Natural Resources; and Outdoor Recreation.

High-Level Issue	Priority Resource Concerns & Opportunities
Altered Hydrology and Drainage	**Concern:** Landscape changes within the watershed, particularly the historic construction and recent improvement of drainage ditches and tile, have led to decreased water storage and increased watershed discharge. The net increase in water flow and volume across the watershed, referred to as altered hydrology, reduces stream channel resiliency, increases sediment and nutrient loading, and increases flooding and stresses on infrastructure and communities. Changing climate patterns are also impacting agriculture production and drainagewhile further altering natural systems response (increased channel impacts as a result of increased frequency of higher flow events). Drainage projects are, in effect, watershed projects with cumulative impacts. The significant investments in unmitigated drainage improvements can counteract public and private investments in watershed health improvement efforts. Hydrology trend analysis from the long-term USGS gage in New Ulm going back to 1939 indicates a significant increase in river flows over historic averages. After analyzing the entire flow record, a change point in the relationship between precipitation and streamflow was identified in approximately 1982. Since 1982, watershed discharge has increased at a faster rate than can be explained by precipitation increases alone. This trend has resulted in extended periods of high flows, fewer low flows, and more frequent flooding. • **Opportunity: Drainage Management** – Drainage ditch and drainage tile improvement projects should include water storage to offset or mitigate increases in cumulative discharge, in addition to peak flow reductions. The goal would be to include water storage practices so that peak flow and watershed discharge remain steady or even decrease. • **Opportunity: Water Storage Projects** – Many options exist for enhancing water storage within the watershed. Off channeldry impoundments and wetland restorations are two potential water storage practices that could be effectively implemented to meet storage goals. Dry impoundments are engineered water storage solutions designed to temporarily hold and slowly release flood waters to reduce peak flows by maximizing floodplain storage in the upper watershed for these projects, while minimizing impacts to low/moderate flow events within natural stream systems. Wetland restorations are also effective in storing excess flood waters, and they additionally filter nutrients, recharge groundwater, and provide a host of ecological services. These projects are most effective when implemented in upper watershed and headwaters areas. Two such project opportunities in the CD14 watershed south of Marshall would together provide approximately 100 acre-feet of storage during storm events, slowing the discharge into the Cottonwood River.

	• **Opportunity: Early Coordination** – Early coordination in drainage improvement project proposals benefits all parties by providing more opportunities to find creative solutions to addressing high priority concerns and issues. Engaging in early coordination efforts can help landowners, drainage authorities, and watershed groups identify potential areas of restoration or storage that may qualify for assistance/cost-share and benefit landowners as well as natural resources while achieving project goals.
Surface Water Quality and Groundwater Protection	**Concern:** One of the State's goals is to improve water quality to ensure Minnesota's lakes, rivers, and streams are fishable and swimmable. There are many impaired resources that will require significant attention in the watershed to improve water quality conditions. The plan should work to address the water quality goals established in the Watershed Restoration and Protection Strategies (WRAPS) report and TMDL studies. The DNR Watershed Health Assessment Framework (WHAF), https://arcgis.dnr.state.mn.us/ewr/whaf2/ and forthcoming DNR Evaluation of Hydrologic Change (EHC) Technical Summary for the Cottonwood River Watershed are tools that can help identify priority areas and refine strategies in ways that prevent future surface water quality impairments and groundwater contamination, improve fish habitat and native communities in lakes and streams, and promote watershed resilience to climate change and other stressors. The DNR can provide EHC data on request. • **Opportunity: Targeted Agricultural BMP Implementation** – Opportunities exist for implementation projects that would positively impact water resources without impacting production and yields on prime agricultural lands. Significant benefits could be realized by addressing feedlot surface water runoff issues and targeting conservation best management practices (BMPs) such as cover crops and conservation tillage. Healthy soils protected by cover crops and conservation tillage reduce nutrient loading, increase residue, reduce runoff, and increase water storage within the soil profile. We recommend contacting the Minnesota Soil Health Coalition (MN Soil Health Coalition - MN Soil Health Coalition) for information on promoting soil health practices that farmers can implement to help retain water on the landscape and improve water quality and storage in the watershed. • **Opportunity: Targeted Urban BMP Implementation** – Several waterbodies in the watershed are directly affected by urban runoff. Urban runoff can carry pollutants and cause fluctuations in stream flows and lake levels if not properly mitigated. Residential property owners could be encouraged to use rain barrels and infiltration gardens to treat and reduce runoff while promoting groundwater recharge. Other practices, such as proper management of garden waste and grass clippings would prevent additional nutrient loading to lakes. Riparian landowners should be encouraged to establish buffer zones, and implement best management practices along shorelines and urban areas. Effective implementation of shoreland ordinances would provide additional protection to sensitive shoreland areas. Also see the DNR's Innovative Shoreland Standards Showcase | Minnesota DNR (state.mn.us). Sleepy Eye Lake is a great example of a community coming together to reduce urban runoff pollutants and educating residents about the impacts. Their efforts over the past 20 years have helped remove Sleepy Eye Lake from the impaired waters

	list. **Concern: Developing Lake Shores** – Lakes in many areas are starting to experience increased development pressure; Rock Lake in Lyon County is an example. Upper watershed restorations and protections are needed for nearly all water basins, however new development can create additional pressure and it is imperative that shoreland ordinance standards are enforced to prevent degradation. Additional protections may be possible in the way of higher standards in previously undeveloped shoreland areas. Also see the DNR's Cottonwood River and Redwood River Watersheds Stressor Identification Report - Lakes (state.mn.us). **Concern:** Groundwater supplies 75% of Minnesota's drinking water and 90% of agricultural irrigation. Buried surficial aquifers are often limited in extent and water availability. In such situations, surface water infiltration plays an important role in increasing aquifer recharge, reducing the amount of surface water runoff and decreasing flooding. • **Opportunity: Geologic Atlas** – Complete geologic atlases for Lyon, Murray, and Cottonwood Counties. Having a comprehensive examination of the groundwater component and the connection to surface resources is critical to ensure there is a complete understanding of the watershed. • **Opportunity: Information and Education** – The DNR provides the Community based Aquifer Management Partnership (CAMP) program to raise awareness of water supply issues, infrastructure and water availability considerations for future need with local government units. At the LGU/watershed level, relevant strategies include making information available for irrigators on application rates, timing, irrigation endgun discharge and scheduling. There are also opportunities to work with local communities to instrument and monitor local water usage work with the DNR to expand the groundwater monitoring network (Cooperative Groundwater Monitoring (CGM) | Minnesota DNR (state.mn.us).
Land Use and Management, Biology and Natural Resources	**Concern:** The Cottonwood River and Middle Minnesota watersheds have hundreds of stream and river miles, and a limited number of water basins, that are home to diverse plants, wildlife, and aquatic organisms. Few native landscapes and natural areas remain in the watershed, and those that do remain support a wide variety of plant and animal species that warrant protection. Healthy, intact natural areas are essential for a functioning and resilient ecosystem, which can help mitigate weather events, and provide nutrient management, water treatment and erosion control. • **Opportunity: Private Forest Stewardship Assistance** – Raise awareness of the DNR Forestry Stewardship program for floodplain and upland forest areas (Forest stewardship | Minnesota DNR (state.mn.us)). Landowners and communities are encouraged to reach out to the local DNR Forester to discuss options. https://www.dnr.state.mn.us/woodlands/cfm-map.html • **Opportunity: Native Plant Communities** – Native prairie, restored grassland, and forested riparian corridors with floodplain wetlands are home to many different diverse communities, rare plant and animal species listed as

	endangered; Species in Greatest Conservation Need (SGCN) identified in Minnesota's Wildlife Action Plan 2015-2025 | Minnesota DNR (state.mn.us); and rare or sensitive natural features, including those vulnerable to a single catastrophic event, as detailed in the Natural Heritage Information System | Minnesota DNR (state.mn.us).
	• Calcareous Fens – There are three calcareous fens in the Dutch Charlie Creek Watershed Calcareous Fens (state.mn.us)
	• Native Plant Communities (https://www.dnr.state.mn.us/prairie/visit/where-see-prairie.html)
	• There are 54 rare plant and animal species (state and federal) that are listed as threatened or of special concernt.
	
	• **Opportunity**: **Biological Resources** - Minnesota's Wildlife Action Plan aims to ensure the long-term health and viability of the state's wildlife, with emphasis on species that are rare, declining or vulnerable to decline. See also the Minnesota Conservation Explorer.
	  ○ The DNR recommends protection efforts focusing on remnant native habitats within or adjacent to Wildlife Action Network-identified priority areas, specifically those lands that are not already in some form of protected conservation land status. Riparian zones along streams, wetland and shallow lakes are also high priority, as is enforcing existing shoreland and floodplain ordinances. Suggested additional goals include restoring or improving degraded resources, targeting the creation of larger habitat areas and restoring drained wetlands and basins.
	• Trout Streams – There are two trout streams, Spring Creek (Hindeman Creek AMA) and John's Creek (Trout fishing in southwestern Minnesota | Minnesota DNR (state.mn.us)).
	• Lakes of High Biological Significance
	  ○ Lake Augusta, Lake Willow, Leedom Slough and Christianson Marsh

Outdoor Recreation	**Opportunity: Public Recreation Opportunities** – Following the COVID-19 pandemic, state agencies have observed increased public participation in activities like fishing, hiking, biking, tubing, canoeing and kayaking. The entire Minnesota River is a designated State Water Trail, as is the Cottonwood River from MN Hwy 4 to the confluence with the Minnesota River (Minnesota State Water Trails | Minnesota DNR). Existing Public Water Access sites on the Cottonwood River are experiencing erosion issues; repairs to these sites or redesigns to allow for accessibility and climate change resiliency should be a priority. • **Programs** – State and Local programs such as the Walk in Access (WIA) program (Walk-In Access (WIA) Program | Minnesota DNR (state.mn.us)) and Outdoor Recreation Grant Program. (Outdoor Recreation Grant Program | Minnesota DNR (state.mn.us)). • **Public Lands** – Public lands include Flandrau State Park, the DNR South Region Headquarters, four Scientific and Natural Areas, 79 State Wildlife Management Areas consisting of approximately 15,900 acres that account for 0.019% of the watershed.

	DNR staff welcome constructive dialogue and relationship building opportunities with 1W1P Partners about management and uses of existing public lands, projects and ensuring future opportunities in a transparent and equitable process that fully accounts for the benefits they provide.

DEPARTMENT OF AGRICULTURE

June 13, 2023

Cottonwood-Middle Minnesota One Watershed, One Plan Partnership
c/o Kerry Netzke
Redwood-Cottonwood Rivers Control Area
1424 East College Drive, Suite 300
Marshall, MN 56258
(507) 532-1325
kerry.netzke@rcrca.com

Re: Respond to request for priority issues in the Cottonwood-Middle Minnesota Watershed

Dear Kerry,

Thank you for the opportunity to provide priority issues for consideration in the development of the Cottonwood-Middle Minnesota One Watershed One Plan (1W1P). The Minnesota Department of Agriculture (MDA) looks forward to working closely with local government units, stakeholders,and other agency partners in the planning process, as well as providing practical information and feedback to appropriate landowners and agricultural organizations in the watershed.

One of MDA's roles that relates to the One Watershed One Plan process is technical assistance. The MDA maintains a variety of water quality programs including; the Minnesota Agricultural Water Quality Certification Program, research, on-farm demonstrations, and groundwater and surface water monitoring. Our goal is to help better understand the resource concerns and further engagethe agricultural community in problem solving.

MDA Priority Concerns

Nitrates and pesticides in groundwater are a priority resource concern for the MDA in this watershed.

Additionally, the MDA is interested in working with local and state partners to engage the agricultural community, support on-farm demonstrations, promote the Minnesota Ag Water Quality Certification Program, and use the most recent and relevant research and tools to share information about conservation practices.

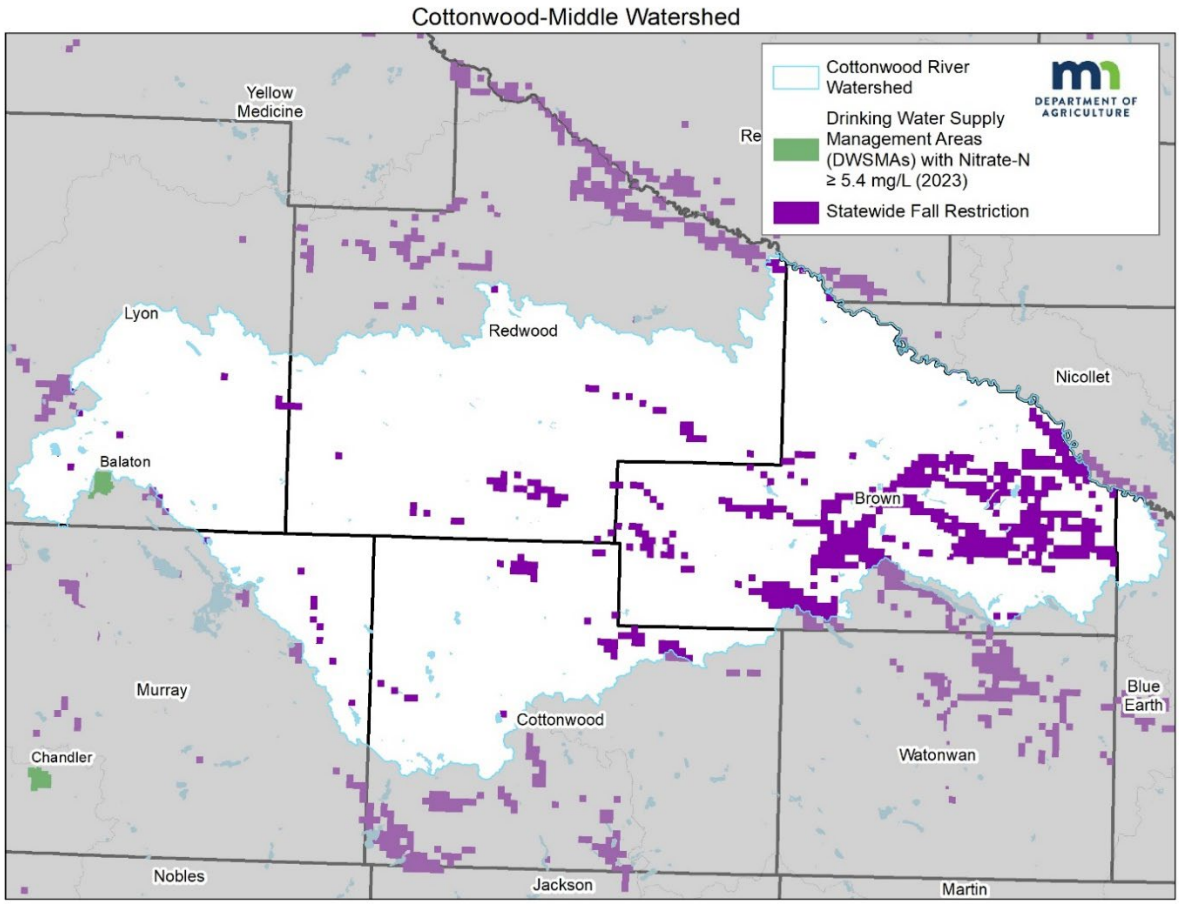
Nitrogen Fertilizer Management Plan (NFMP)
http://www.mda.state.mn.us/nfmp

The NFMP is the state's blueprint for preventing or minimizing impacts of nitrogen fertilizer on groundwater. The primary goal of the Nitrogen Fertilizer Management Plan (NFMP) is to involve the agricultural community in problem solving at the local level and work together to respond and address localized concerns about unsafe levels of nitrate in groundwater with a focus on Drinking Water Supply Management Areas (DWSMAs).

Groundwater Protection Rule (GPR)
https://www.mda.state.mn.us/nfr

The Groundwater Protection Rule minimizes potential sources of nitrate pollution to the state's groundwater and protects our drinking water. The first part of the rule restricts fall application of nitrogen fertilizer in areas vulnerable to contamination and is identified by the purple and green highlighted areas in **Figure 1** shown below. There are approximately 87,194 acres in the watershed that fall under part 1 of the rule. ***The 1W1P should consider including this map in the plan and using this for targeting groundwater quality areas of focus.***

Figure 1. Land Affected by Groundwater Protection Rule in Cottonwood-Middle Minnesota Watershed



The second part of the rule outlines steps to reduce the severity of the problem in areas where nitrate in public water supply wells are elevated. Currently, there are no areas in the watershed affected by Part 2 of the GPR. Balaton is a DWSMA just outside the watershed with high levels of nitrates.

Township Testing- Private Well Nitrate Testing

The MDA has identified townships throughout the state that are vulnerable to groundwater contamination and have significant row crop production. Two counties (Brown and Cottonwood Counties) had townships in the Township Testing Program (TTP) in this watershed. Each selected township was offered testing in two steps, the 'initial' sampling, and the 'follow-up' sampling. In the initial sampling, all township homeowners using private wells received a nitrate test kit. If the initial sample detected nitrate, the homeowner was offered follow-up tests for nitrate and pesticides and a well site visit. Trained MDA staff visited willing homeowners to resample the well and then conducted a site assessment. The site assessment identified possible non-fertilizer sources of nitrate and assessed the condition of the well. A well with construction problems may be more susceptible to contamination.

Two datasets, 'Initial' and 'Final', are used to evaluate nitrate in the private wells in this program. The initial dataset represents private wells drinking water regardless of the potential source of nitrate. The final dataset was informed through an assessment process to evaluate each well. In the assessment, wells that had nitrate results over 5 mg/L were removed from the final dataset if a potential non-fertilizer source or well problem was identified, there was insufficient information on the construction or condition of the well, or for other reasons which are outlined in the full report. The final dataset represents wells with nitrate attributed to the use of fertilizer.

In the "initial results" **Figure 2** map below, five townships were tested for nitrate in the watershed. One township had 10% or more of wells at or over 10 mg/L of nitrate. Two townships had 5<10% of wells at or over 10 mg/L of nitrate and another two townships had less than 5% of wells over 10 mg/L of nitrate. A total of 124 wells were tested in the townships and nine wells were over 10 mg/L of nitrate.

In the "final results" **Figure 3** map below, no townships had 10% or more of wells at or over 10 mg/L of nitrate. Three townships had less than 5% of wells over 10 mg/L of nitrate. Two townships had less than 20 wells in their final data set. MDA considers less than 20 wells inadequate to characterize a township for purposes of the NFMP. In the final data set for these townships, a total of 107 wells remained and 1 well was over 10 mg/L. Detailed sampling results are available at Township (Nitrate) Testing Program (http://www.mda.state.mn.us/townshiptesting).

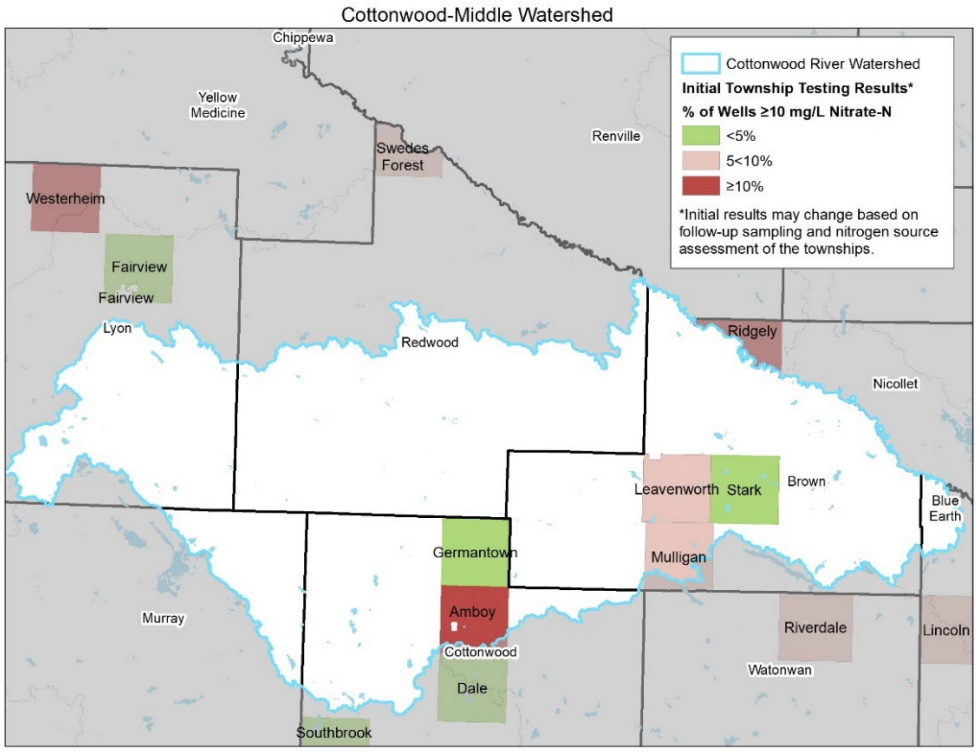


Figure 2: This map displays the Initial Township Testing Program results. Initial results represent private well drinking water regardless of nitrate source.

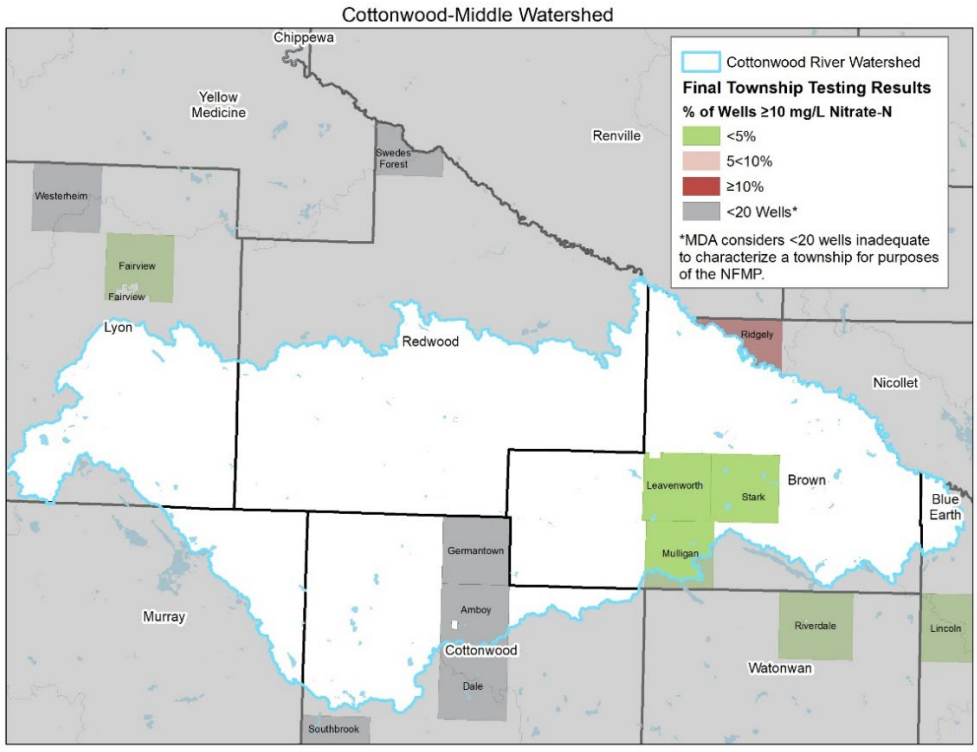


Figure 3: This map displays the Final Township Testing Program results. The final dataset represents wells with nitrate attributed to the use of fertilizer.

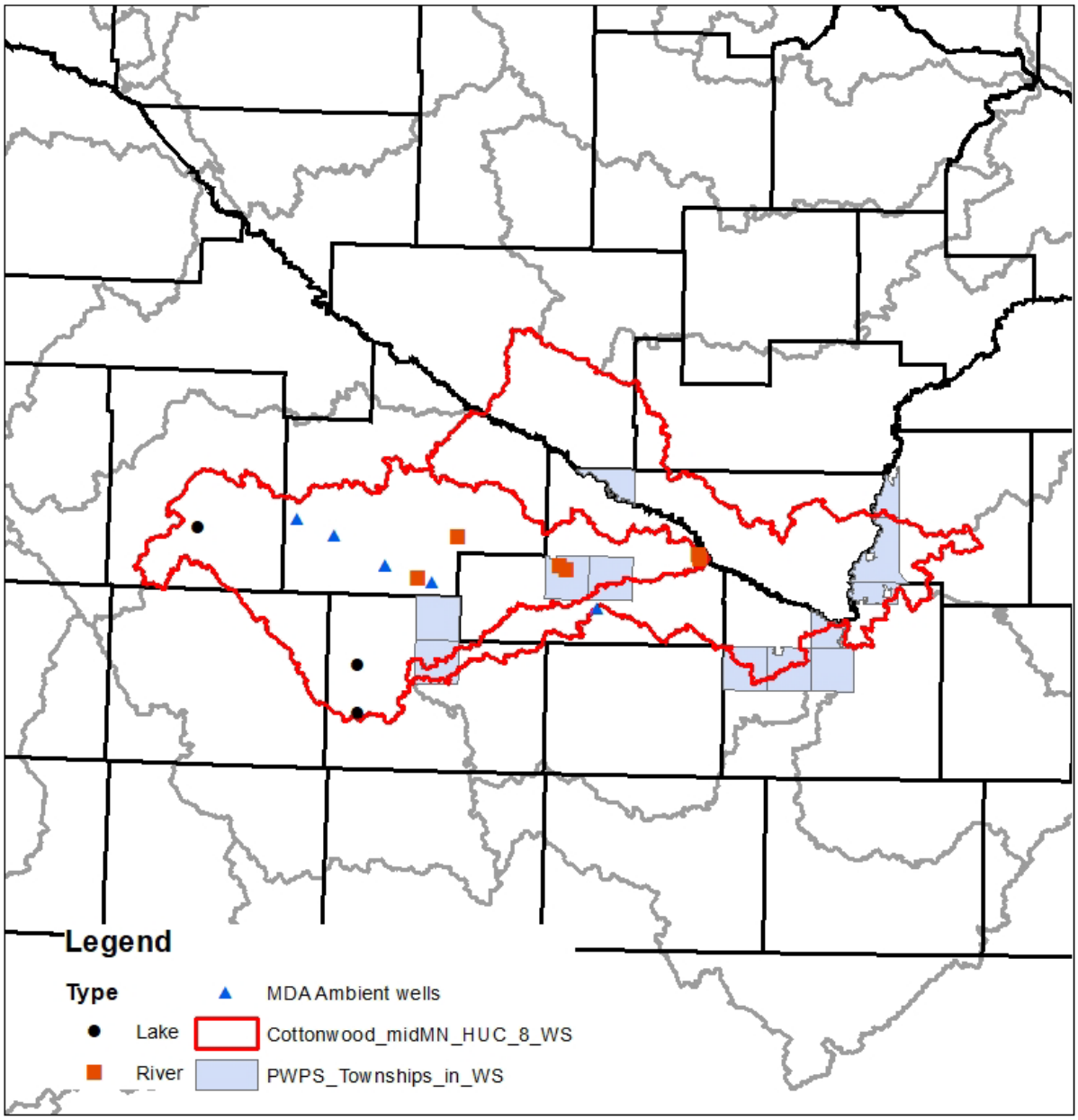
Minnesota Department of Agriculture Pesticide Water Quality Monitoring

The MDA collects water samples from agriculture and urban areas of Minnesota and analyzes water for up to approximately 180 different pesticide compounds that are widely used and/or pose the greatest risk to water resources. Groundwater monitoring is conducted by MDA and Minnesota Pollution Control Agency staff. Surface water monitoring is conducted by the MDA and a variety of cooperators. All monitoring is completed following annual work plans and standard operating procedures (SOP's) developed by the MDA.
The purpose of the MDA's pesticide monitoring program is to determine the presence and concentration of pesticides in Minnesota waters, and present long-term trend analysis. Trend analysis requires long-term investments in monitoring within the MDA's established networks. The MDA releases an annual water quality monitoring report that includes all pesticide water quality data and long term trends available at www.mda.state.mn.us/monitoring. The MDA will continue to conduct statewide pesticide monitoring in the future and will provide additional information related to the occurrence of pesticides in Minnesota waters.

The MDA began evaluating pesticide presence and magnitude in private residential drinking water wells as part of the Private Well Pesticide Sampling (PWPS) Project in 2014 as a companion program to the MDA Township Testing Program (TTP). Townships in different counties were sampled every year with for the PWPS project. The initial project concluded in June 2021, but ongoing sampling in select counties continues. Townships in the PWPS Project depend on the participation of well owners and may not reflect all the townships sampled in the TTP. Water samples were collected by trained MDA hydrologists and analyzed by a private contract lab for compounds similar to the MDA ambient water quality monitoring program. All monitoring is completed following annual work plans and standard operating procedures (SOP's) developed by the MDA. Results of the PWPS sampling can be found at the MDA's website for the PWPS Project at www.mda.state.mn.us/pesticide-fertilizer/private-well-pesticide-sampling-project.

Figure 4 below presents the locations of the MDA's groundwater and surface water monitoring locations and the PWPS townships that were sampled.

Figure 4 MDA Sample Locations in the Cottonwood Mid-Minnesota Watershed (Ambient Monitoring and PWPS)



DEPARTMENT OF AGRICULTURE

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Cottonwood Mid-Minnesota Watershed Sampling

Groundwater

Ambient Monitoring Results

The MDA has sampled six sites but currently samples two sites within the watershed.

Historical Monitoring

The wells which are not currently sampled were four MN DNR Observation wells. The observation wells were sampled between 1986 and 1991 with one well sampled again in 2004.

Atrazine was detected four times with concentration ranging from 120 ng/L to 1,100 ng/L. The HRL for atrazine is 3,000 ng/L. Nitrate concentration ranged from not detected to 3 mg/L. The health risk limit (HRL) for nitrate is 10 mg/L.

Current Monitoring

The two sites that the MDA currently samples within this watershed have been sampled annually or semiannually since 2006.

Twelve different pesticides or pesticide breakdown products (or degradants) have been detected in the well. None have exceeded human health reference values.

Nitrate-nitrite (nitrate) concentrations range from not detected to 47.9 mg/L. The health risk limit (HRL) for nitrate is 10 mg/L.

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

PWPS Project Results

As part of the PWPS Project, wells in five townships in Blue Earth County, in two townships in Brown County, in two townships in Cottonwood County, in two townships in Le Sueur County, and in one township in Nicollet County that lie within or on the border of the watershed were sampled for approximately 130 pesticide compounds during 2019 or 2020. The chemistry data is available for the wells; however, due to privacy rules, the well locations cannot be shared.

The county, the year it was sampled, number of wells, and the number of townships that were sampled are listed below:

- Blue Earth (2019) – 42 wells in five townships
- Brown (2020) – 4 wells in two townships
- Cottonwood (2019) – 2 wells in two townships
- Le Sueur (2019&2020) – 38 wells in two townships
- Nicollet (2019) – 4 wells in one township

The number of pesticides or pesticides degradants that were detected in wells in each county is listed below:

- Blue Earth – 13
- Brown – 4

- Cottonwood – 6
- Le Sueur – 13
- Nicollet – 6

None of the wells had a concentration that exceeded an established human health reference value for the compounds.

Nitrate concentrations within the townships tested ranged from <0.05 to 18.0 mg/L. The HRL for nitrate is 10 mg/L. The list below presents the number of wells in each county that had a nitrate concentration that exceeded the nitrate health reference value.

- Blue Earth – 1
- Brown – 0
- Cottonwood – 1
- Le Sueur – 6
- Nicollet – 0

The MDA does not currently plan to continue this sampling within the watershed.

Surface Water

Rivers and Streams

The MDA has completed 324 pesticide water quality sample collection events from six river and stream locations from 1991 through 2021. two locations were sampled one time in 2010. Two locations on the Cottonwood River near New Ulm have been sampled a combined 264 times between 1991 and 2022. Two locations on Sleepy Eye Creek southwest of Sleepy Eye have been sampled a combined 158 times between 2005 and 2022. The Cottonwood River and Sleepy Eye Creek are currently in the MDA's monitoring network.

The MDA has monitored the Cottonwood River at the Cottonwood Streat Bridge in New Ulm since 2002. Through 2022, the MDA has detected five pesticides over a numeric water quality reference value including six detections of acetochlor (2012, 2019 (4) and 2020), one detection of chlorpyrifos (2016), seven detections of clothianidin (2018, 2019 (4). 2020 and 2022), eight detections of imidacloprid (2018 (2), 2019 (4), 2020 and 2022) and one detection of pyroxasulfone (2022). None of these detections have resulted in a water quality impairment.

The MDA has monitored Sleepy Eye Creek at county Highway 8, 2.2 miles north of Leavenworth since 2014. Through 2022, the MDA has detected two pesticides over a numeric water quality reference value including seven detections of acetochlor (2014, 2017, 2018, 2019 (2), 2020 and 2022) and four detections of chlorpyrifos (2015, 2016 (2) and 2017). One detection of chlorpyrifos in each 2015 and 2016 exceeded the maximum (acute) standard and Sleepy Eye Creek was designated as impaired for the insecticide chlorpyrifos on the 2018 Impaired Waters List. The United States Environmental Protection Agency (EPA) announced chlorpyrifos can no

longer be used for food or grain crops in February 2022, essentially ending chlorpyrifos use in Minnesota.

The MDA requires all pesticide applications be completed following guidelines on the pesticide label and encourages the use of Best Management Practices (BMPs) to limit the movement of pesticides into waterbodies.

Lakes

The MDA completed 20 pesticide water quality sample collection events from 3 lake locations from 2017 through 2022. Double Lake in Cottonwood County (17-0056) has been sampled 18 times and has had two detections of chlorpyrifos that led it to be designated as impaired for not meeting the water quality standard. All other pesticide detections in lakes were below the applicable water quality reference value

Nitrogen and Pesticide Use

The MDA surveys farmers through the National Agricultural Statistics Service (NASS). A summary of the data is attached to the submitted email as the pdf. "*Cottonwood-Middle Minnesota Watershed MDA Survey*." The survey indicates that the average nitrogen rate for corn following soybeans was approximately 150 pounds per acre.

The most recent nitrogen use survey was for the 2014 crop year for corn, and the most recent pesticide use survey was for the 2018 and 2019 crop years.

For reference, the University of Minnesota fertilizer recommendations are found here: https://extension.umn.edu/crop-production#nutrient-management

Additional Resources and Opportunities for BMP Funding and Cost-share

Since there is a significant portion of the watershed in agricultural production, we would like to bring to your attention a couple resources, listed below, that we encourage you to consider during the planning process, and potentially include in the plan.

1) The **Agricultural BMP Handbook for Minnesota** is a comprehensive inventory of agricultural best management practices that address water quality impairments.The handbook is available on-line and hard copies are available upon request. State agenciesand local government partners have found this a useful resource in the WRAPS and 1W1P processes. http://www.mda.state.mn.us/protecting/cleanwaterfund/research/handbookupdate.aspx.

- Download at: https://wrl.mnpals.net/islandora/object/WRLrepository%3A2955/datastream/PDF/view

2) **Minnesota Agricultural Water Quality Certification Program (MAWQCP)**
http://www.mda.state.mn.us/awqcp.

The MAWQCP is a voluntary opportunity for farmers and agricultural landowners to take the lead in implementing conservation practices that protect our water. Those who implement and maintain approved farm management practices will be certified and in turn obtain regulatory certainty for a period of ten years. We encourage you to consider this program in the 1W1P process because it is an opportunity for agricultural producers to evaluate nutrient and field management practices within the Cottonwood-Middle Minnesota Watershed to help reduce losses.

- There are currently 32 certified producers, 221 fields, and 22,728 acres certified in the Cottonwood-Middle Minnesota Watershed.

3) **The AgBMP Loan Program**
http://www.mda.state.mn.us/agbmploans

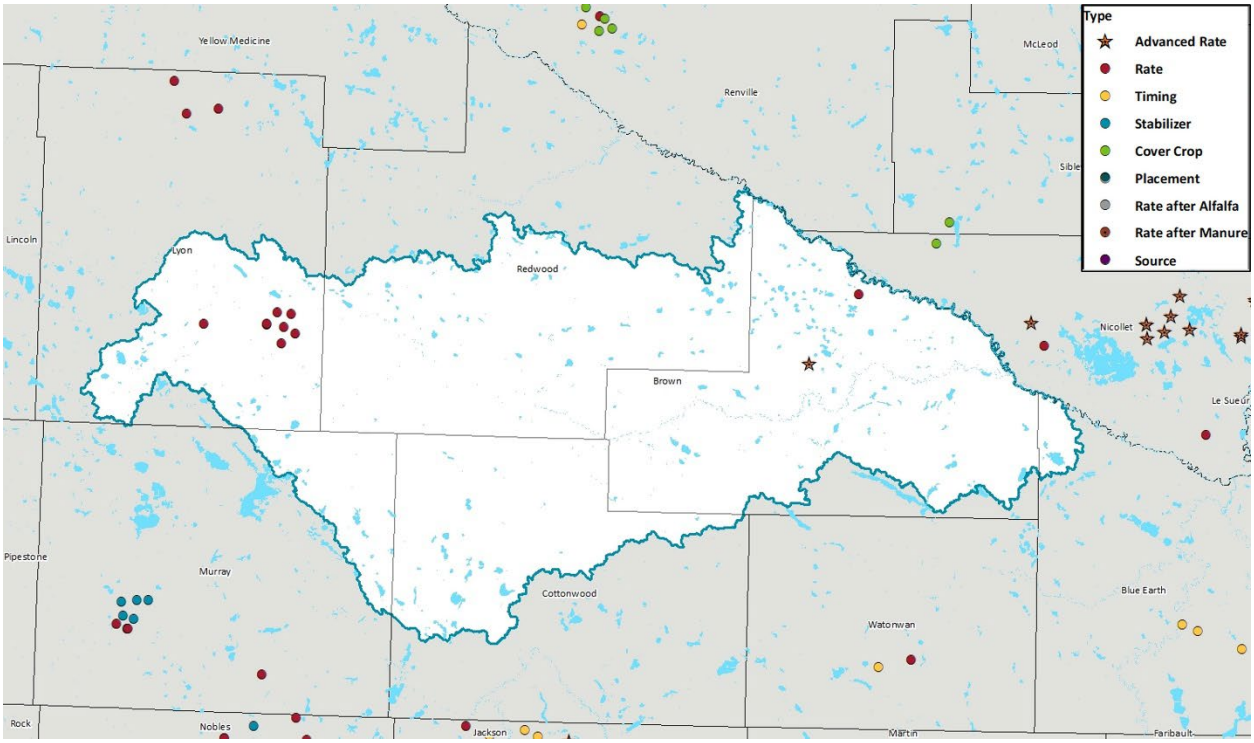
The AgBMP Loan Program is a water quality program that provides low interest loans to farmers, rural landowners, and agriculture supply businesses. The purpose is to encourage agricultural best management practices that prevent or reduce runoff from feedlots, farm fields, and other pollution problems identified by the county in local water plans. Loans can be used asmatch for other federal or state dollars supporting implementation.

4) **Nutrient Management Initiative (NMI)**
http://www.mda.state.mn.us/nmi

The NMI assists crop advisers and farmers in evaluating nutrient management practices on their own fields by utilizing on-farm trials. This is a great opportunity to promote and compare new strategies that are available that could improve fertilizer use efficiency, as well as to help open the door to include local cooperators in the water quality discussion. In addition, advanced nitrogen rate trials working with University of Minnesota researchers help guide current nitrogen rate recommendations.

Since 2015, nine on-farm trials (**Figure 5**) have been completed in the watershed where crop advisers worked directly with farmers and focused on new strategies that evaluated nitrogen rates, timing, and stabilizers. New trial ideas in other watersheds included on-farm cover crop, fertilizer placement, tillage, as well as precision agriculture and technology-based evaluations.

Figure 5. On-Farm Trials (2015-2022) in Cottonwood-Middle Minnesota Watershed



We look forward to being involved in the 1W1P process. If you have any questions, please do not hesitate to contact me at the information listed below.

Sincerely,

Kevin Hauth

Kevin Hauth, CCA-MN
Pesticide and Fertilizer Management Division
23669 130th Street
Lamberton, MN 56152
C: 507-822-4175
kevin.hauth@state.mn.us

DEPARTMENT OF AGRICULTURE

Cottonwood River Watershed

One Watershed One Plan

Lyon County–Murray County–Cottonwood County–Redwood County-Brown County-Blue Earth

Minnesota Department of Agriculture
Nitrogen and Pesticide Use

The Minnesota Department of Agriculture surveys farmers through the National Agricultural Statistics Service. The most recent nitrogen use survey was for the 2014 crop year and the most recent pesticide use survey was for the 2018 and 2019 crop years.

The following nitrogen use information is from the 2014 nitrogen use report, specifically the Irrigated and non-irrigated sandy soils, Northwestern, Southwestern and West Central BMP region.

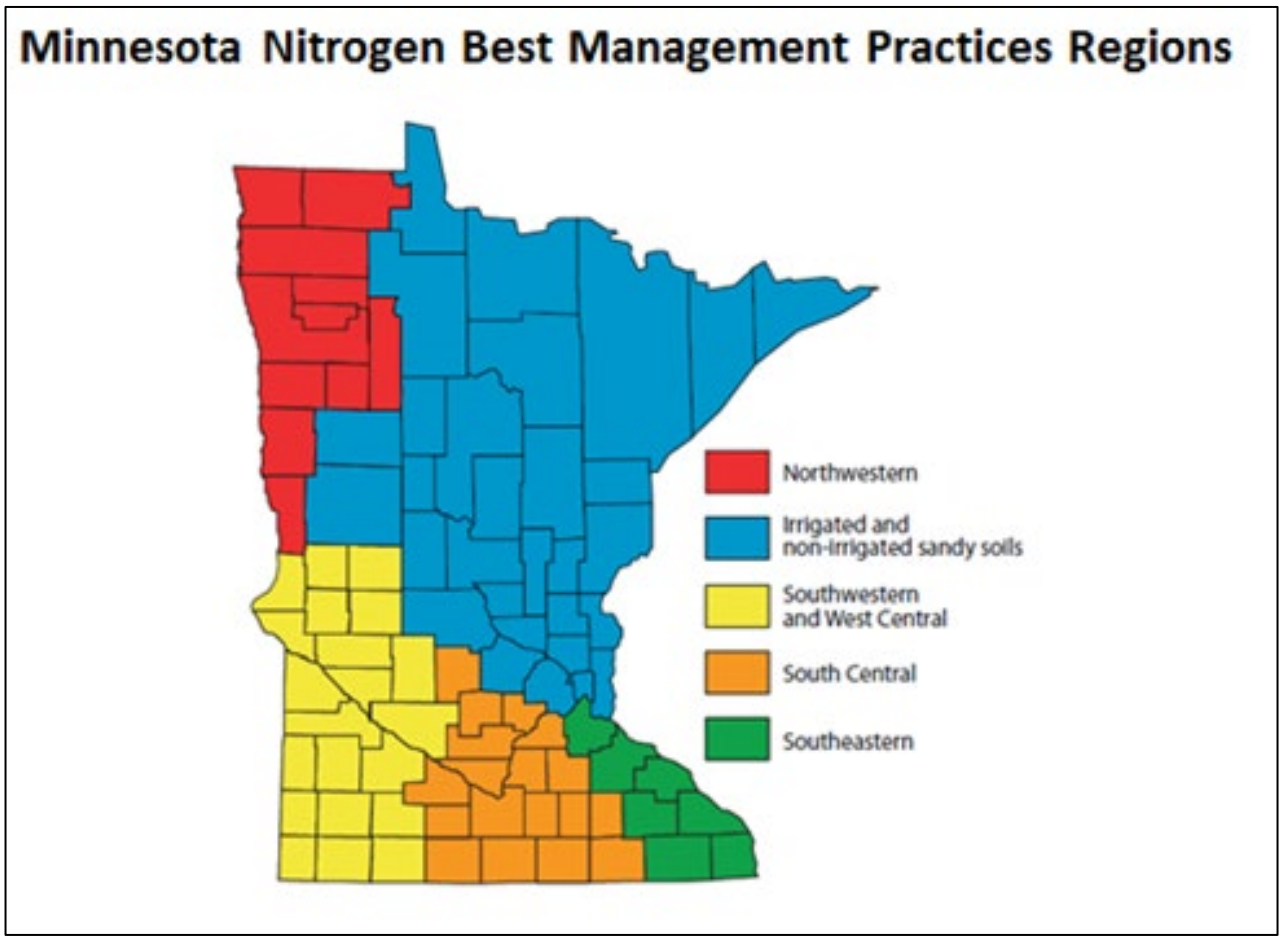


Figure 1. Minnesota Nitrogen Best Management Practices Regions

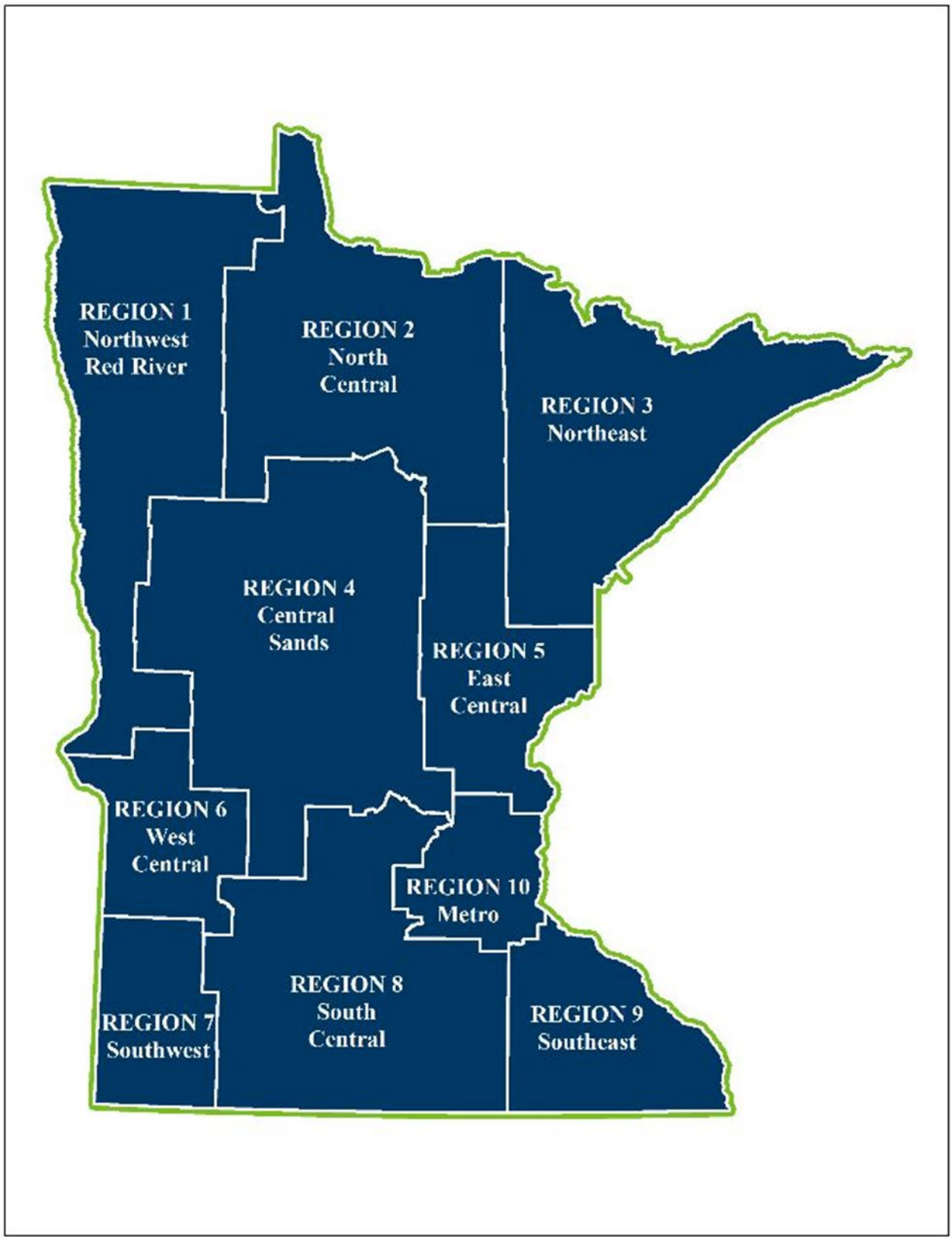


Figure 2. Minnesota Pesticide Best Management Practices Regions

Nitrogen use in the Cottonwood River Watershed: 2014 Crop Year

More than five responses are required for any individual category to be reported. Regional data may not represent county data due to the low number of farmers represented from these counties.

Fertilizer section

Figure 3 details the distribution of nitrogen fertilizer rates in the SC BMP region for corn following soybeans; the corresponding corn yields are detailed in red.

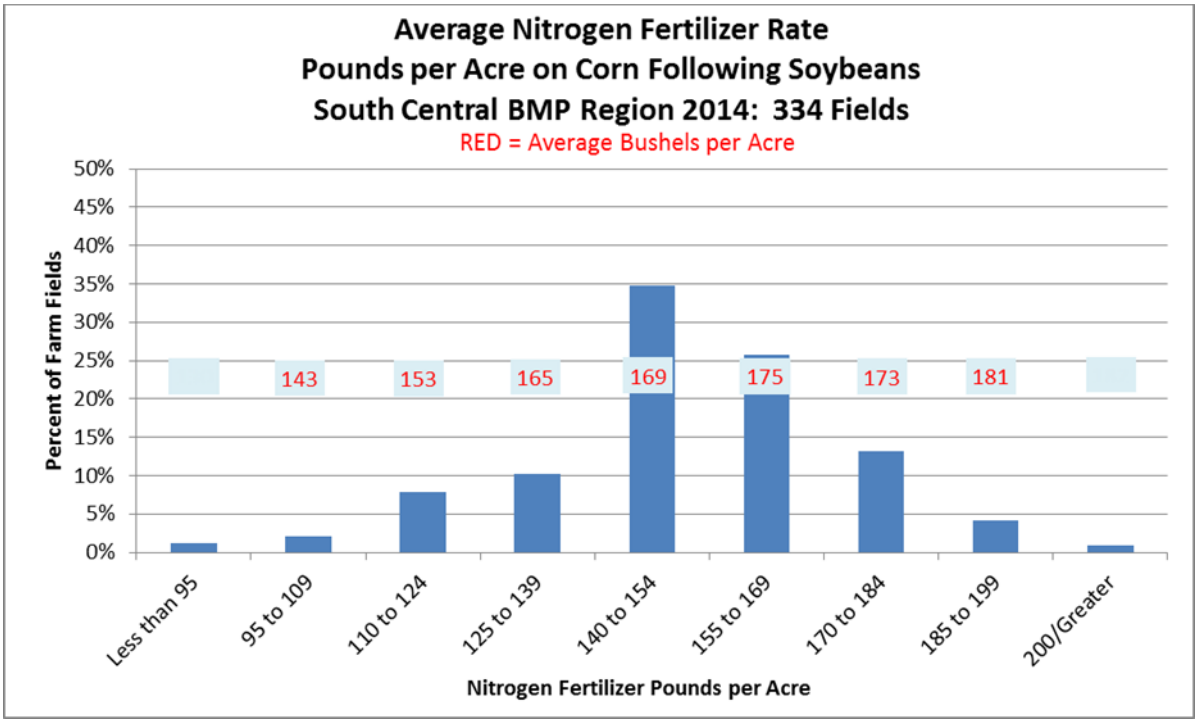


Figure 3. Average nitrogen fertilizer rates and yields on corn following soybeans in the SC BMP region for 2014: 334 fields.

In the SC BMP region, nitrogen fertilizer rates ranged from an average of 150 pounds per acre in Blue Earth County and Brown County as shown in Table 1.

Table 1. Average county nitrogen fertilizer rates and corn yields for the SC BMP region for corn following soybeans.

County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Blue Earth	31	150	172
Brown	25	150	170

Figure 4 details the distribution of nitrogen fertilizer rates in the SC BMP region for corn following corn; the corresponding corn yields are detailed in red.

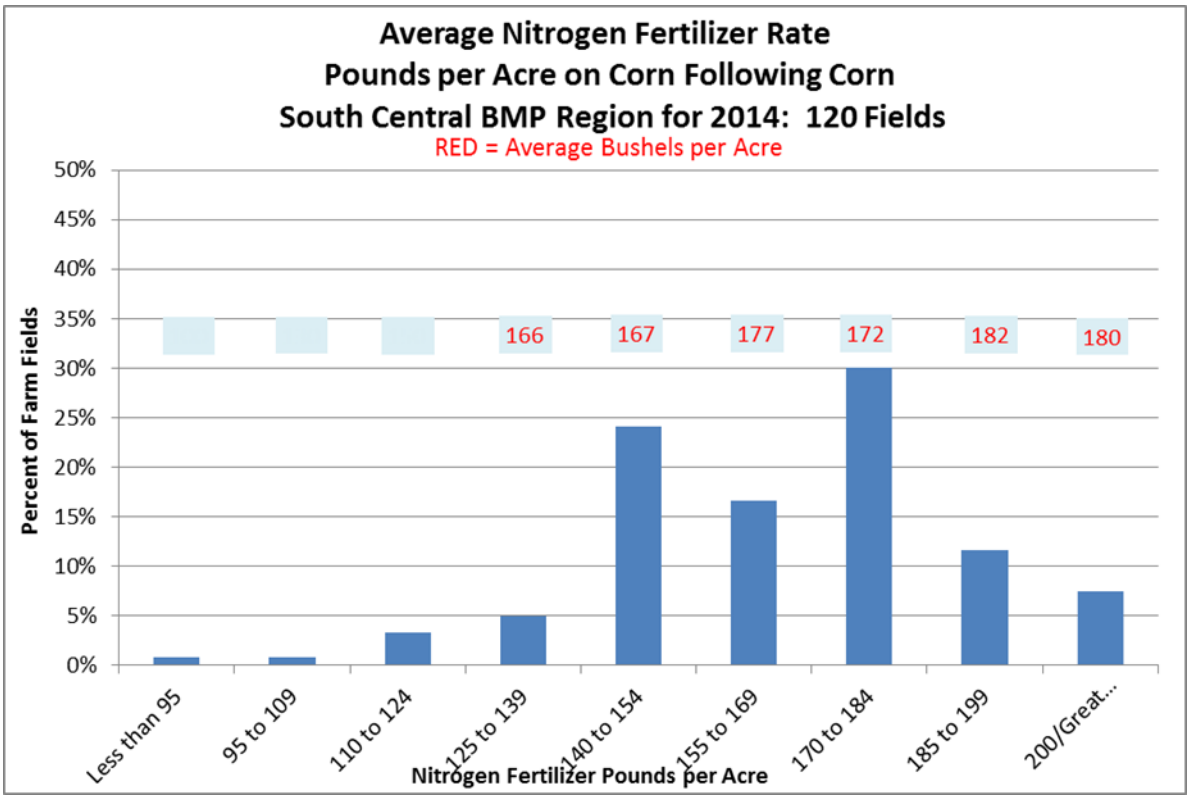


Figure 4. Average nitrogen fertilizer rates and yields on corn following corn in the SC BMP region for 2014: 120 fields.

In the SC BMP region, nitrogen fertilizer rates ranged from an average of 167 pounds per acre in Blue Earth County to 173 pounds per acre in Brown County as shown in Table 2.

Table 2. Average county nitrogen fertilizer rates and corn yields for the SC BMP region for corn following corn.

County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Blue Earth	14	167	176
Brown	8	173	178

Figure 5 details the distribution of nitrogen fertilizer rates in the SC BMP region for corn following corn following alfalfa; the corresponding corn yields are detailed in red.

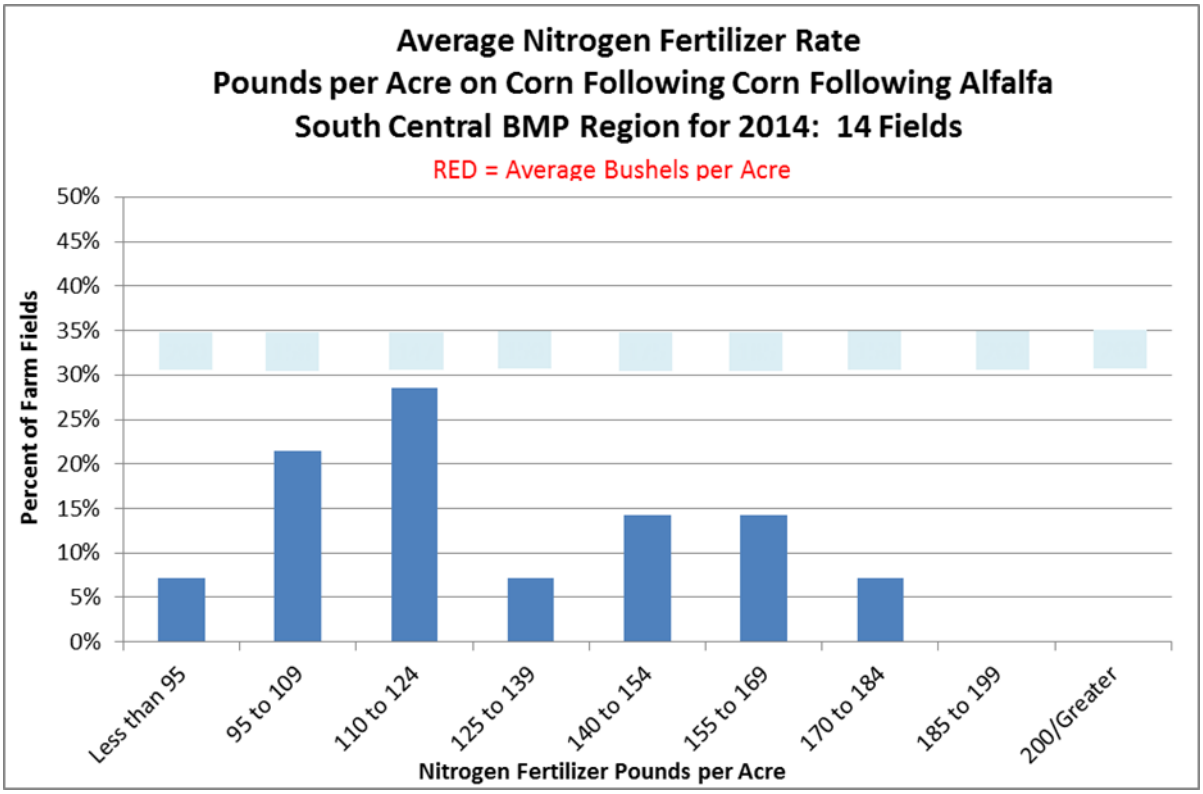


Figure 5. Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in the SC BMP region for 2014: 14 fields.

No counties had five or more responses in SC BMP region.

South Central BMP Region: Corn Following Alfalfa

There were less than five responses that were included in the SC BMP region for corn following alfalfa analysis.

Figure 6 details the distribution of nitrogen fertilizer rates in the SC BMP region for corn following small grains; the corresponding corn yields are detailed in red.

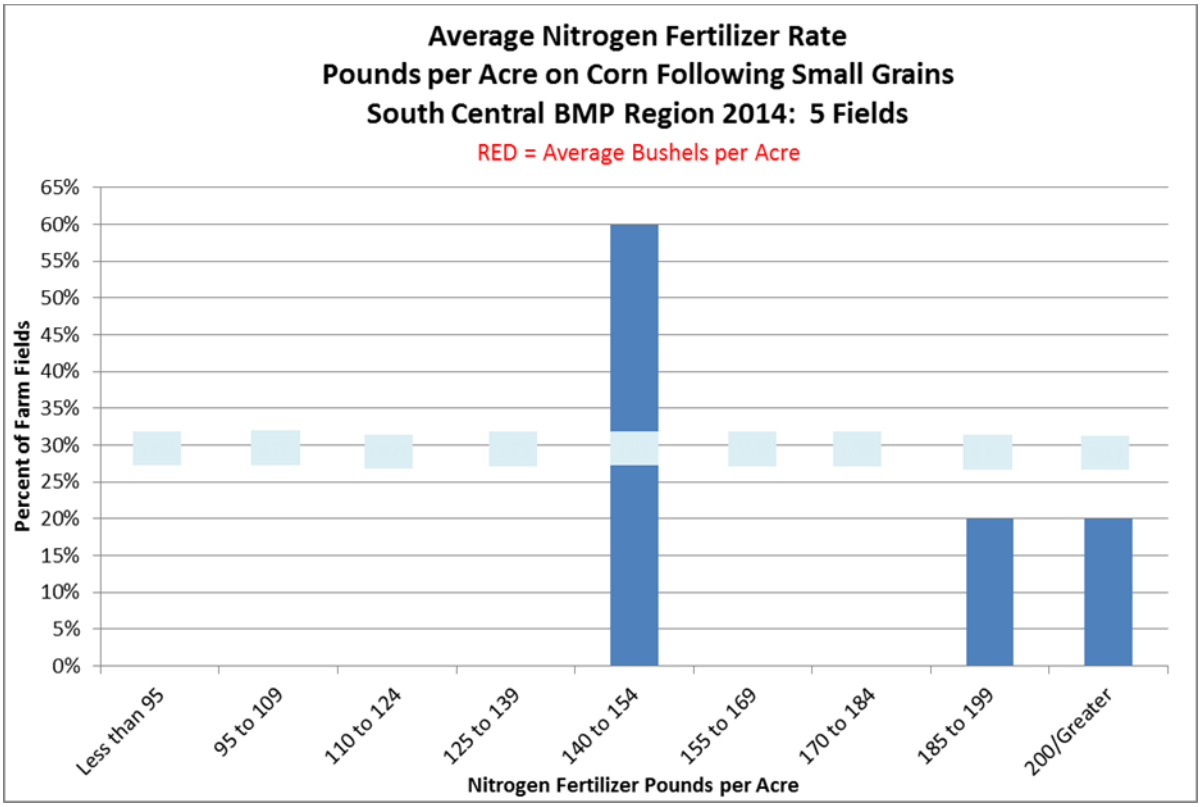


Figure 6. Average nitrogen fertilizer rates and yields on corn following small grains in the SC BMP region for 2014: 5 fields.

No counties had five or more responses in the SC BMP region.

Figure 7 details the distribution of nitrogen fertilizer rates in the SC BMP region for corn following other crops; the corresponding corn yields are detailed in red.

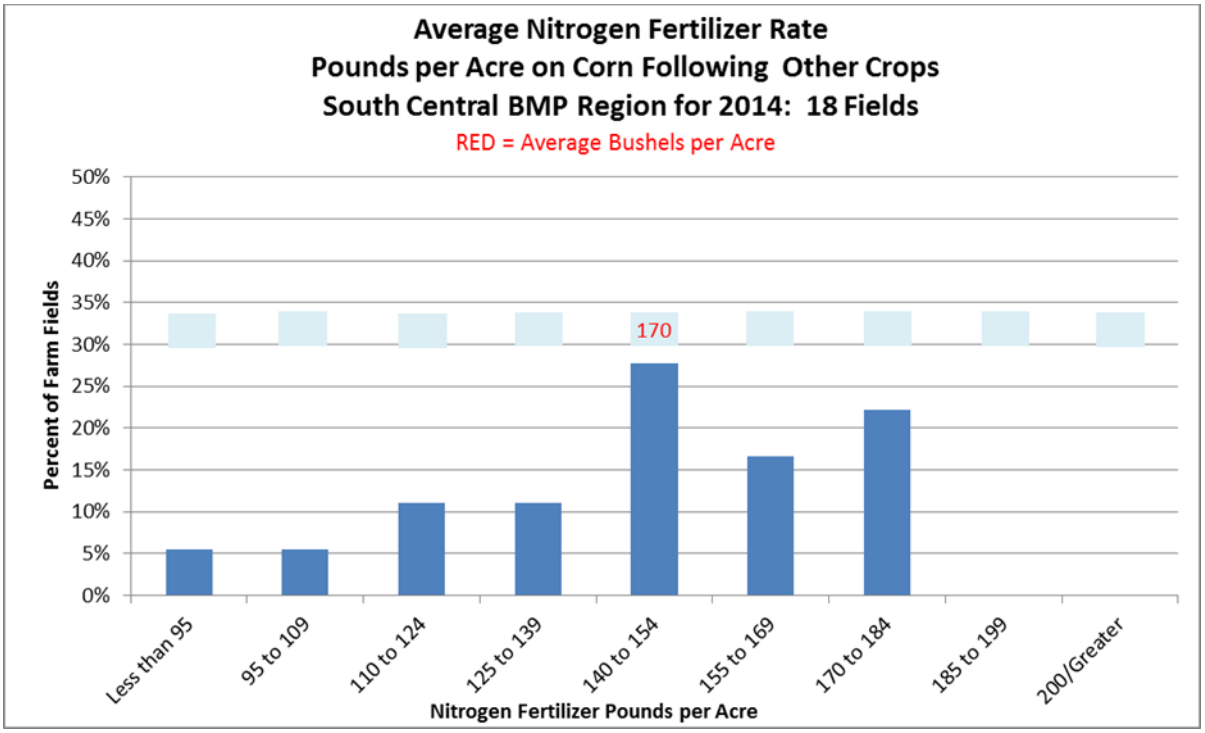


Figure 7. Average nitrogen fertilizer rates and yields on corn following other crops in the SC BMP region for 2014: 18 fields.

No counties had five or more responses in the SC BMP region.

Figure 8 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following soybeans; the corresponding corn yields are detailed in red.

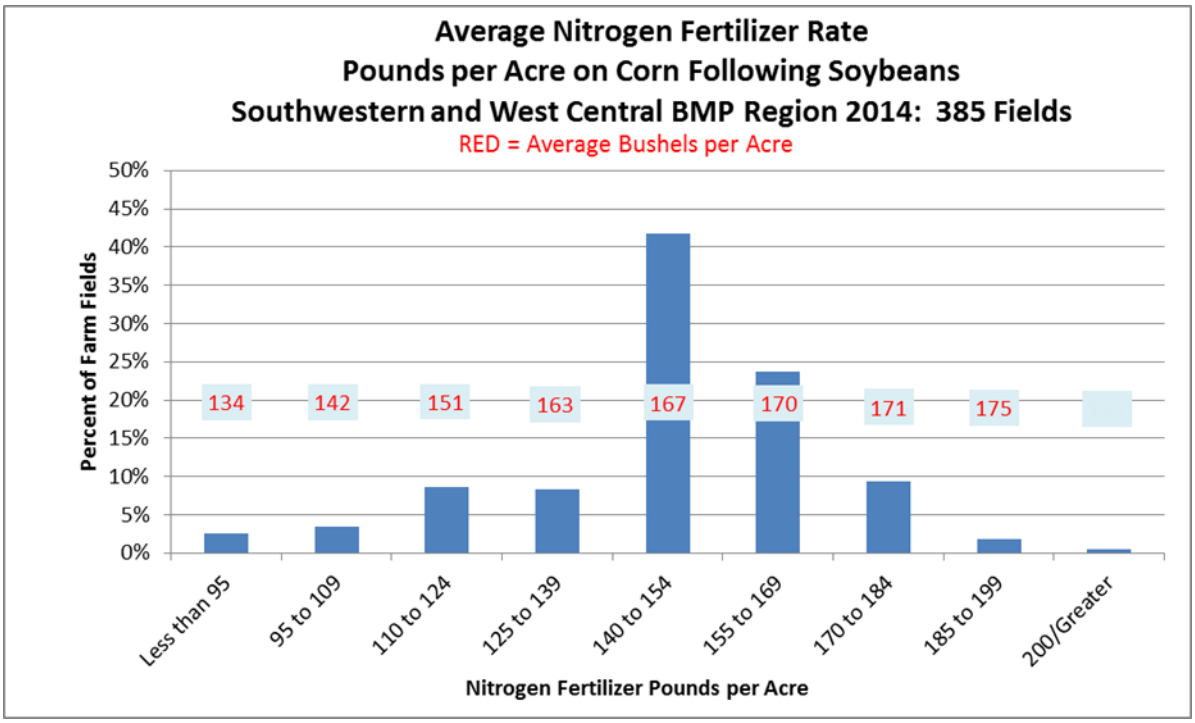


Figure 8. Average nitrogen fertilizer rates and yields on corn following soybeans in the SW BMP region for 2014: 385 fields.

In the SW BMP region, nitrogen fertilizer rates ranged from an average of 145 pounds per acre in Lyon County to 157 pounds per acre in Redwood County as shown in Table 3.

Table 3. Average county nitrogen fertilizer rates and corn yields for the SW BMP region for corn following soybeans.

County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Cottonwood	23	148	172
Lyon	22	145	158
Murray	23	150	171
Redwood	38	157	173

Figure 9 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following corn; the corresponding corn yields are detailed in red.

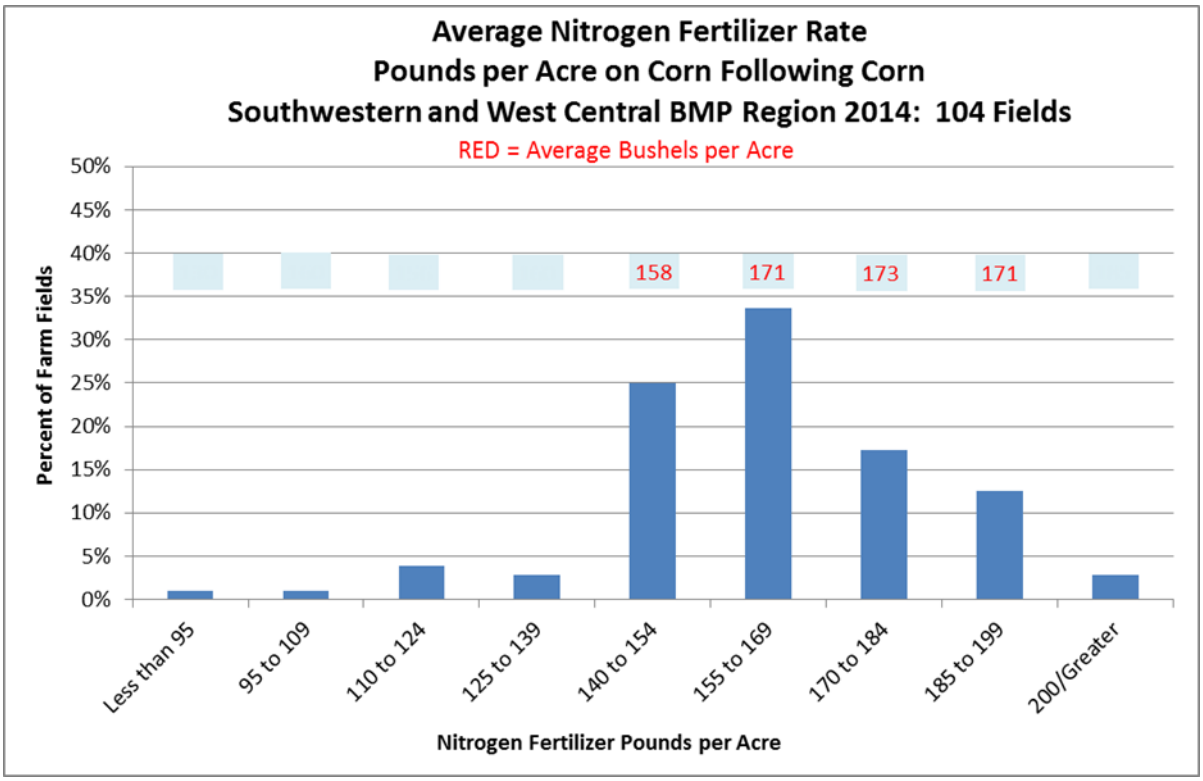


Figure 9. Average nitrogen fertilizer rates and yields on corn following corn in the SW BMP region for 2014: 104 fields.

In the SW BMP region, nitrogen fertilizer rates ranged from an average of 138 pounds per acre in Lyon County to 166 pounds per acre in Murray County as shown in Table 4.

Table 4. Average county nitrogen fertilizer rates and corn yields for the SW BMP region for corn following corn.

County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Cottonwood	5	156	179
Lyon	5	138	157
Murray	9	166	173
Redwood	15	157	168

Figure 10 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following corn following alfalfa; the corresponding corn yields are detailed in red.

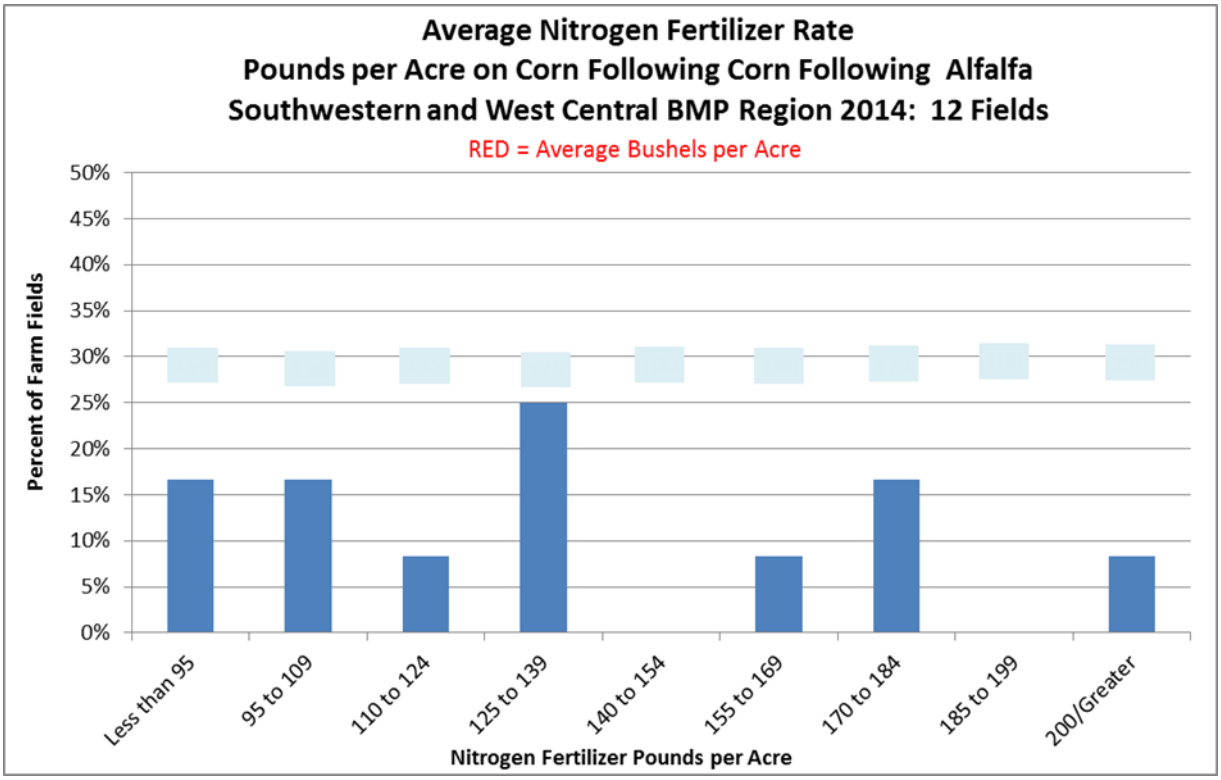


Figure 10. Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in the SW BMP region for 2014: 12 fields.

No counties had five or more responses in SW BMP region.

Figure 11 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following alfalfa; the corresponding corn yields are detailed in red.

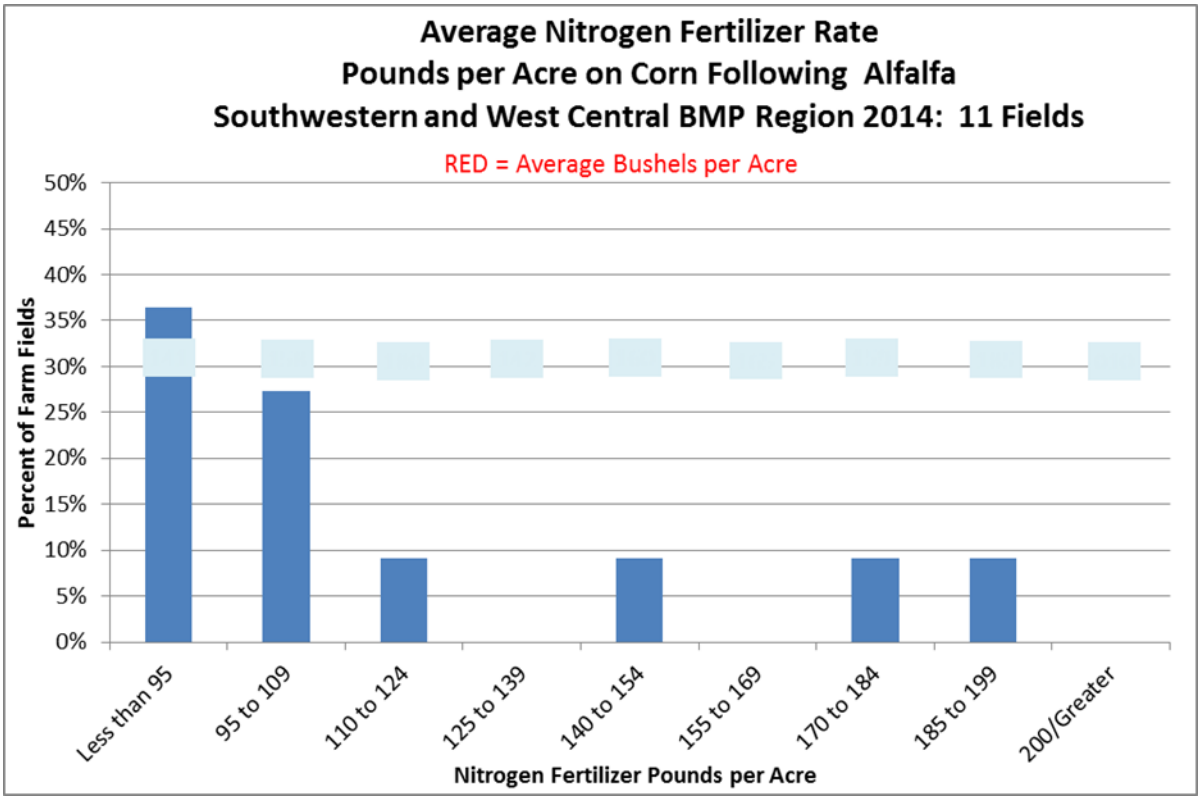


Figure 11. Average nitrogen fertilizer rates and yields on corn following alfalfa in the SW BMP region for 2014: 11 fields.

No counties had five or more responses in SW BMP region.

Figure 12 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following small grains; the corresponding corn yields are detailed in red.

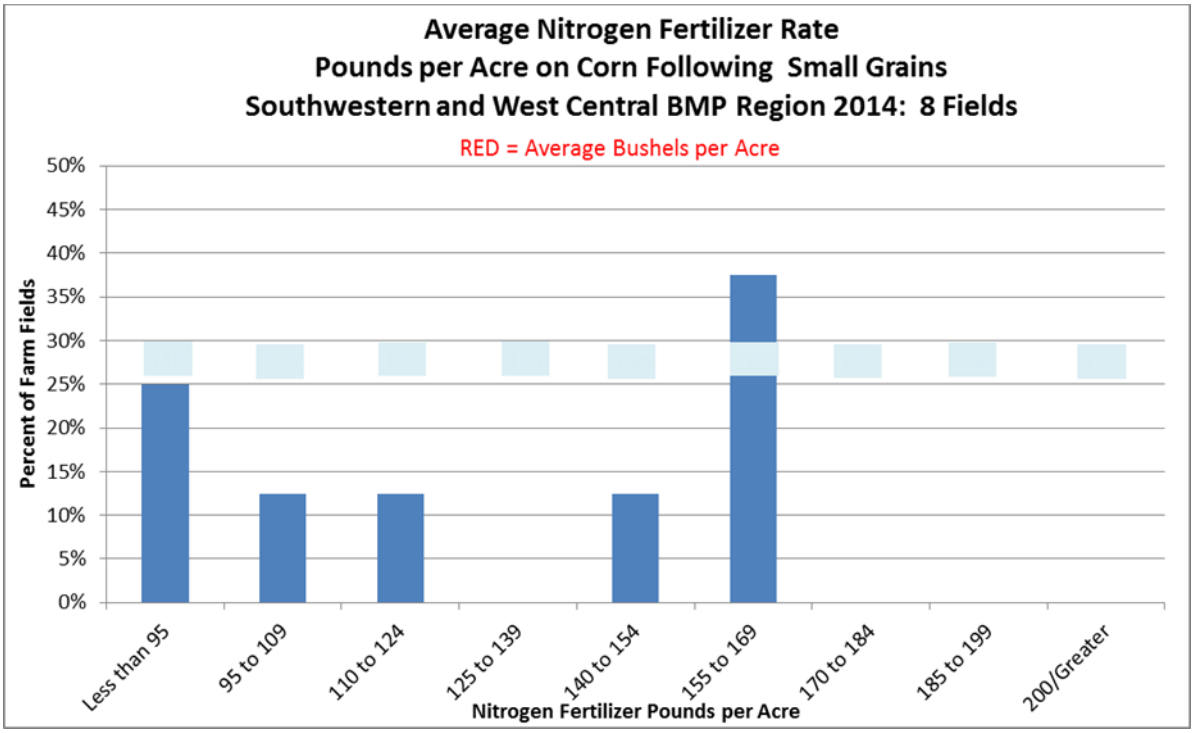


Figure 12. Average nitrogen fertilizer rates and yields on corn following small grains in the SW BMP region for 2014: 8 fields.

No counties had five or more responses in the SW BMP region.

Figure 13 details the distribution of nitrogen fertilizer rates in the SW BMP region for corn following other crops; the corresponding corn yields are detailed in red.

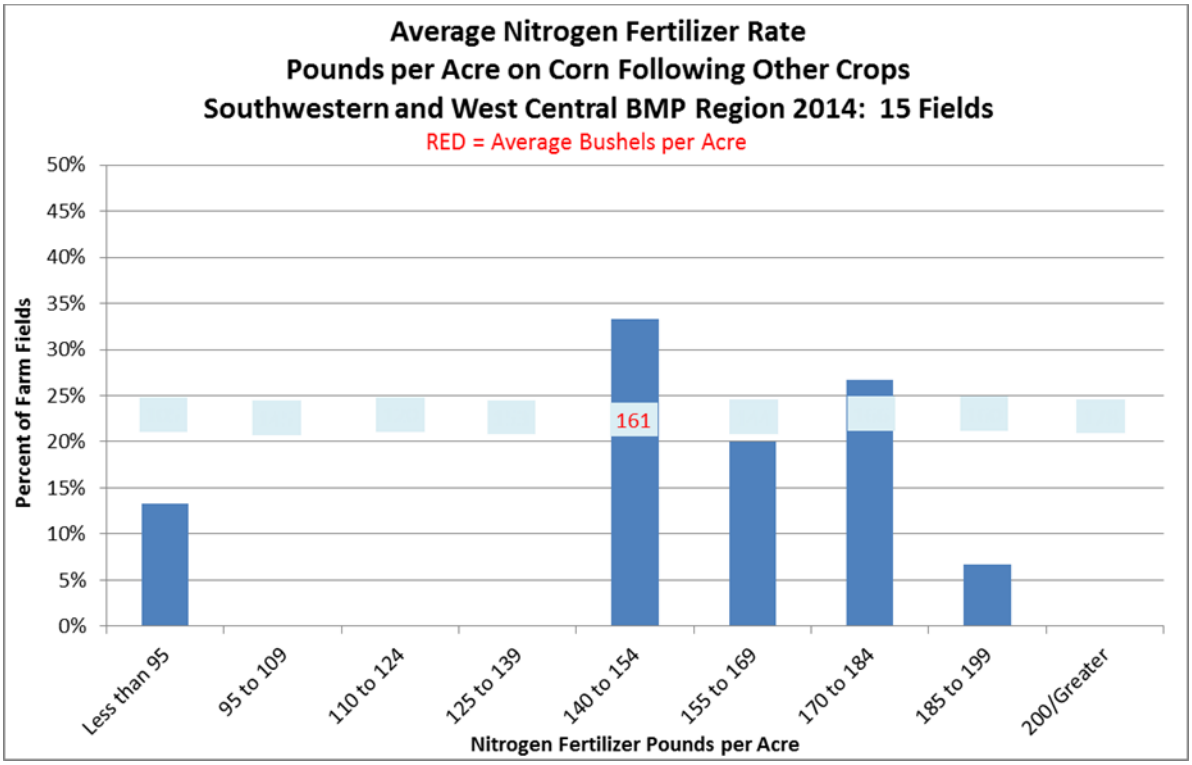


Figure 13. Average nitrogen fertilizer rates and yields on corn following other crops in the SW BMP region for 2014: 15 fields.

No counties had five or more responses in the SW BMP region.

Manure section

Table 5 details the percentage of respondents on if the farmer knew the amount of nitrogen that is in the manure applied for the 2014 corn crop.

Table 5. The farmers' knowledge of nitrogen content of manure being applied for the 2014 corn crop.

BMP Region	Knowledge of the Actual Amount of Nitrogen Applied	Percentage of Respondents
Southwestern and West Central	Yes	37
Southwestern and West Central	No	63
South Central	Yes	38
South Central	No	62

§ Percent was calculated using only those respondents who answered yes or no to the question.

Table 6 details the nitrogen rates and corn yields in the Southwestern and West Central and South Central BMP regions on corn following various crops. These are corn fields applied with manure and commercial nitrogen fertilizer.

Table 6. Average amount of nitrogen applied from manure and commercial nitrogen fertilizer and corresponding corn yields to previous crops by BMP region.

BMP Region	Previous Crop	Average Nitrogen Rate from Manure Only or Manure with Commercial Fertilizer Pounds per Acre	Average Corn Yield Bushels per Acre
Southwestern and West Central	Soybeans	166	178
Southwestern and West Central	Corn	170	182
Southwestern and West Central	Corn/Alfalfa	**	**
Southwestern and West Central	Small Grains	**	**
Southwestern and West Central	Other	**	**
South Central	Soybeans	167	178
South Central	Corn	176	179
South Central	Corn/Alfalfa	**	**
South Central	Small Grains	**	**
South Central	Other	**	**

** Less than five responses

Table 7 details the total amount of nitrogen applied to fields from both manure and commercial nitrogen.

Table 7. Average amount of nitrogen applied to fields from both commercial fertilizer and manure.

BMP Region	Main Source of Manure	Average Nitrogen Rate from Manure and Commercial Fertilizer Pounds per Acre
Southwestern and West Central	All	180
Southwestern and West Central	Dairy	159
Southwestern and West Central	Beef	198
Southwestern and West Central	Hog	179
Southwestern and West Central	Poultry	**
Southwestern and West Central	Other	**
South Central	All	188
South Central	Dairy	178
South Central	Beef	185
South Central	Hog	**
South Central	Poultry	208
South Central	Other	180

Pesticide Section

Table 8. Pesticide applications and rates for corn – PMR 7

Agricultural Chemical (a.i.)	Planted Acres Treated *Percent*	Average Applications *Number*	Average Rate Per Application *Pounds per Acre* (a.i.)	Average Rate Per Crop Year *Pounds per Acre* (a.i.)	Total Applied Per Crop Year *Total Pounds* (a.i.)
Herbicide					
Acetochlor	75	1.0	1.33	1.33	741,593
Atrazine	17	1.0	0.73	0.73	95,038
Clopyralid	63	1.0	0.10	0.10	48,767
Dicamba	6	1.0	0.22	0.22	10,145
Diflufenzopyr	5	1.0	0.05	0.05	2,094
Dimethenamid-p	10	1.0	0.63	0.63	45,895
Flumetsulam	34	1.0	0.03	0.03	7,945
Glufosinate-ammonium	4	1.1	0.44	0.50	13,365
Glyphosate	68	1.1	1.06	1.15	587,083
Mesotrione	59	1.0	0.14	0.14	61,557
S-metolachlor	13	1.0	1.22	1.22	116,564
Tembotrione	5	1.0	0.08	0.08	3,151
Topramezone	6	1.0	0.01	0.01	682
Insecticide					
Bifenthrin	9	1.0	0.03	0.03	2,007
Chlorpyrifos	4	1.0	0.28	0.28	7,900
Fungicide					
Azoxystrobin	6	1.0	0.08	0.08	3,674
Propiconazole	7	1.0	0.08	0.08	3,933

Herbicides applied but not published included the following: 2,4-D, Bicyclopyrone, Rimsulfuron, Saflufenacil, and Thiencarbazone-methyl.

Insecticides applied but not published included the following: Chlorethoxyfos, Cyfluthrin, Lambda-cyhalothrin, Tebupirimphos, Tefluthrin, and Thiamethoxam.

Fungicides applied but not published included the following: Benzovindiflupyr, Fluxapyroxad, Prothioconazole, Pyraclostrobin, and Trifloxystrobin.

Table 9. Pesticide applications and rates for corn – PMR 8

Agricultural Chemical (a.i.)	Planted Acres Treated *Percent*	Average Applications *Number*	Average Rate Per Application *Pounds per Acre* (a.i.)	Average Rate Per Crop Year *Pounds per Acre* (a.i.)	Total Applied Per Crop Year *Total Pounds* (a.i.)
Herbicide					
Acetochlor	66	1.0	1.16	1.16	2,236,409
Atrazine	17	1.0	0.48	0.48	243,086
Bicyclopyrone	8	1.0	0.04	0.04	8,209
Clopyralid	46	1.0	0.10	0.10	130,939
Dicamba	5	1.0	0.20	0.20	30,129
Diflufenzopyr	4	1.0	0.04	0.04	5,362
Dimethenamid-p	13	1.0	0.56	0.56	215,007
Flumetsulam	28	1.0	0.03	0.03	24,414
Glufosinate-ammonium	7	1.0	0.47	0.48	96,888
Glyphosate	70	1.1	1.00	1.09	2,218,988
Mesotrione	55	1.0	0.12	0.12	187,014
S-metolachlor	29	1.0	1.07	1.07	888,927
Saflufenacil	9	1.0	0.06	0.06	14,804
Tembotrione	25	1.0	0.08	0.08	59,387
Thiencarbazone-methyl	1	1.0	0.01	0.01	357
Topramezone	3	1.0	0.02	0.02	1,433
Insecticide					
Bifenthrin	8	1.0	0.07	0.07	16,427
Chlorpyrifos	7	1.0	0.26	0.26	50,767
Lambda-cyhalothrin	1	1.0	0.02	0.02	686
Tefluthrin	3	1.0	0.13	0.13	10,829
Fungicide					
Azoxystrobin	3	1.0	0.11	0.11	9,023
Benzovindiflupyr	3	1.1	0.03	0.04	3,133
Metconazole	5	1.0	0.03	0.03	4,478
Propiconazole	4	1.0	0.10	0.10	10,858
Prothioconazole	4	1.0	0.11	0.11	14,141
Pyraclostrobin	6	1.0	0.11	0.11	17,855
Trifloxystrobin	4	1.0	0.08	0.08	10,203

Herbicides applied but not published included the following: 2,4-D, Flumioxazin, Isoxaflutole, Metribuzin, Nicosulfuron, Primisulfuron, Pyroxasulfone, and Quizalofop.

Insecticides applied but not published included the following: Beta-cyfluthrin, Cyfluthrin, Tebupirimphos, Terbufos, and Zeta-cypermethrin.

Fungicides applied but not published included the following: Chlorothalonil, Cyproconazole, Fluxapyroxad, and Picoxystrobin.

Table 10. Pesticide applications and rates for soybeans – PMR 7

Agricultural Chemical (a.i.)	Planted Acres Treated *Percent*	Average Applications *Number*	Average Rate Per Application *Pounds per Acre* (a.i.)	Average Rate Per Crop Year *Pounds per Acre* (a.i.)	Total Applied Per Crop Year *Total Pounds* (a.i.)
Herbicides					
Acetochlor	5	1.0	1.25	1.25	36,239
Clethodim	4	1.1	0.10	0.11	2,648
Cloransulam	42	1.0	0.02	0.02	5,272
Dicamba	14	1.0	0.50	0.50	42,597
Dimethenamid-p	4	1.0	0.43	0.43	10,603
Fluazifop	15	1.0	0.06	0.06	5,529
Fomesafen	28	1.0	0.20	0.20	33,066
Glufosinate-ammonium	28	1.1	0.45	0.48	81,614
Glyphosate	57	1.1	1.01	1.17	402,046
Imazethapyr	12	1.0	0.04	0.04	3,059
Metribuzin	13	1.2	0.18	0.21	16,337
Pyroxasulfone	7	1.0	0.11	0.11	4,232
S-metolachlor	10	1.1	1.15	1.26	72,356
Saflufenacil	6	1.0	0.03	0.03	1,062
Sulfentrazone	48	1.0	0.16	0.16	46,092

Herbicides applied but not published included the following: 2,4-D, Acifluorfen, Chlorimuron, Flumioxazin, Fluthiacet-methyl, Lactofen, Metolachlor, Pendimethalin, Thifensulfuron, and Trifluralin.

Insecticides applied but not published included the following: Bifenthrin, Chlorpyrifos, Imidacloprid, Lambda-cyhalothrin, Permethrin, and Zeta-cypermethrin.

Fungicide applied but not published included the following: Cyproconazole, Difenoconazole, Fluxapyroxad, Picoxystrobin, Propiconazole, Prothioconazole, Pyraclostrobin, Tetraconazole, and Trifloxystrobin.

Table 11. Pesticide applications and rates for soybeans – PMR 8

Agricultural Chemical (a.i.)	Planted Acres Treated *Percent*	Average Applications *Number*	Average Rate Per Application *Pounds per Acre* (a.i.)	Average Rate Per Crop Year *Pounds per Acre* (a.i.)	Total Applied Per Crop Year *Total Pounds* (a.i.)
Herbicides					
2,4-D	3	1.0	0.82	0.82	54,014
Acetochlor	12	1.0	0.95	0.95	259,576
Clethodim	11	1.0	0.13	0.14	35,498
Cloransulam	32	1.0	0.02	0.02	14,890
Dicamba	31	1.0	0.49	0.50	364,023
Dimethenamid-p	8	1.0	0.37	0.38	67,609
Fluazifop	3	1.0	0.07	0.07	4,791
Fomesafen	30	1.1	0.18	0.19	130,280
Glufosinate-ammonium	22	1.0	0.52	0.54	280,686
Glyphosate	71	1.2	0.93	1.13	1,880,890
Imazethapyr	13	1.0	0.05	0.06	17,557
Lactofen	3	1.0	0.12	0.13	9,293
Metolachlor	2	1.2	1.14	1.41	60,268
Metribuzin	11	1.0	0.25	0.25	62,296
Pyroxasulfone	6	1.0	0.11	0.11	15,884
S-metolachlor	17	1.0	1.21	1.26	508,945
Saflufenacil	15	1.0	0.03	0.03	10,300
Sulfentrazone	34	1.0	0.16	0.16	129,014
Insecticides					
Bifenthrin	4	1.0	0.06	0.06	5,176
Chlorpyrifos	15	1.0	0.44	0.45	154,899
Lambda-cyhalothrin	6	1.0	0.02	0.02	3,106
Thiamethoxam	1	1.0	0.03	0.03	772
Fungicides					
Azoxystrobin	5	1.0	0.09	0.09	9,508
Benzovindiflupyr	2	1.0	0.03	0.03	1,122
Fluxapyroxad	2	1.0	0.06	0.06	2,538
Picoxystrobin	1	1.0	0.09	0.09	1,756
Propiconazole	5	1.0	0.09	0.09	11,698
Prothioconazole	12	1.0	0.10	0.10	28,922
Pyraclostrobin	3	1.0	0.10	0.10	8,178
Trifloxystrobin	8	1.0	0.07	0.07	14,698

Herbicides applied but not published included the following: Acifluorfen, Bentazon, Chlorimuron, Fenoxaprop, Flumioxazin, Fluthiacet-methyl, Imazamox, Pendimethalin, Quizalofop, Thifensulfuron, and Trifluralin.

Insecticides applied but not published included the following: Beta-cyfluthrin, Cyfluthrin, Esfenvalerate, Gamma-cyhalothrin, and Imidacloprid.

Fungicide applied but not published included the following: Boscalid, Cyproconazole, Difenoconazole, Metconazole, Tetraconazole, and Thiophanate-methyl.

No data is published for pesticide applications and rates on wheat in PMR 7.

Table 12. Pesticide applications and rates for wheat – PMR 8

Agricultural Chemical (a.i.)	**Surveyed Area Applied** ***Percent***	**Average Applications** ***Number***	**Average Rate Per Application** ***Pounds per Acre*** (a.i.)	**Average Rate Per Crop Year** ***Pounds per Acre*** (a.i.)	**Total Applied Per Crop Year** ***Total Pounds*** (a.i.)[1]
Herbicides					
Fluroxypyr	55	1.0	0.08	0.08	37
MCPA	49	1.0	0.35	0.35	144
Fungicides					
Pyraclostrobin	26	1.0	0.07	0.07	16

Herbicides applied but not published included the following: 2,4-D, Bromoxynil, Clopyralid, Fenoxaprop, Glyphosate, Pyrasulfotole, Triencarbazone-methyl.

Insecticides applied but not published included the following: Lambda-cyhalothrin.

Fungicides applied but not published included the following: Azoxystrobin, Propiconazole, and Trifloxystrobin.

Table 13. Pesticide applications and rates for hay by active ingredient – PMR 7

Active Ingredient	**Planted Acres Treated** ***Percent***	**Average Applications** ***Number***	**Average Rate Per Application** ***Pounds per Acre***	**Average Rate Per Crop Year** ***Pounds per Acre***	**Total Applied Per Crop Year** ***Total Pounds***
Herbicide					
Glyphosate	7	1.0	1.12	1.12	2,581
Insecticide					
Lambda-cyhalothrin	4	1.4	0.03	0.04	45

Herbicides applied but not published included the following: 2,4-D and Picloram.

Insecticides applied but not published included the following: Chlorpyrifos and Gamma-Cyhalothrin.

Table 14. Pesticide applications and rates for hay – PMR 8

Agricultural Chemical (a.i.)	**Surveyed Area Applied** ***Percent***	**Average Applications** ***Number***	**Average Rate Per Application** ***Pounds per Acre*** (a.i.)	**Average Rate Per Crop Year** ***Pounds per Acre*** (a.i.)	**Total Applied Per Crop Year** ***Total Pounds*** (a.i.)[1]
Insecticides					
Chlorpyrifos	7	1.0	0.47	0.47	307
Lambda-cyhalothrin	3	1.2	0.02	0.03	7

Herbicides applied but not published included the following: 2,4-D, Clethodim, and Imazethapyr.

Insecticides applied but not published included the following: Cyfluthrin and Permethrin.

Fungicides applied but not published included the following: Azoxystrobin.

DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

June 16, 2023

Kerry Netzke
RCRCA
1424 East College Drive, Suite 300
Marshall, MN 56258
Kerry.netzke@rcrca.com

Subject: Initial Comment Letter – *Cottonwood-Middle Minnesota River 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 Cottonwood-Middle Minnesota River Watershed Planning Area. Our agency looks forward to working closely with the local government units, stakeholders, and other agency partners on this watershed planning initiative.

The Minnesota Department of Health's (MDH) mission is to protect, maintain, and improve the health of all Minnesotans. An important aspect to protecting citizens health is the protection of drinking water sources. MDH is the agency responsible for implementing programs under the federal Safe Drinking Water Act (SDWA).

Source Water Protection (SWP) is the framework MDH uses to protect drinking water sources. The broad goal of SWP in Minnesota is to protect and prevent contamination of public and private sources of groundwater and surface water sources of drinking water using best management practices and local planning. Core MDH programs relevant to watershed planning are the State Well Code (MR 4725), Wellhead Protection (MR 4720) and surface water / intake protection planning resulting in a strong focus in groundwater management and protecting drinking water sources.

One of the three high level state priorities in Minnesota's Nonpoint Priority Funding Plan is to "Restore and protect water resources for public use and public health, including drinking water" which aligns with our agency's mission and recommendations to your planning process.

MDH Priority Concerns:

Prioritize Drinking Water Supply Management Areas (DWSMA) in the Cottonwood-Middle Minnesota River 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.

Support the implementation of Mankato's Surface Water Intake Protection Plan.

Surface water based drinking water systems are highly susceptible to potential contamination. Recognizing those surface water bodies that are sources of drinking water in the watershed is very important.

Approximately 70% of Mankato's drinking water is supplied by two shallow Ranney wells that draw water from the Minnesota and Blue Earth Rivers. Source water to these wells is considered to be groundwater under the direct influence of surface water, filtered through the riverbed sediments with a very short time-of-travel. Mankato well 13 sits at the confluence of the Blue Earth and Minnesota Rivers. Well 15 is directly adjacent to the Minnesota River. Nitrate concentrations in Mankato Ranney Wells has previously reached levels of concern. Portions of the Mankato Drinking Water Supply Management Area-Surface Water (DWSMA-SW) and the Spill Management Area (SPA) are within the Cottonwood – Middle Minnesota Watershed planning area. Local partners may consider focusing nitrogen BMPs in the Mankato DWSMA-SW due to the mutual benefits of protecting drinking water supplies.

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 Cottonwood-Middle Minnesota River Watershed rely on a private well for the water they drink. However, no public entity is responsible for water testing or management of a private well after drilling is completed. Local governments are best equipped to assist private landowners through land use management and ordinance development, which can have the greatest impact on protecting private wells. Other suggested activities to protect private wells include: hosting well testing or screening clinics, providing water testing kits, working with landowners to better manage nutrient loss, promoting household hazardous waste collection, managing storm water runoff, managing septic systems, and providing best practices information to private well owners.

Approximately 21% of the 576 arsenic samples taken from wells in the Cottonwood-Middle Minnesota River 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 Cottonwood-Middle Minnesota River 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 contaminants, 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 Cottonwood-Middle Minnesota River Watershed. GRAPS will provide information and strategies on groundwater and drinking water supplies to help inform the local decision making process of the 1W1P. Information in a GRAPS Report can be used to identify risks to drinking water from different land uses. Knowing the risks to drinking water in a specific area allows targeting of specific activities.

- Prioritize Actions Identified in the Groundwater Restoration and Protection Strategies (GRAPS) report.

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, 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
Dereck Richter, MDH Source Water Protection Unit
Danielle Nielsen, MDH Source Water Protection Unit
John Shea, BWSR Board Conservationist
Mark Hiles, BWSR Clean Water Specialist
Kyle Jarcho, DNR
Michael Weckwerth, MPCA
Bryan Spindler, MPCA
Kevin Hauth, MDA

MDH Data and information:

- Drinking Water Statistics – Where do people get their drinking water in the Cottonwood-Middle Minnesota River 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 Cottonwood-Middle Minnesota River Watershed. This information can help you understand the ease with which recharge and contaminants from the ground surface may be transmitted into the Cottonwood-Middle 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 "Primary Aquifers by Section" in the Cottonwood-Middle Minnesota River Watershed. This data source displays the general distribution of aquifer use in the watershed, signaling where drinking water is at greatest risk to contaminants from the ground surface. This information allows for targeting of implementation activities to the sources of water people are drinking.
- A figure detailing "Nitrate Results" in the Cottonwood-Middle Minnesota River Watershed. This information can help you understand which wells in the watershed contain elevated nitrate levels.
- A figure detailing "Arsenic Results" in the Cottonwood-Middle Minnesota River Watershed. This information can help you understand which wells in the watershed contain elevated arsenic levels.
- A figure detailing "DWSMA Vulnerability" in the Cottonwood-Middle Minnesota River Watershed. This information can help you understand DWSMA vulnerability to contamination from the ground surface. This figure allows for targeting of implementation activities for public water suppliers.

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

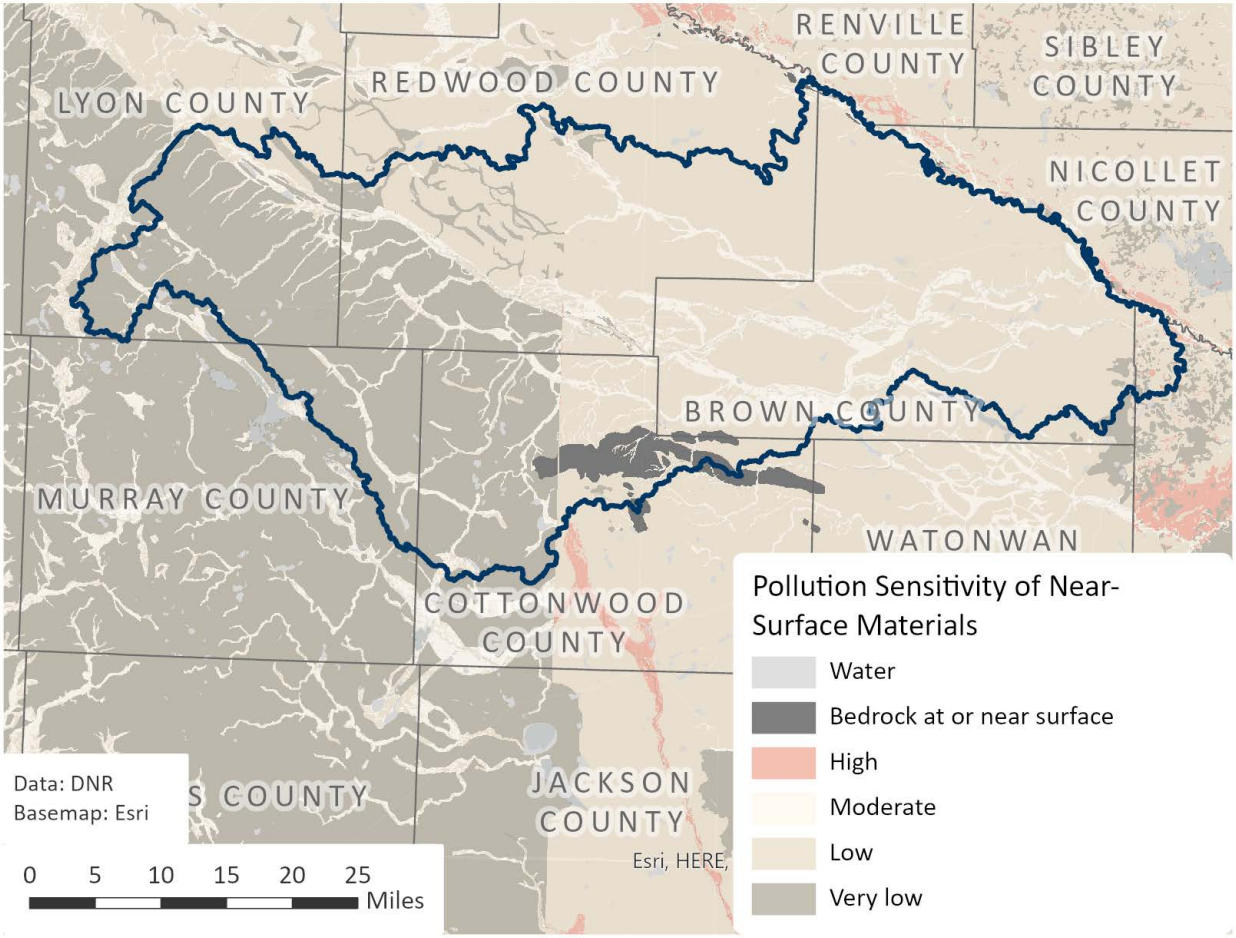
Source Water Risk	Name	County	Watershed	Subwatershed	Drinking Water Source	WHP/Surface Intake Plan	DWSMA Vulnerability/ Surface Water Source	Drinking Water Protection Notes
Very high potential contaminant risk due to surface water source and/or connection with surface water - Focus on impacts from land use practices and surface water runoff								
	Mankato	Multiple	Cottonwood and Middle MN	Multiple	Surface Water	SWIPP	High-Minnesota River	Concerns with nitrate
	Red Rock Rural Water-Lake Augusta and Jeffers	Cottonwood	Cottonwood	Augusta Lake	Groundwater	WHP Plan	High GW/High SWCA	On edge of watershed
High potential contaminant risk - Focus on potential land use contaminant sources that may impact water quality								
	Marshall-Marshall Wellfield	Lyon	Cottonwood	Lake Marion	Groundwater	WHP Plan	High	
	Marshall-Dudley Wellfield	Lyon	Cottonwood	Meadow Creek	Groundwater	WHP Plan	High	
	Comfrey	Brown and Cottonwod	Middle MN	Co Ditch 28-1	Groundwater	WHP Plan	Moderate	
	Lamberton	Redwood	Cottonwood	Lower Dutch Charley Creek, Lamberton	Groundwater	WHP Plan	Moderate	
	Lucan	Redwood	Cottonwood	Headwaters Sleepy Eye Creek	Groundwater	No WHP Plan Yet	Anticipate Low	On edge of watershed
	New Ulm	Brown	Cottonwood	Cottonwood, Huelskamp Creek	Groundwater	WHP Plan	Moderate/Low	
	Sleepy Eye-East	Brown	Cottonwood	Co Ditch 1, JD 30	Groundwater	WHP Plan	High/Moderate	
	Sleepy Eye-West	Brown	Cottonwood	JD 30	Groundwater	WHP Plan	Moderate/Low	
	Springfield	Brown	Cottonwood	Springfield	Groundwater	WHP Plan	Moderate	
	Balaton	Lyon	Cottonwood	Rock Lake	Groundwater	WHP Plan	High/Moderate	On edge of watershed

Source Water Risk	Name	County	Watershed	Subwatershed	Drinking Water Source	WHP/Surface Intake Plan	DWSMA Vulnerability/ Surface Water Source	Drinking Water Protection Notes
Low potential contaminant risk - Focus on sealing of unused wells and old public water supply wells (funding available from MDH)								
	Clemens	Redwood	Cottonwood	Co Ditch 24, 38	Groundwater	WHP Plan	Low	Two DWSMAs
	Cobden	Brown	Cottonwood	JD 30, Sleepy Eye Creek	Groundwater	WHP Plan	Low	
	Hanska	Brown	Middle MN	Morgan Creek	Groundwater	WHP Plan	Low	
	Sanborn	Redwood	Cottonwood	Coal Mine Creek, Sanborn	Groundwater	WHP Plan	Low	
	Skyview Mobile Home Park	Brown	Middle MN	Cottonwood, Courtland	Groundwater	WHP Action Plan	Low	Community, Non-municipal
	Tracy	Lyon	Cottonwood	JD 9, 20A, 22, Lone Tree Creek	Groundwater	WHP Plan	Low	
	Wabasso	Redwood	Cottonwood	Daubs Creek	Groundwater	No WHP Plan Yet	Anticipate Low	
	Walnut Grove	Redwood	Cottonwood	Plum Creek, Pell Creek	Groundwater	WHP Plan	Low	
	Wanda	Redwood	Cottonwood	Coal Mine Creek, Co Ditch 54	Groundwater	No WHP Plan Yet	Anticipate Low	
	Westbrook	Cottonwood	Cottonwood	Upper Dutch Charley Creek, Upper Highwater Creek	Groundwater	WHP Plan	Low	
	Morgan	Redwood	Middle MN	Co Ditch 109, Spring Creek, JD 17	Groundwater	WHP Plan	Low	On edge of watershed

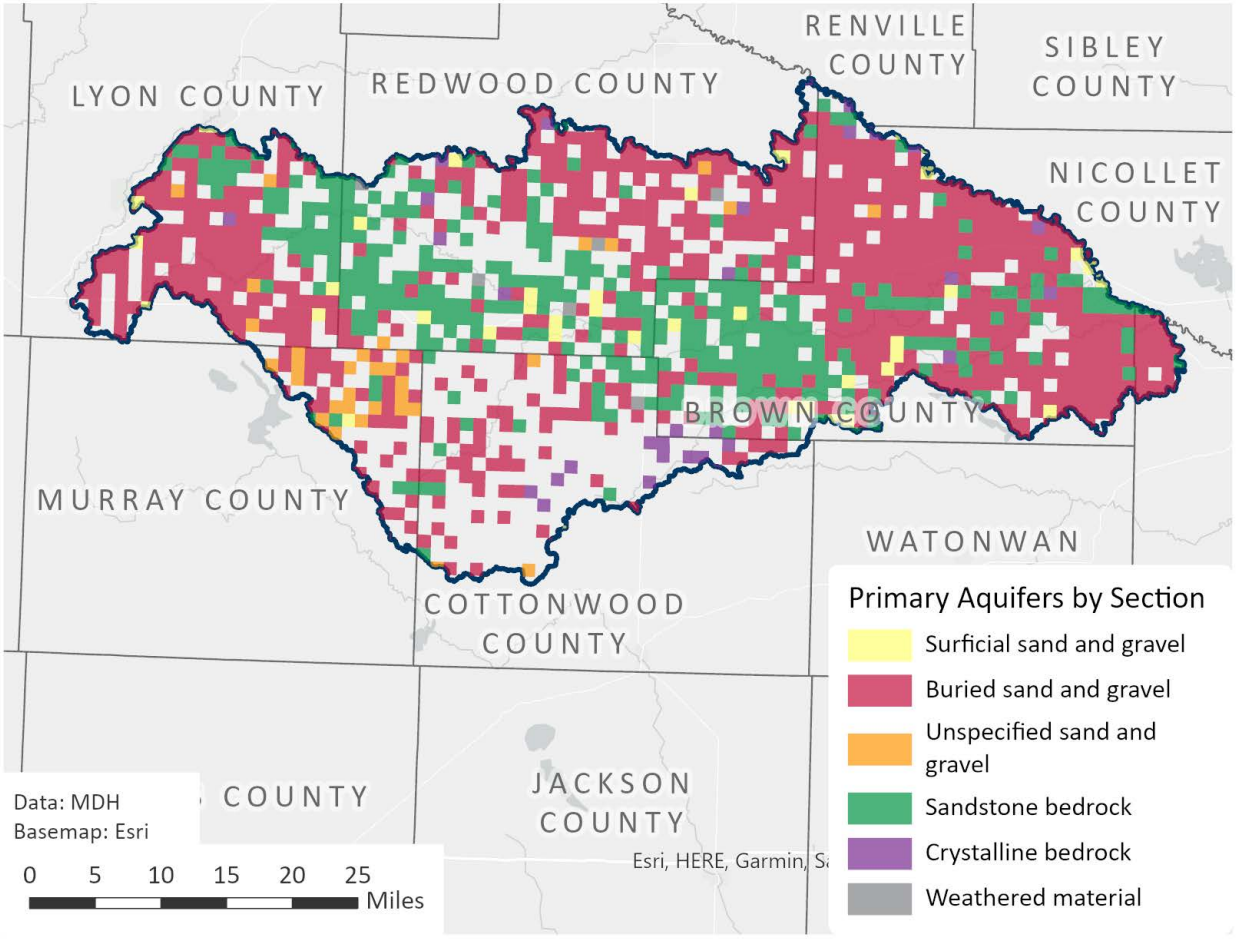
21 Non-Community Public Water Suppliers in Cottonwood and 10 Non-Community Public Water Suppliers in Middle Minnesota

Acronyms:
SWCA=Surface Water Contribution Area
DWSMA=Drinking Water Supply Management Area
WHP=Wellhead Protection
SWIPP=Surface Water Intake Protection Plan

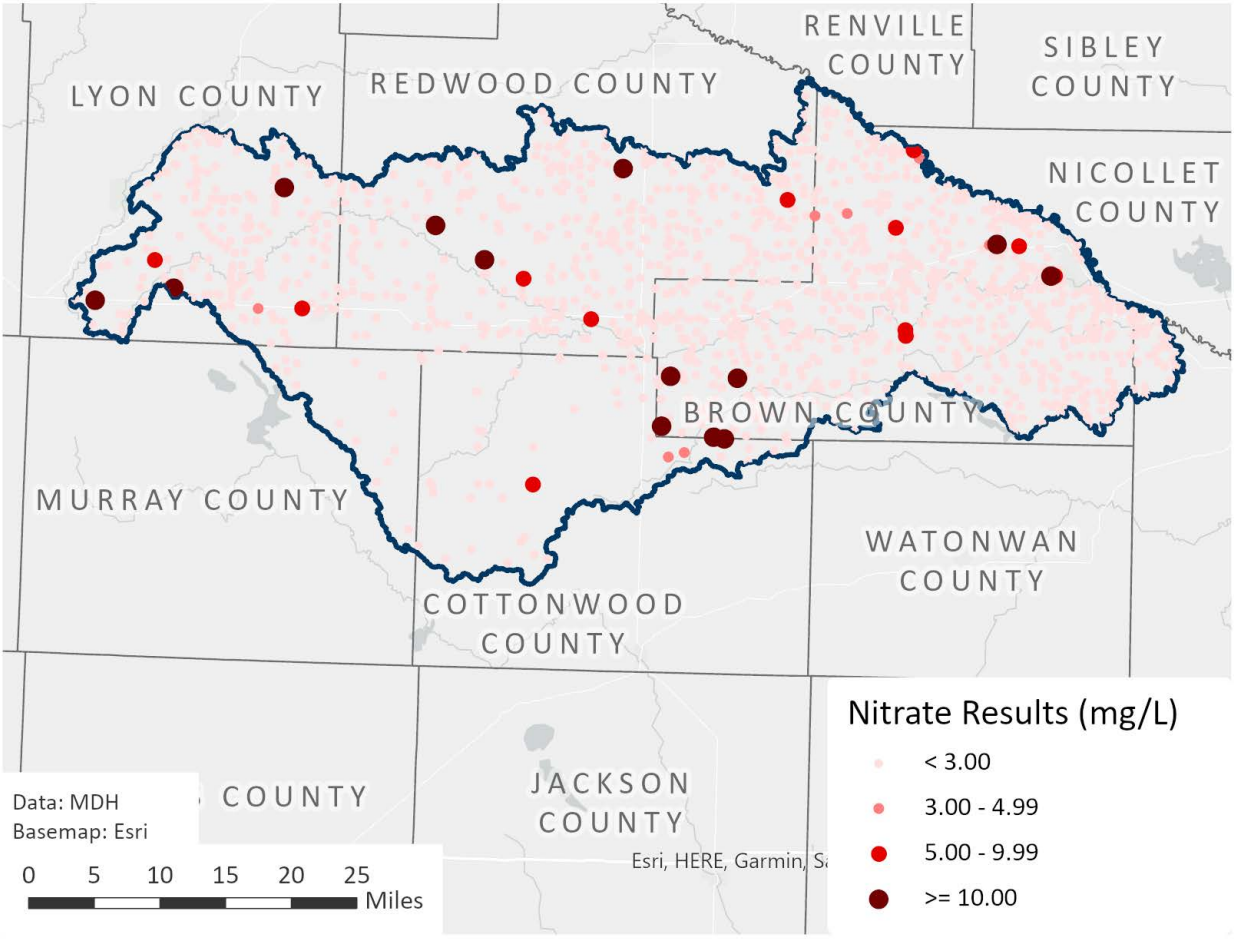
Pollution Sensitivity of Near-Surface Materials



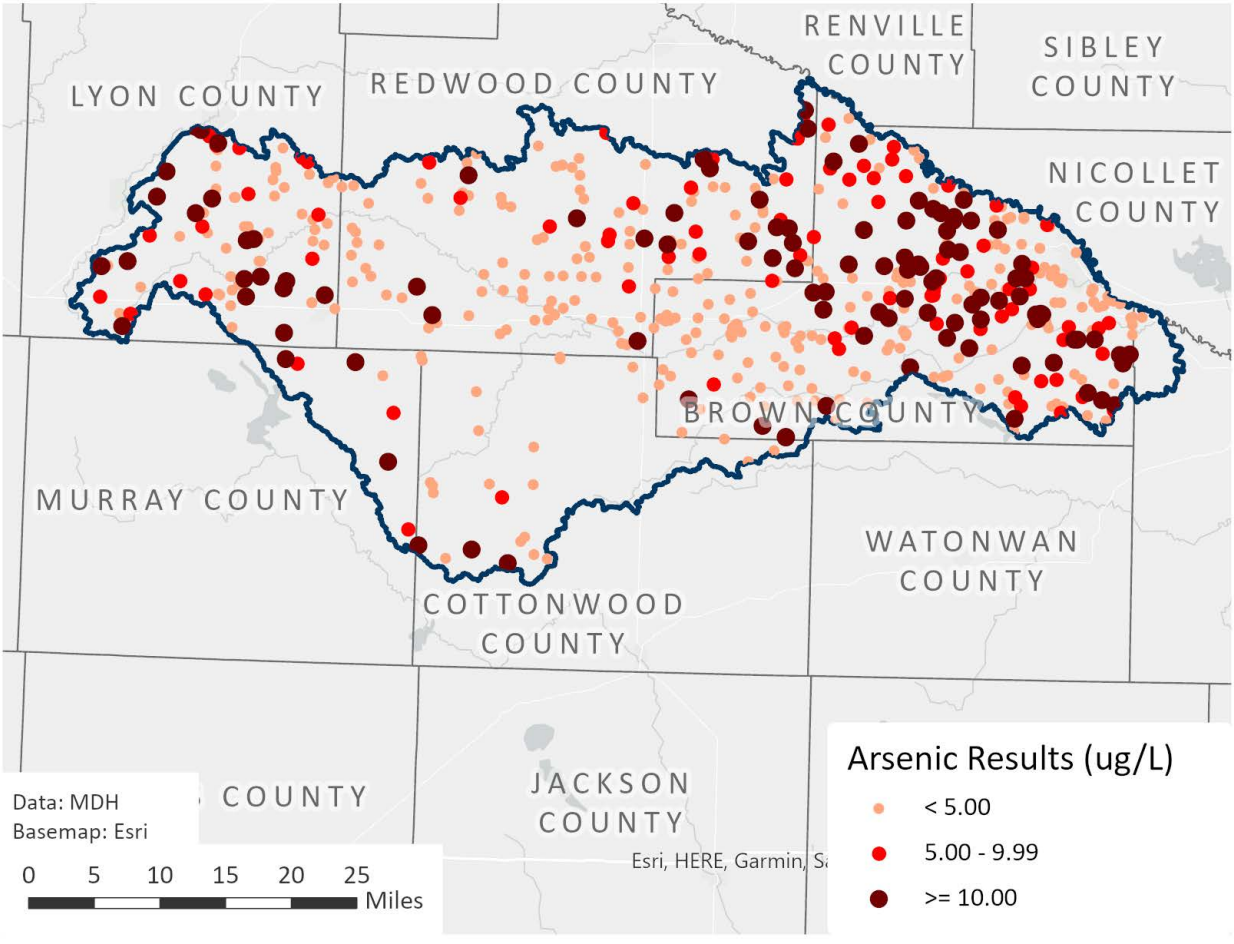
Drinking Water Aquifers



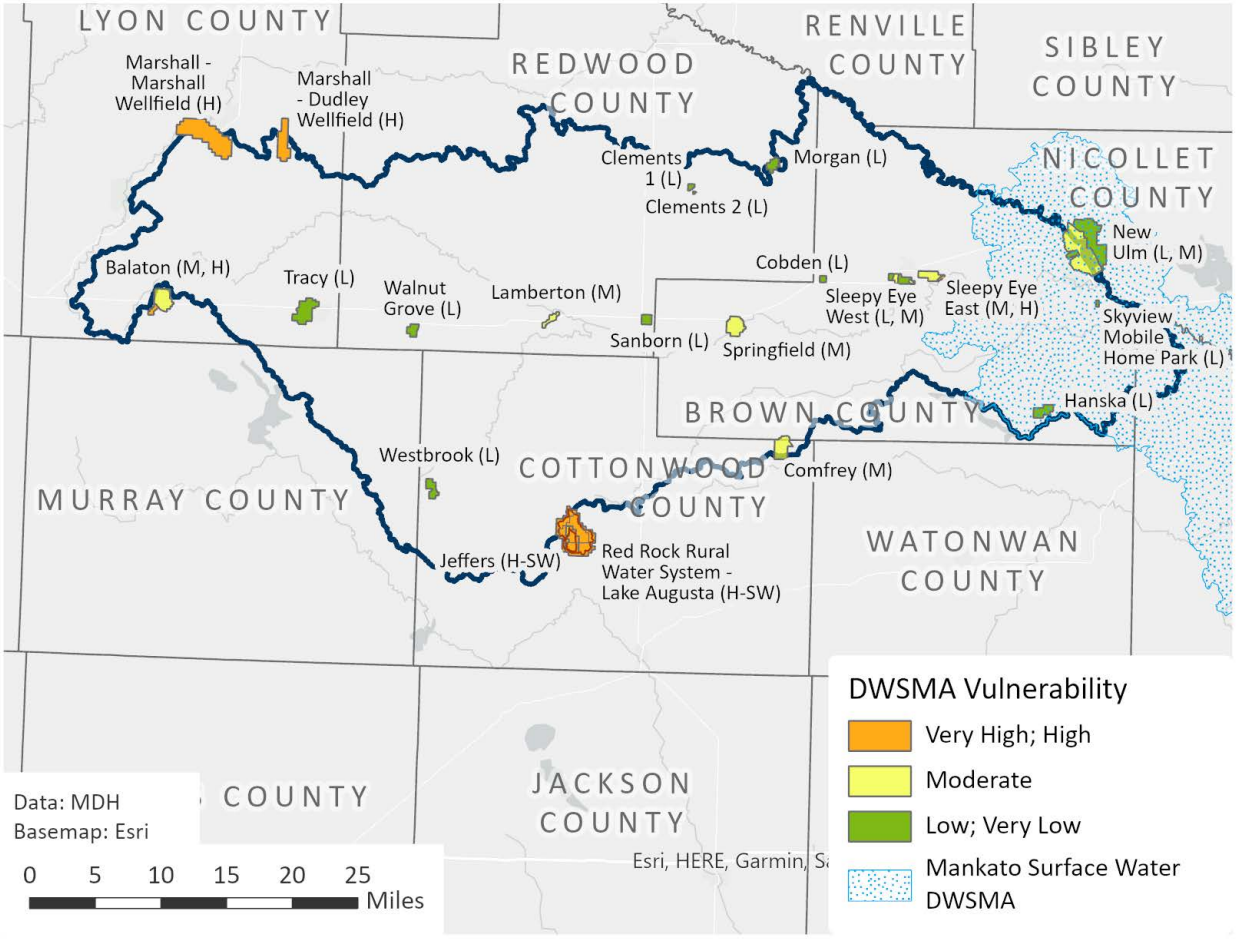
Nitrate Results (maximum recorded)



Arsenic Results (maximum recorded)



DWSMA Vulnerability



MINNESOTA POLLUTION CONTROL AGENCY

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

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June 20, 2023

Kerry Netzke
RCRCA Executive Director
1434 E College Dr, Ste 300
Marshall, MN 56258
kerry.netzke@rcrca.com

RE: Response to Request for Priority Issues and Concerns to be addressed in the Cottonwood River - Middle Minnesota River, One Watershed One Plan

Dear Kerry:

The Minnesota Pollution Control Agency (MPCA) appreciates the opportunity to provide priority resource concerns and issues for consideration in the Cottonwood River - Middle Minnesota River (CMM), One Watershed, One Plan (1W1P). Our priority resource concerns and issues focus primarily on information available through the Watershed Approach process for the Cottonwood River that began in 2017 and in 2013 for the Middle Minnesota River portion. A list of the available reports, studies, technical information, data, and other relevant supporting documents from this process and prior watershed work is included below.

The MPCA and other state agencies coordinated with local partners to gather, analyze, and summarize information to develop the Watershed Restoration and Protection Strategies (WRAPS) report for the entire CMM. The following pages provide a summary of available information from the watershed process that includes the CMM planning area. The MPCA requests you consider this information during development of the 1W1P.

Background Information

The State of Minnesota employs a watershed approach to restore and protect Minnesota's rivers, lakes, and wetlands. The watershed approach includes the following processes that can be used to inform water planning:

1. Watershed monitoring and assessment
2. Stressor identification (SID) of biological impairments
3. Total Maximum Daily Loads (TMDLs)
4. WRAPS

The following pages provide a brief description of these processes and internet links for the reports associated with these efforts in the CMM.

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 inform water quality assessment and create a long-term data set to track progress toward water quality goals. These programs will continue to collect and analyze data in the CMM as part of Minnesota's Water Quality Monitoring Strategy. Intensive Watershed Monitoring (IWM), the Watershed Pollutant Load Monitoring Network (WPLMN) and Volunteer Stream and Lake Monitoring Program (VSMP and VLMP) data represent water quality conditions throughout the watershed at different scales and rigor.

In 2013, monitoring and assessment of surface water bodies began in the Minnesota River- Mankato Watershed for aquatic life, recreation, and fish consumption use support. For details on the data collected, refer to the Minnesota River- Mankato Watershed Monitoring and Assessment Report.

For more information about the Minnesota River- Mankato Watershed and links to reports visit:

Minnesota River - Mankato | Minnesota Pollution Control Agency.

In 2017, a comprehensive approach was taken to monitor and assess surface water bodies in the Cottonwood River Watershed for aquatic life, recreation, and fish consumption use support. For details on the data collected, refer to the Cottonwood River Watershed Monitoring and Assessment Report.

For more information about the Cottonwood River and links to reports visit:

Cottonwood River | Minnesota Pollution Control Agency.

Within the Cottonwood River Watershed, there are 73 impairment listings. For the CMM planning area of the Minnesota River- Mankato Watershed there are 32 impairments. Table 1 summarizes the listings by impairment type. See the 2022 Impaired Waters List for details.

Table 1. Summary of water quality impairments for the CMM Planning Area.

Impairment Type	Cottonwood River Listings	Middle Minnesota River Listings	Beneficial Use
Turbidity; Total Suspended Solids	10	2	Aquatic Life
Fecal Coliform; *E. coli*	8	9	Aquatic Recreation
Aquatic Macro-invertebrate bio assessment	25	11	Aquatic Life
Fish bio assessment	14	9	Aquatic Life
Lake; Nutrient/eutrophication	7	0	Aquatic Recreation
River Eutrophication	0	0	Aquatic Life
Nitrate (Drinking Water)	0	1	Aquatic Consumption
Mercury in fish tissue	9	0	Aquatic Consumption

Stressor Identification

SID is performed on biological impairments to determine what pollutant and nonpollutant stressors are causing impairments to the aquatic biological community. The process is described in more detail and documented in the Cottonwood River Watershed Streams Stressor Identification Report and the Minnesota River - Mankato Stressor Identification Report for the reaches listed for aquatic life impairments (fish, aquatic macro-invertebrate impairments). SID was completed on 30 water bodies for biota (fish and/or macroinvertebrates) impairments in the Cottonwood River Watershed. In the CMM planning area of the Middle Minnesota Watershed, 14 reaches were investigated for SID. A table of stressors for each stream reach is also available in the respective stream reach sections of the reports listed above. In the studies, primary stressors are identified as summarized in Table 2.

Table 2. Stressor identification summary for the aquatic life impaired streams in the CMM area.

Stressor	Number of Cottonwood River Reaches	Number of Middle Minnesota River Reaches
Altered hydrology/connectivity	21	12
Poor Habitat	28	5
Low Dissolved Oxygen	4	2
Eutrophication	11	2
High turbidity/TSS	5	4
High Nitrates	5	7
Water temperature	0	1

Total Maximum Daily Loads

The Clean Water Act requires that TMDLs be developed for waters that do not support their designated uses. A TMDL essentially provides the allowable pollutant loading, as well as needed reductions, to attain and maintain water quality standards in waters that are not currently meeting standards. Some impaired water bodies in the CMM area were covered under Minnesota River Basin TMDL studies completed in 2019 and 2020. Following assessment of the watershed during the watershed approach, TMDL studies were completed for impairments on water bodies for the entire Minnesota River – Mankato Watershed and Cottonwood River Watersheds.

The TMDL reports containing impaired waterbodies and pollutant reductions are found here:

Basin-wide

Minnesota River and Greater Blue Earth River Basin TMDL for TSS

Minnesota River Bacteria TMDL and Strategies Report

Cottonwood River TMDL

Final Cottonwood River Watershed Total Maximum Daily Load Report

Minnesota River – Mankato TMDL

Minnesota River - Mankato Watershed TMDL Report

WRAPS

In each cycle of the watershed approach, rivers, lakes, and wetlands across the watershed are monitored and assessed, WRAPS and local plans are developed, and conservation practices are implemented. Much of the information presented in the WRAPS report was synthesized from the Monitoring and Assessment, SID, and TMDL reports. However, the WRAPS report presents additional data and analyses including watershed-scale models and tools, detailed analyses and output from these work products, and a set of potential strategies for point and nonpoint source pollution that will cumulatively achieve, or otherwise make significant progress toward, water quality targets. To ensure the WRAPS strategies and other analyses appropriately represent the Cottonwood and Minnesota River-Mankato Watersheds, local county, SWCD staff, and state natural resource and conservation professionals (referred to as the WRAPS Feedback Group) were convened to inform the report and advise technical analyses. Two key products of the WRAPS reports are the strategies table and the priorities section, each developed with the WRAPS Feedback Group from the respective watersheds. The strategies table outlines high level strategies necessary to restore and protect water bodies in the Watershed, including social strategies that are key to achieving the physical strategies. The priorities section presents criteria to identify priority areas for water quality improvement, including examples of water bodies and areas that meet the prioritizing criteria.

The Cottonwood River WRAPS Report can be found here: Final Cottonwood River Watershed Restoration and Protection Strategy Report. The restoration and protection strategy table can be found beginning on page 71 of the report. The Minnesota River- Mankato WRAPS report is found here: Minnesota River - Mankato Watershed WRAPS report. The restoration and protection strategy table can be found beginning on page 86 of the report.

Public participation was a major focus during the Minnesota River- Mankato Watershed Approach occurring from 2013 through 2017. The MPCA worked with county and Soil and Water Conservation District (SWCD) staff in the watershed, consultants, citizens, and other state agency staff to work on projects to promote public participation collaboratively in the area. Projects were tailored to local partner interest and capacity. Summary findings from the public participation activities by Brown and Cottonwood SWCDs that are pertinent to the CMM portion of the Minnesota River-Mankato are located on pages 27-38 of the Middle Minnesota River Watershed Approach Civic Engagement Project Summary.

Watershed Goals

Among the required elements of WRAPS are timelines for achieving water quality targets and interim milestones within 10 years of strategy adoption. It is the intent of the implementing organizations in these watersheds to make steady progress in terms of pollutant reduction. However, needed pollutant load reductions are generally high and will require significant adoption of conservation practices.

Cottonwood River and Minnesota River- Mankato Watershed goals were developed separately and are found in their respective reports but are similar in rates of reduction. Accordingly, as a very general guideline or goal, it is assumed that 1% to 2% of the overall needed reduction will occur per year on average. This means that a 10% reduction goal is expected to be achieved in 5 to 10 years and 50% reduction goal will take 25 to 50 years.

Again, this is a general guideline and approximation. Factors that may mean slower progress include limits in funding or landowner acceptance, challenging fixes (e.g., unstable bluffs and ravines, invasive species) and unfavorable climatic factors. Conversely, there may be faster progress for some impaired

waters, especially where high-impact fixes are slated to occur or where the watershed is subject to focused efforts.

Prioritizing and Targeting

Section 3 of the WRAPS reports discuss several existing methods to identify priority areas for planning consideration through development of the goals maps, the HSPF model maps, and the GIS estimated altered hydrology maps. The WRAPS report describes the priority areas identified by the WRAPS Local Work Group, which are summarized below and should be considered for 1W1P planning efforts. These water bodies provide both ecological and recreational value to residents and are of high social importance. Areas with rare and natural plant and animal communities should also be protected and enhanced. Rebuilding habitat utilized by rare and threatened species will help restore their populations while also improving watershed health and stream stability.

Protection Plans and Strategies

There is a growing focus on maintaining high-quality surface water in the Cottonwood and Middle Minnesota Watersheds. The same practices that protect water quality will also benefit wildlife, groundwater, air quality, soils, and numerous other aspects of our Minnesota environment.

With this understanding in mind, the MPCA collaborated with the Minnesota Department of Natural Resources and the Board of Water and Soil Resources to develop guidance for incorporating protection strategies into WRAPS, local water plans, and/or 1W1P documents. Resources for protection prioritization can be found here: Protection and prioritization tools.

Stream Protection Prioritization

Several streams in the Cottonwood River Watershed area were considered priority for protection by the Cottonwood River WRAPS work group:

- Meadow Creek (07020008- 601)
- Unnamed Creek (07020008- 578)
- Unnamed Creek (07020008- 586)
- Unnamed Creek (07020008- 623)
- Judicial Ditch 9 (07020008- 548)
- Unnamed Creek (07020008- 584)
- Judicial Ditch 3 (07020008- 588)
- County Ditch 38 (07020008- 527)
- Unnamed Creek (07020008- 587)
- County Ditch 198 (07020008- 589)
- Cottonwood River (07020008- 507)
- County Ditch 54 (07020008- 543)
- County Ditch 68 (07020008- 561)
- Unnamed Ditch (07020008- 594)
- Unnamed Creek (07020008- 595)

- Judicial Ditch 35 (07020008- 596)

Streams that are nearly impaired or barely impaired (i.e., within 40% of water quality standards) mentioned by Cottonwood River WRAPS work group include:

- Dutch Charley Creek Reach 518 (impaired by TSS, within 5% of standard)
- Dutch Charley Creek Reach 517 (impaired by TSS, within 39% of standard)

Priority areas in the Middle Minnesota portion of the CMM mentioned during the WRAPS process include:

- Spring Creek, Hindeman (07020007-573, -574)
- Little Cottonwood (07020007-676, -677)
- County Ditch 10, John's Creek (7020007-571)
- Morgan Creek (0702007-691)

Lake Protection/Restoration Prioritization

Several lakes/wetlands in the Cottonwood River Watershed area are considered priority for protection considering high recreational use and value that were mentioned by the Cottonwood River WRAPS work group. These include:

- Mahlke Marsh (42- 0060-0)
- Leedom Slough (42- 0114-00)
- Round Lake (17-0048-01)
- Lake Laura (Plum Creek County Park) (64-0150-00)
- Willow (51- 0044-00)
- Christianson Marsh (42- 0008-00)
- Double-South (17-0056-00)
- Sleepy Eye Lake (08-0045- 00)

Lakes that are nearly impaired or barely impaired (i.e., within 40% of water quality standards) mentioned by Cottonwood River WRAPS work group include:

- Bean Lake (impaired by TP, within 40% of standard)
- Double Lake (impaired by TP, within 38% of standard)
- Hurricane Lake (not impaired, within 6% of standard)
- Sleepy Eye Lake (not impaired, within 9% of standard)
- Wellner-Hageman Reservoir (not impaired, within 14% of standard)
- Lake Laura (not impaired, within 18% of standard)

There were no lakes located in the Middle Minnesota River planning area of the CMM that were brought up for discussion during WRAPS planning.

Groundwater Protection Prioritization

Groundwater protection areas pertinent to the CMM that were mentioned by the Cottonwood River WRAPS work group include:

- Protect vulnerable and sensitive groundwater areas throughout the watershed, particularly wellhead protection areas (WHPAs) and drinking water supply management areas (DWSMAs) with high vulnerability:
- Marshall and Marshall Dudley DWSMAs/WHPAs
- Red Rock Rural Lake Augusta DWSMA

Groundwater protection pertinent to the CMM that were mentioned by the Minnesota River-Mankato WRAPS work group include:

- WHPAs and DWSMAs within the Middle Minnesota River Watershed. The cities of Comfrey and New Ulm are both community public water suppliers that have some moderately vulnerable areas to potential contamination. The communities have vulnerable drinking water systems that indicate a connection and influence from surface water in the watershed. Contaminants on the surface can move into the drinking water aquifers more quickly in these areas. There is also the potential for contamination through unused and abandoned wells. Ensuring abundant and high-quality supplies of groundwater is critical; especially in light of altered hydrology and the impacts on groundwater recharge.

MPCA Water Management Priorities in the CMM 1W1P Area

The MPCA recommends focusing on the following priorities in the planning process. The priorities were identified based on the existence of these issues watershed wide as identified by monitoring and assessment, SID, and the WRAPS.

<u>Biota (Aquatic Life)</u>

Address the stressors to aquatic life in the 1W1P. Aquatic life use impairments within the watershed are complex. Biotic impairments are a result of nonpoint source pollution and localized stress linked to poor habitat condition and altered hydrology. High nitrogen and phosphorus levels are likely impacting fish and macroinvertebrate communities in the southern part of the watershed. Stabilizing hydrology, increasing riparian buffer width, and stabilizing stream banks would greatly help the in-stream habitat.

<u>Altered Hydrology</u>

Seek changes to the landscape that reduce the volume, rates, and timing of runoff and increase the base flows needed to prevent continued and further impairments. A primary stressor of the biotic impairments in the watershed is altered hydrology. Other pollutants (turbidity, nutrients, bacteria, etc.) are delivered because of altered hydrology. Managing the hydrology to provide a consistent base flow is imperative for the survival of the biological communities in the watershed. Increasing rainfall infiltration and water retention, and improving riparian conditions are activities that are needed to stabilize hydrology and reduce impairments.

<u>Turbidity and Total Suspended Solids (Aquatic Life)</u>

Reduce and control sediment entering the water bodies of the watershed. Total suspended solids (TSS), and turbidity (measure of water clarity affected by sediment, algae, and organic matter), are common impairments and stressors to aquatic life in the watershed. Reducing TSS will also likely reduce how other pollutants are conveyed (phosphorus and bacteria).

Nutrients (Aquatic life/Eutrophication)

Reduce nutrient delivery to the watershed. High levels of nutrients (phosphorus) are driving nuisance algae blooms in the watershed's impaired lakes and threatening other lakes that are on the verge of becoming impaired. Algae blooms can deprive lakes of their oxygen as the algae die off and decay, causing fish kills. High levels of algae cause increased levels of turbidity, degrading aquatic recreation and aquatic life. Blue-green algae can also cause serious health issues for humans and pets.

The MPCA anticipates more lakes and stream reaches will be listed as impaired following the intensive monitoring phase of the second watershed cycle (Middle MN beginning 2024; Cottonwood River beginning 2027). Past stream monitoring has documented high concentrations of total phosphorus. With the implementation of River Eutrophication Standards, the MPCA suspects that new stream impairments are likely to emerge.

Management plans that appropriately value the nutrient worth of manure and previous crops and focus on the timing and intensity of the fertilizers and manure applications will help reduce the amount of phosphorus and nitrogen reaching the river. These reductions would also aid in the low dissolved oxygen problems present in some parts of the watershed. Resources for nutrient management include:

- Point Source Phosphorus Mapping Tool: Provides summaries of annual phosphorus loads and flow volumes discharged from National Pollutant Discharge Elimination System (NPDES)/ State Disposal System (SDS) permitted facilities since 2005
- Minnesota Nutrient Reduction Strategy

Bacteria (Aquatic Recreation)

Practices to control pathways delivering human and livestock feces to the CMM waters should be a priority for the 1W1P. High levels of bacteria are widespread across the western portion of the watershed. The abundance of feedlots, feedlot runoff, improper manure management, and over-grazed pastures in the watershed may correlate with this finding. High bacteria levels could also be attributed to noncompliant septic systems.

Climate Change Resiliency and Adaptation

Planning should incorporate implementation of practices that address changing weather patterns to help our communities be prepared for extreme weather events. As part of the WRAPS update process, the MPCA is planning on making Climate Change Resiliency and Adaptation a priority.

Environmental Justice

Environmental justice means the right of communities of color, Indigenous communities, and low-income communities, to the enjoyment of a healthy environment and to fair treatment and meaningful involvement with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. As part of the WRAPS update process, the MPCA is planning on making environmental justice concerns a priority. As part of this 1W1P, please consider integrating environmental justice values when identifying priority areas in the plan.

The MPCA has resources to assist in identifying areas with environmental justice concerns:

- Understanding environmental justice in Minnesota
- MPCA and environmental justice | Minnesota Pollution Control Agency

Additional MPCA resources:

- Minnesota Stormwater Manual
- MPCA funding options

Again, thank you for the opportunity to comment. The MPCA recognizes all the hard work and cooperation from the local partners within the Cottonwood River and Middle Minnesota River Watersheds and offers our continued support in local water planning. If we may be of further assistance, please contact Mike Weckwerth at michael.weckwerth@state.mn.us at the MPCA's Marshall office or Bryan Spindler at bryan.spindler@state.mn.us at the MPCA's Mankato office.

Sincerely,

Mike Weckwerth

This document has been electronically signed.

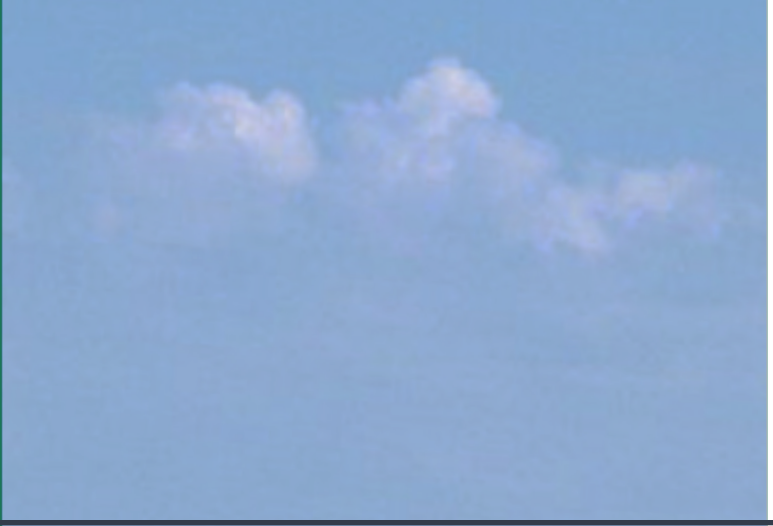
Mike Weckwerth
Watershed Project Manager - Cottonwood
Watershed Division

Bryan Spindler

This document has been electronically signed

Bryan Spindler
Watershed Project Manager – Middle MN
Watershed Division

BF:jdf



Appendix C: Public Kickoff Summary

Appendix C.

Public Survey Responses

On June 1st and 2nd, 2023, public kickoff meetings were held in Springfield and Walnut Grove to educate the public on the watershed planning process and to get their input on what issues were most important to them to include in the plan. A survey was given to attendees, with 38 responses. The results of that survey are described in the following pages.

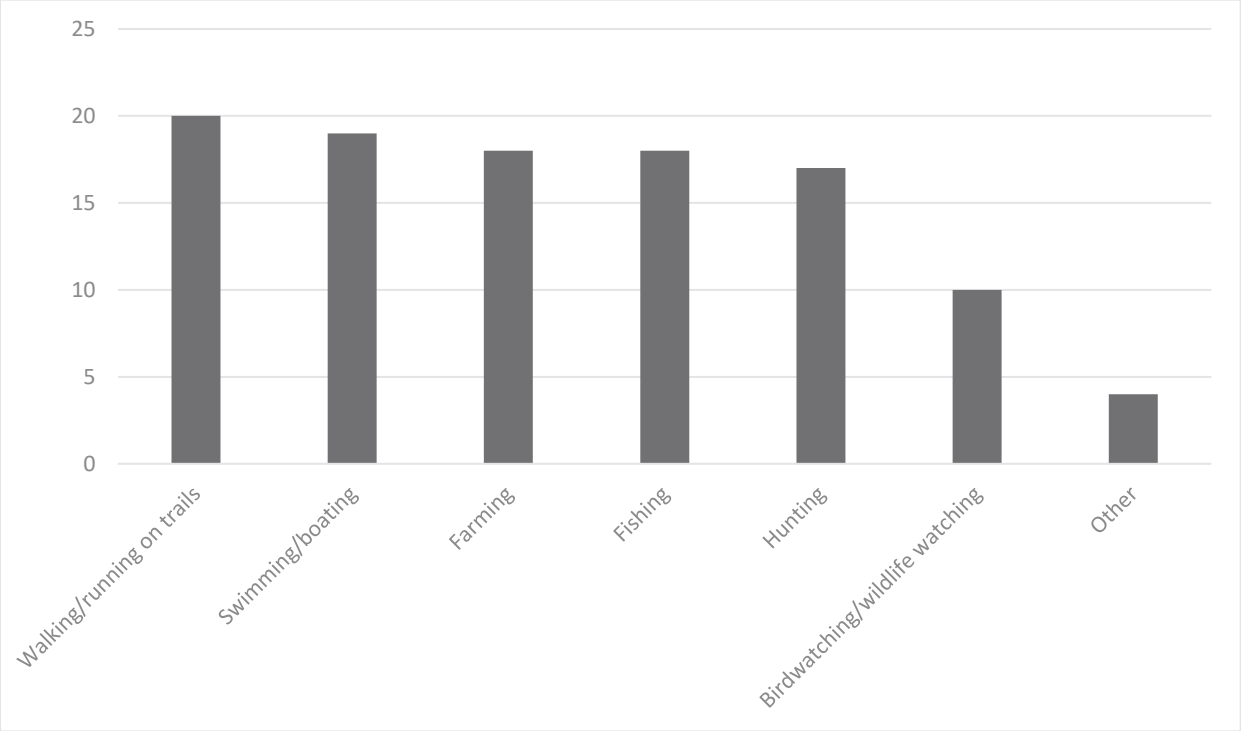


Figure 1. Which of the following activities do you do within the watershed?

When asked about specific waterbodies/ resources you are concerned about:

- Lakes
  - Double Lake
  - Bean Lake
  - Sleepy Eye Lake
  - Lake Hanska
  - North Dimble Lake
- Streams
  - Cottonwood River

    - Little Cottonwood River
    - Sleepy Eye Creek
- Mankato DWSMA
- County owned parks
- Quality of waterbodies near campgrounds and parks

A word cloud was created to visually show the responses to the question 'using 4-5 words, when you think of the CMMW, what comes to mind?

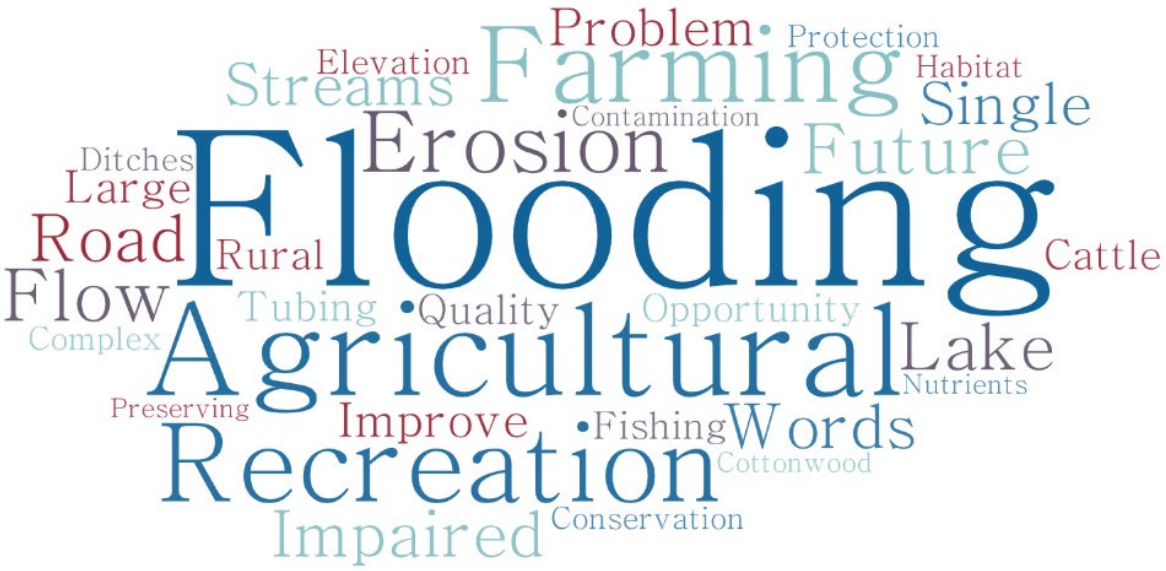


Figure 2. Word cloud of what comes to mind when you hear 'CMMW'

When asked to vote for 5 of the top issues facing the CMMW, the top response was erosion (**Figure 3**). After that, flooding, polluntants, and protecting drinking water were the top issues locals were concerned about. Other issues not included in **Figure 3** because they were only mentioned by one person include altered hydrology, livestock access to riparian areas, and the Mankato DWSMA.

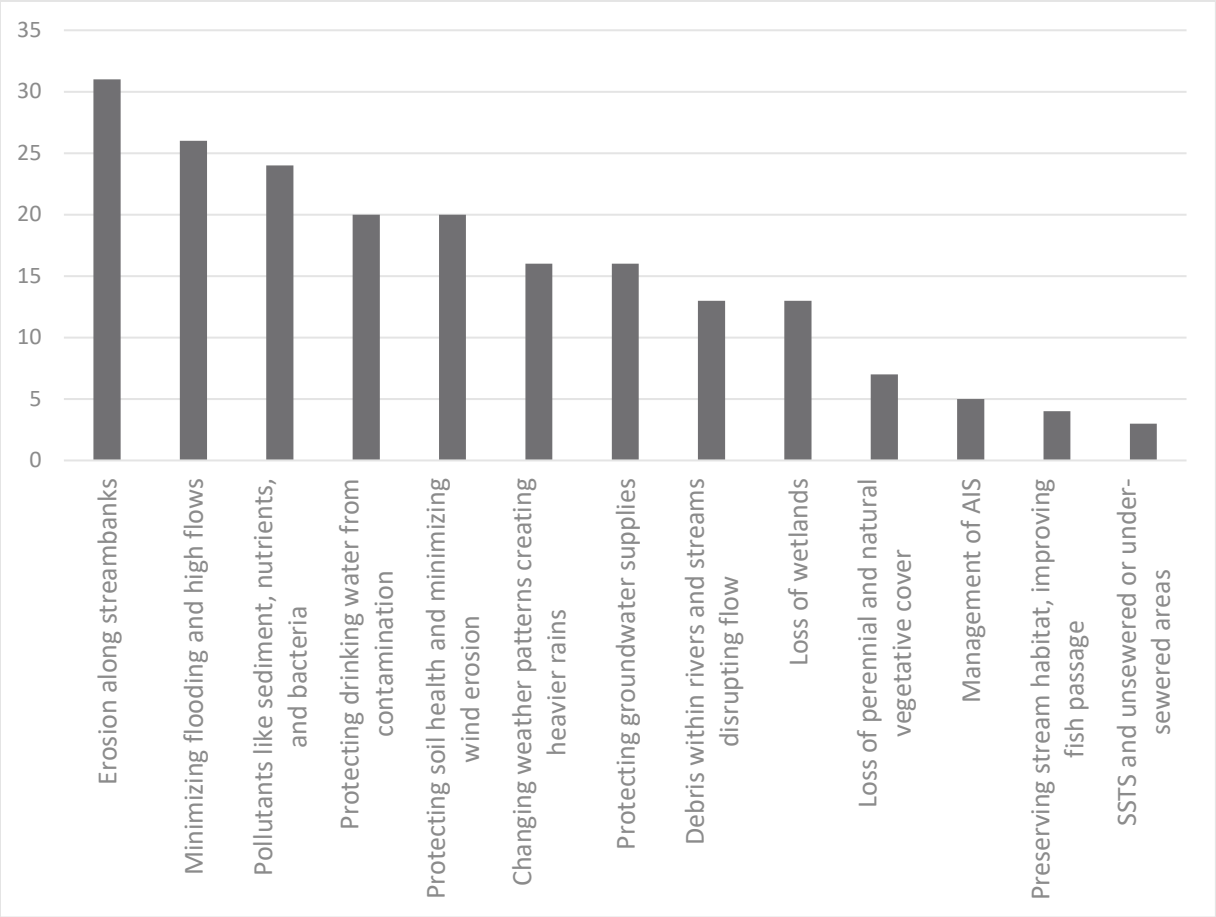


Figure 3. Top watershed issues

In response to asking the attendees if there were any additional topics, resources, problems, or opportunities that were not covered that they wanted to comment on, the following was answered:

- Costs and impacts of extreme tiling/drainage
- Flooding in Springfield
- Farming practices on highly erodible lands
- How to get landowners on board with best management practices if there is cost involved in getting these practices implemented. Motivation for them.
- We need to make sure to promote the BMPs with all the ag land
- Great meeting!
- Groundwater Atlas identifying the geology of the area and GW sources
- Ag drainage / altered hydrology
- What can I do as a landowner to help?

- City drainage into streams
- Slowing water down seemed to be a theme within our group as we rotated situations. Water retention solutions, berms, alternative intakes, alternative tillage patterns, all seem like solutions that warrant attention in this watershed
- Sometimes one doesn't get to choose the best option; rather on has to pick the least bad
- How to gain access to areas along river for work to be accomplished
- Perhaps farming practices, reduced tillage, etc.
- First meeting very good
- More constant cover of land, through various methods
- This was commented on- but algal blooms in lakes is a big issue- incentivizing easements would be beneficial

Resource Station Feedback

Attendees were invited to place post-it notes on large maps to identify geographic issues. Notes were also recorded at each resource station. Summaries are provided below for feedback from the Springfield and Walnut Grove kickoff meetings.

Springfield - Resource Station Notes

Land Use/Habitat

- Grass waterway maintain
- Road ditch re-shaping and maintenance
- Habitat not by water
- Soil erosion
- Tillage practices
- Tree planting in steep slopes
    - Highway 68 in Co. 45 into C
- More wildlife
- City infrastructure- flood protection
- Recreation opportunity- swimmable waters
    - Reservoir type impoundments
    - Along the Coteau de Prairie?
- Emerald ash borer- tree loss- effect on erosion- blockage at rivers- bridge damage

Groundwater

- Red Rock drinking water supply concern
- Well with manganese
- Water demand for pipe-capturing carbon dioxide to ND
- Brown County landfill
- Lyon County landfill
- Keep carbon dioxide pipe out of Red Rock DWSMA
- Sulfates in the wells and city water
- South of sleepy eye- individuals want more water- irrigation and permits
- Lots of wells still needing to be sealed
- Old shallow wells

Flood-prone areas

- Iberia Bridge
- Comfrey flood event
- Loss of bridges, acres, access to land
- DNR wildlife land- sediment erosion filled in area and is causing flooding over township roads
- Additional water storage for flood events
- Riverbank erosion
- Preserve existing storage area/assets- improve as needed
- Plugged culverts/maintenance of roads, bridge
- County ditch water storage- might need upgrade due to increased amount of rain

Springfield – Resource Station Maps

Near Marshall:

- Protect water supply area especially in high vulnerable areas

Near Comfrey:

- Groundwater Atlas
- Waterway east of Comfrey along Hwy 20 has bank erosion

Dutch Charley Park

- Poor water clarity

Bean and North Double Lake

- Have natural sand bottoms but now over 2 ft of mud

General

- Nutrient and pesticide management
- Trash during floods like corn stalks and trees clogs bridges and other structures from working properly
- What to do about riverbank erosion
- Road ditches not draining correctly
- Additional storage needed for flood events
- More conservation easements on the rivers in floodplain areas

Plum Creek

- Used to run clear 40 years ago

Springfield and Revere

- Water quality of Cottonwood River
- Riverside Park in Springfield

Sleepy Eye Lake

- Protect

Lake Louisa

- Sediment

Iberia Bridge

- Erosion- flooding with rip rap berms

Lake Laura

- Protect water quality

Dry Creek

- WMA?

Little Cottonwood River

- Beaver dam north of Comfrey

Hageman Dam

- Protect water quality

Morgan Creek

- Bare since tornado
- 68 and Courtland
    - Erosion area with mudslides that close the road

Walnut Grove - Resource Station Notes

Surface water

- Grass find more data on buffer function
    - Increase buffer size if feasible
- Decrease open intakes
- Focus on recreational areas
    - Willow and Plum Creek area
    - Lamberton area
- WASCOBs to slow down water
- Focus on newer generation farmers
    - Field days?
- Focus on flooding impacts by Springfield
- Erosion in Comfrey
    - Berms, cover crops
- Overflow basins by Lamberton area

Land Use/Habitat

- Weeds in wildlife areas (thistle)
- Cottonwood River- trees and snags
- Beaver dams at Treml Park
- Stabilize banks on Cottonwood River
- Excessive amounts of nutrients and fertilizers
    - Lamberton and Wabasso
- Retention dikes help slow down the flow
- Zebra mussels- Sarah lake, Rush Lake
- Fishing
- County Parks
    - Protect perennial vegetation
- Mining + gravel pits + water disturbance
- Native prairie good for hunting
- Plant trees- more wood area

Groundwater

- Recharge of aquifers
- Recharge rates
- Rural water distribution map
- Tracy wastewater ponds- replaced ponds and some infrastructure
- Slow down river for infiltration
- Erosion going up and banks eroding
- Good to make water "walk" not "run"
- Tile water + N levels
- What is solution decrease N?
- Well sealing
- Comfrey sealed tons of wells after tornado
- Data and info about N levels
- Water conservation
- Rural water supplies and distribution area
- Well sealing grants
- ?'s about well depths
- Water levels- quantity
- Concern about aquifer levels when its dry- need water restrictions?
- Irrigation use?
- Recharge areas- buffer zone

Flood-prone areas

- Ag land is large contributor- tile
    - Need more holding basins
- Farming along river is not productive
    - Best soil- but prone to flooding
- Bigger retention ponds
    - More retention ponds
- Storm event, have changed
- Dams between Lamberton
    - DNR used to remove them- no longer
- DNR removed dam so more erosion in campground
- Retention ponds- more

- Storage investigation
- Large rain events, how can you manage that
- Less pasture for growing up

Walnut Grove – Resource Station Maps

Dutch Creek (near Westbrook)

- Drainage- too much
- Steep
- Many large feedlots

Cottonwood River near Lone Tree Creek Tributary

- SW corner of CSAH 5 Jct. CSAH4
- Drainage along Cottonwood River
- Floods every year

Sleepy Eye Lake

- Protect

Springfield

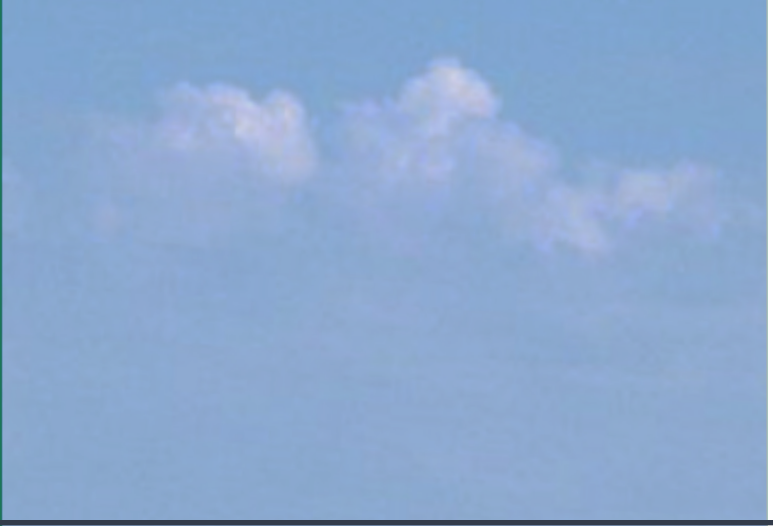
- Buffers to prevent major flooding

Lamberton/Sanborn

- Beaver dams
- Loss of land in Sanborn bank erosion

Lake Sarah (outside watershed)

- Zebra mussels
- Makes lake clear



Appendix D: Subwatershed Geospatial Analysis

Appendix D.

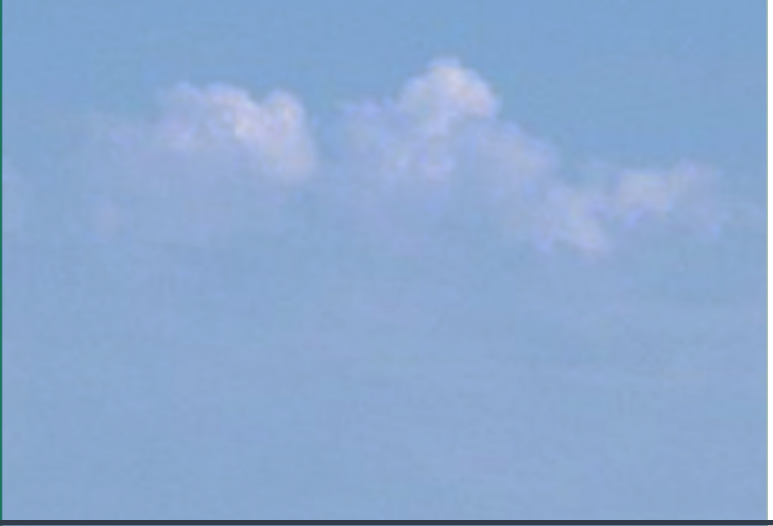
Geospatial data used for subwatershed prioritization

Goal	Issue	Issue Description	Geospatial Ranking Layers
Groundwater	Groundwater Contamination	Protection of private and public drinking water from contaminants, including nitrates and pesticides, especially in areas with groundwater and surface water interaction.	• High and moderate DWSMAs • High and moderate pollution sensitivity • Recharge layer • MDA nitrate testing results
	Groundwater Supplies	Protection of groundwater resources and aquifer availability through recharge and wise water use.	
Sediment and Nutrients	Nutrients	Excess nutrient delivery to surface waterbodies causing algal blooms and impacting aquatic life and recreation.	• Mankato Drinking Water Supply Management Area • PTMApp subwatershed sediment yields • PTMApp subwatershed nutrient yields
	Overland Runoff	Accelerated overland runoff leading to turbidity, sedimentation, and other water quality issues.	
Bacteria	Bacteria	Elevated levels of bacteria (*E. coli*) in surface waters impacting aquatic recreation and human health.	• *E. coli* and Fecal Coliform impairments

Goal	Issue	Issue Description	Geospatial Ranking Layers
	SSTS and Undersewered Communities	Noncompliant SSTSs are prevalent and contribute bacteria, nitrogen, and phosphorus to surface waters and groundwater along with posing a threat to human health and recreation.	• Density of MPCA Registered Feedlots per subwatershed
Protection	Protection	Protection of high-recreational use and high-value waters.	• WRAPS work group priority resources • Priority resources in agency letters
Storage, Flooding, and Hydrology	Altered Hydrology and Water Storage	Decreased water storage and increased delivery of peak flow from altered hydrology (tile, drainage ditches, and climate) which impacts channel stability, infiltration rates, and water quality degradation.	• Local input • Public Law 878-639 Study
	Flooding	Flood damage to crops, agricultural land, urban areas, infrastructure; human health impacts of floodwater.	
	Drainage Management	Lack of adequate drainage management and coordination to meet drainage network needs and promote water quality.	
	Wetlands	Loss of historic wetlands and associated habitat and water storage benefits	

Goal	Issue	Issue Description	Geospatial Ranking Layers
	Climate	Changing weather patterns creating heavier rains, leading to higher flows and erosion.	
Soil Health	Soil Health	Protection and improvement of soil health and minimizing wind erosion and surface water runoff	• PTMApp critical source areas
	Ground Cover	Lack of sufficient perennial cover and crop diversity and its impact on sediment loss, nutrient management, and water infiltration.	
Stream Habitat and Connectivity	Riparian Habitat	Inadequate riparian (buffer) corridors and habitat and its impact on aquatic life and wildlife.	• DNR Stream Crossing and Prioritization Report- priority barriers • Minnesota River-Mankato Stressor Identification Report – barriers impacting water quality
	Aquatic Connectivity	Lack of stream connectivity causing impacts to fish passage and altering the flow of water.	
	Eroding Banks	Increased erosion along streams and riverbanks impacting water quality and aquatic habitat.	
	Debris	Maintenance of debris (i.e. downed trees) within rivers and streams disrupting flow and damaging streambanks.	

Goal	Issue	Issue Description	Geospatial Ranking Layers
Stormwater	Stormwater	Runoff from urban/impervious sources and the increased rates of potential delivery of pesticides, fertilizer, sediment, salt, and other pollutants to surface waters.	• Cities and MS4s • DNR Development Lakes



Appendix E: Carbon Benefits

Cottonwood-Middle Minnesota CWMP

Carbon Benefits

The impact of a changing climate on precipitation, flooding, agriculture, and the economy has drawn increased attention to carbon sequestration. Agricultural conservation practices do not only improve soil health and water quality, but also sequester carbon. Estimating carbon sequestration provides a quantifiable benefit to share with planning partners, state agencies, and watershed residents as an additional benefit of plan implementation.

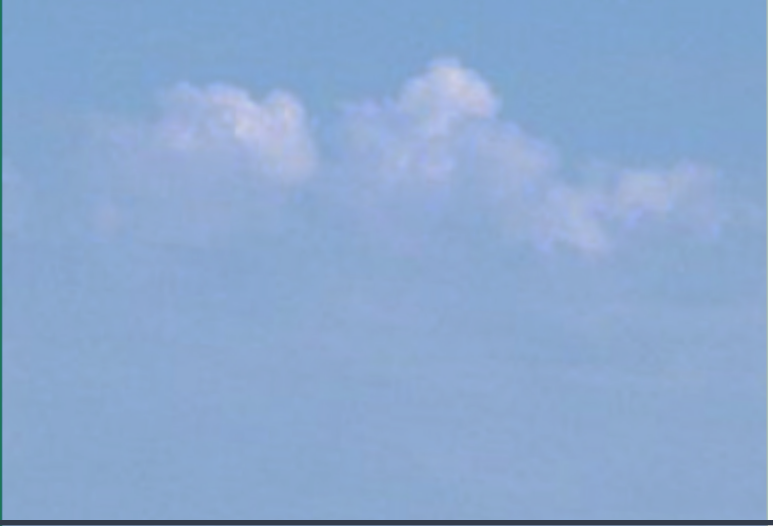
Carbon sequestration was estimated for the "Protection" and "Soil Health" goals using the COMET-Planner tool. The tool was created by the NRCS and Colorado State University for estimating greenhouse gas impacts of conservation practice implementation on the county scale. The output is reported as CO_2-e, or the carbon dioxide, methane, and nitrous oxide emissions reported as the warming potential (or equivalent) of carbon dioxide. The following conditions were set for calculating CO_2-e for CRP land and cover crops:

- CRP: conservation cover as permanent unfertilized grass cover, converted from non-irrigated cropland
- Cover crops: Non-legume crop, conventional tillage, on non-irrigated cropland

The cover crop selections provided more conservative estimates of CO_2-e, as legume cover crops sequester nitrous oxides and reduce more fertilizer application. In practice, it is likely a combination of legume and non-legume cover crops will be planted. Metric tons CO_2-e per acre of land enrolled in CRP and with cover crops planted was obtained for each county in the watershed, and a watershed average was calculated based on the proportional area of each county.

	Metric tons CO_2-e/year	Equivalent to emissions from*
CRP (15,000 acres)	8,400	1,870 cars driven for one year
Cover Crops (18,150 acres)	1,961	467 cars driven for one year

*Calculated by the EPA greenhouse gas equivalencies calculator



Appendix F: Altered Hydrology Analysis

Technical Memorandum

From: Timothy Erickson PE
Houston Engineering, Inc.
Subject: Cottonwood River Altered Hydrology Analysis
Date: February 16, 2024
Project: 9257-0005

1.0 INTRODUCTION

One of the stressors commonly referenced as a reason for aquatic life impairments is "altered hydrology." Altered hydrology is commonly thought to be characterized by increases in peak discharge and runoff volume for a range of precipitation events, as compared to some historic or benchmark condition. Numerous studies have suggested that this hydrologic alteration is a result of some combination of climatic variation, land use/land cover changes, or other landscape scale changes. Aquatic habitat loss, increased streambank erosion and bank failure, and increased sediment levels are some of the suggested consequences of altered hydrology. Individually and collectively, these are believed to lead to the impairment of aquatic life, exhibited by lower ecological diversity.

This technical memorandum (TM) describes a framework used define and quantify altered hydrology using records for the USGS's long-term, continuous flow gaging network. In addition, this TM describes methods to estimate storage goals based on changes of altered hydrology metrics that can be used to develop management plans to help mitigate the impacts of alteration.

1.1 A NEED TO ASSESS ALTERED HYDROLOGY

Although a general sense of the characteristics of altered hydrology exists, a substantive challenge remains. A challenge associated with addressing altered hydrology is the lack of a common definition, including agreement on a set of science-based metrics to establish the desired (i.e., benchmark) condition, and assess whether altered hydrology has indeed occurred. **Figure 1** provides an example of hydrologic data which could be used to illustrate altered hydrology. **Figure 1** shows a flow duration curve for a streamflow gage in the Sand Hill River Watershed, within northwestern Minnesota. Two 30-year time periods are shown on the graph; i.e., 1980 – 2010 (solid line) and 1945 - 1975 (dashed line). The graph

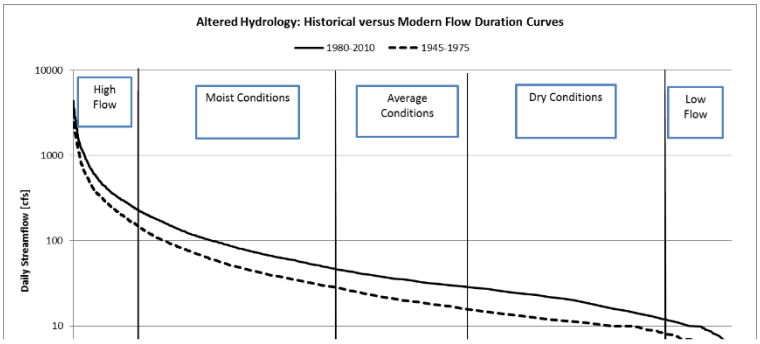


Figure 1. Flow duration curve for the Sand Hill River at Climax, Minnesota. The solid black line shows an increase in daily mean discharge for the 1980 – 2010 period, compared to the early 1945 – 1975 period.

represents the likelihood of exceeding a specific daily mean discharge. The graph indicates an increase in the daily mean discharge through most of the flow range, because for the same likelihood of exceedance the daily mean discharge is greater for the more recent time periods. This suggests “altered hydrology” meaning that flow conditions in the watershed differ between the two time periods. The example illustrates one possible visual metric which could be used to describe altered hydrology.

Agreement on a set of science-based metrics to assess the extent of hydrologic alteration and the desired (i.e., benchmark) condition is needed in order to quantitatively assess changes in the hydrology of a watershed. A definition is needed to rigorously assess whether hydrology has indeed changed through time, establish goals for altered hydrology, and assess and evaluate various means, methods and projects to mitigate the adverse effects of altered hydrology.

Considerable research and technical information relative to describing altered hydrology has been completed. The recent released report titled “Technical Report: Protection Aquatic Life from Hydrologic Alternatives” (Novak et al., 2015) is one example. The report presents metrics which can be used to describe altered hydrology. However, causal information about how the change in hydrology results in the alteration or loss of ecological function is lacking within the report.

For the hydrology of a watershed to be altered there must be some deviation from a preferred or desired hydrologic condition; i.e., a “benchmark” condition. The benchmark for altered hydrology could be the “natural hydrologic regime” or some other condition. The natural hydrologic regime (Poff et al 1997; Arthington et al 2006; Bunn and Arthington 2002 ; Sparks 1995) is the characteristic pattern of water quantity, timing and variability in a natural water body. A river’s hydrologic or flow regime consists of environmental flow components (Mathews and Richter, 2007; The Nature Conservancy, 2009), each of which can be described in terms of the magnitude, frequency, duration, timing and rate of change in discharge. The integrity of an aquatic system presumably depends on the natural dynamic character of these flow components thereby driving ecological processes.

Defining altered hydrology and the benchmark condition, identifying the metrics to describe altered hydrology and translating the information into goals to mitigate the adverse consequences is technically challenging. The approach used to evaluate whether a watershed exhibits altered hydrology is presented within this document along with a definition of altered hydrology. Specific quantitative metrics to assess the extent of hydrologic change and the desired (i.e., benchmark) condition are also presented. No effort is made to describe the causal relationship between hydrology and the ecological, geomorphological or water quality effects. Rather, the assumption is made that the desired condition is achieved by obtaining the benchmark condition. These results are intended to be a beginning point in addressing the topic of altered hydrology in a more rigorous manner, which no doubt will evolve through time.

2.0 A METHODOLOGY TO DEFINE ALTERED HYDROLOGY

2.1 A BRIEF HISTORY OF CHANGING HYDROLOGY

Streamflow in Minnesota (Novotny & Stefan, 2007) and across the contentious United States (Lins and Slack 1999, McCabe and Wolock, 2002) has been changing during the past century, with flows in the period starting from the 1970s to the beginning of the 21st Century tending to be higher than during the early to mid-1900s

(Ryberg et al. 2014). Numerous studies have been conducted to quantify the magnitude of impact and pinpoint relative importance of potential causes of these changes, but scientific consensus has currently not been achieved. The science is not at a point where specific causes can be attributed to altered hydrology with any significant certainty and public discussion about specific causes usually leads to barriers to implementation. In general, the leading candidate causes of altered hydrology can be categorized into to two primary groups: climatic changes and landscape changes. Examples of climatic changes include changes in annual precipitation volumes, in surface air temperature, timing of the spring snowmelt, annual distribution of precipitation, and rainfall characteristics (timing, duration, and intensity). Examples of landscape changes include changes in land use/land cover, increased imperviousness (urbanization), tile drainage and drainage ditching, wetland removal/restoration, groundwater pumpage, flow retention and regulation, and increased storage (both in-channel and upland storage). Although it is important to water resource management to understand the mechanics behind the changes in hydrology, the focus of this analysis is developing a definition for altered hydrology, a method for assessing whether it has occurred within a watershed, and establishing a goal for addressing altered hydrology. No assumption of causation is made or needed to use this framework.

2.2 ALTERED HYDROLOGY DEFINED

Altered hydrology is defined as a *discernable* change in specific metrics derived from stream discharge, occurring through an entire annual hydrologic cycle, which exceed the measurement error, compared to a benchmark condition. For this framework, *discernable* has been used as a proxy for statistical comparisons. The metrics are typically some type of hydrologic statistic derived from the annual discharge record across a long period of time, usually a minimum of 20-years (Gan et al. 1991). The amount of baseflow, the hydrograph shape, peak discharge, and runoff volume for a range of precipitation event magnitudes, intensities, and durations are specific components of or derived from the annual hydrograph.

2.3 ESTABLISHING BENCHMARK CONDITION

A reference or “benchmark” condition is needed to complete an assessment of whether hydrology is altered. A minimum of a 20-year time-periods reasonably ensures stable estimates of streamflow predictably (Gan et al. 1991; Olden & Poff 2003), sufficient duration to capture climate variability and the interdecadal oscillation typically found in climate (McCabe et al. 2004, Novotny and Stefan 2007), and is the standard timespan used for establishing “normal” climate statistics in the United States. Where the extent of data allows it, the analysis is performed for two 35-year time periods; i.e., a benchmark period called “historic” and an “altered” state or called “modern”). The benchmark period used to establish benchmark conditions represents the period before shifts in hydrology are commonly thought to have begun within Minnesota as a result of land use/land cover changes, or increases in the depth, intensity, and duration of precipitation.

To illustrate an example of a change in streamflow and the validity in the breakpoint period, cumulative streamflow (using annual depth values) is plotted across time (**Figure 2)** for the USGS gage at Crow River at Rockford, MN (USGS ID: 05280000). Cumulative streamflow was used instead of straight annual streamflow because (1) it linearizes streamflow relationship where the slope of a trendline would be the average annual streamflow, (2) no assumptions about multi-year dependencies (e.g. changes in storage) or autocorrelation is necessary, and (3) changes in slope can be visualized, showing an altered state of hydrology.

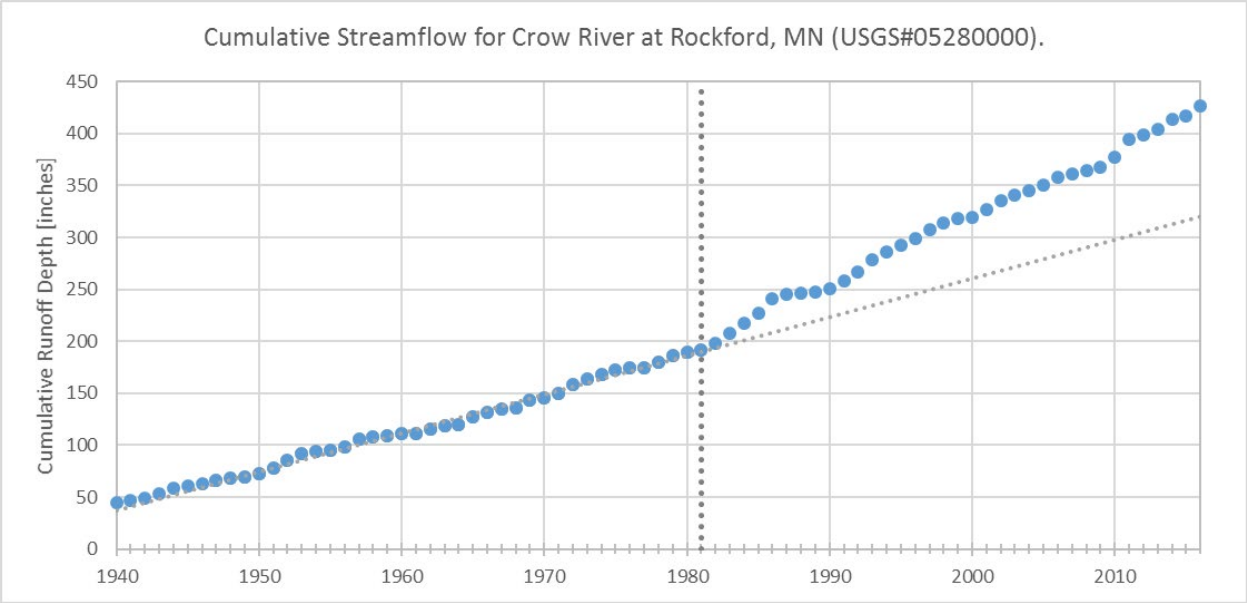


Figure 2. Cumulative streamflow for the Crow River at Rockford, MN (USGS Station 05280000).

Results from analysis shown in the example (**Figure 2**) determine the break point and define the benchmark and modern conditions.

2.4 METRICS USED TO ASSESS ALTERED HYDROLOGY

Many potential metrics can be used to describe a measurable change in the annual hydrograph. For example, the indicators of hydrologic alteration software developed by the Nature Conservancy (https://www.conservationgateway.org/ConservationPractices/Freshwater/EnvironmentalFlows/MethodsandTools/IndicatorsofHydrologicAlteration/Pages/indicators-hydrologic-alt.aspx) uses 67 different statistics derived from mean daily discharge to describe altered hydrology. Ideally, each indicator or metric could be causally linked to an ecological or geomorphological consequence, although this is technically challenging. Use of such a large number of indictors can be problematic as many of the metrics can be correlated and are therefore interdependent or lack ecological or geomorphological meaning.

The structure and therefore function of ecological systems are often “driven” by “non-normal” events; e.g., low flows associated with drought, higher flows which inundate the floodplain. Metrics used to complete this analysis were preferentially selected to reflect the variability in specific characteristics of the annual hydrograph, and include peak discharges, runoff volumes and hydrograph shape. Each metric was specifically selected to represent a flow condition believed to be of ecological or geomorphological importance, in the absence of causal information. **Table 1** shows the specific metrics used to complete the analysis. The use of these metrics is intended to identify: 1) whether the hydrology within a watershed is indeed altered: and 2) which resources may be at risk because of the alteration.

Table 1. Metrics used to define and assess whether hydrology is "altered" for a specific watershed.

Relevance	Hydrograph Feature	Frequency of Occurrence	Duration	Metric	Ecological or Geomorphic Endpoint
Condition of Aquatic Habitat	Baseflow	10-year	30-day	The minimum change between time periods is the accuracy of measuring streamflow discharge and estimating daily mean discharge. A discharge measurement accurate within 10% of the true value is considered excellent by the United States Geological Survey (USGS). Some additional error is induced through the conversion of these data to discharge. Therefore, a minimum change of 15% is needed between "historic" and "modern" period for this metric to classified as "altered."	Discharge needed to maintain winter flow for fish and aquatic life.
		Annual	30-day median (November)		
Aquatic Organism Life Cycle	Shape	Mean	Monthly average of daily means	Use the "historic" period of record to define "normal variability." Develop histograms of daily mean discharges for each month within the period of record for the "historic" and "modern" time periods. Compare the histograms of the monthly average of daily means using an appropriate statistical test. Assume the histograms are from the same statistical population and text for significance at an appropriate significance level.	Shape of the annual hydrograph and timing of discharges associated with ecological cues.
	Timing	Julian day of minimum	1-day		
		Julian day of maximum			
Riparian Floodplain (Lateral) Connectivity	Peak discharge	10-year	24-hour and 10-day	The minimum change between time periods is the accuracy of measuring streamflow discharge and estimating daily mean discharge. A discharge measurement accurate within 10% of the true value is considered excellent by the United States Geological Survey (USGS). Some additional error is induced through the conversion of these data to discharge. Therefore, a minimum change of 15% is needed between "historic" period and "modern" period for this metric to classified as "altered."	Represents the frequency and duration of flooding of the riparian area and the lateral connectivity between the stream and the riparian area. Functions include energy flow, deposition of sediment, channel formation and surface water – groundwater interactions
		50-year			
		100-year			
	Volume	10-year	Total runoff volume for those days with a daily mean discharge exceeding the 24-hour discharge		
		50-year			
		100-year			
Geomorphic Stability and Capacity to Transport Sediment	Peak Discharge	1.5 year	24 - hour	The minimum change between time periods is the accuracy of measuring streamflow discharge and estimating daily mean discharge. A discharge measurement accurate within 10% of the true value is considered excellent by the United States Geological Survey (USGS). Some additional error is induced through the conversion of these data to discharge. Therefore, a minimum change of 15% is needed between "historic" period and "modern" period for this metric to classified as "altered."	Channel forming discharge. An increase is interpreted as an increased risk of stream channel susceptibility to erosion.
	Volume	1.5 year	Cumulative daily volume exceeding channel forming discharge		
		Average daily	30-year flow duration curve		

2.5 DETERMINATION OF ALTERED HYDROLOGY

A simple weight of evidence approach is used to decide whether the hydrology of a watershed is “altered” between two time periods. A “+” is assigned to each metric if it has a discernable increase from the benchmark as defined by the metric, between the historic and modern time periods. A “-“ is assigned to each metric if it has a discernable decrease from the benchmark as defined by the metric, between the historic and modern time periods. An “o” is assigned to each metric if it lacks a discernable increase or decrease from the benchmark as defined by the metric, between the historic and modern time periods. If the number of “+” values exceeds the number of “-“ values, an increase in the watershed response to precipitation is implied and the hydrology is considered altered between the two time periods. If the number of “-” values exceeds the number of “+“ values, the a decrease in the watershed response to precipitation is implied and the hydrology is considered altered between the two time periods. The hydrologic response of the watershed is considered “altered” if the percentage of + and – signs exceeds 50% in any group of metrics.

2.6 ESTABLISHING ALTERED HYDROLOGY GOALS

There are two types of goals; i.e., a qualitative and a quantitative goal. The qualitative goal is to return the hydrology to the benchmark condition. The qualitative goal is evaluated using a weight of evidence approach. The goal is simply to achieve the conditions for the historic period as defined by the metrics with **Table 1**. It is presumed the historic period is “better” from an ecological and geomorphological perspective.

The second type of goal is a quantitative storage goal. Several of the metrics within **Table 1** can be used to establish storage goals, which may be accomplished by a variety of types of projects. These project types include not only traditional storage but increasing the organic matter content of soils. These goals are the change in volume between the historic and modern time periods. The volume needs to be described by the effective volume, which is the amount of storage required on the landscape.

2.7 METHODS FOR EVALUATING ALTERED HYDROLOGY MITIGATION STRATEGIES

Several methods can be used to develop strategies to mitigate the effects of altered hydrology. These methods include the use of continuous simulation hydrology models (like the Hydrologic Simulation Program Fortran) and the event-based hydrology approaches (like those within the Prioritize, Target and Measure Application).

3.0 ALTERED HYDOLOGY IN THE COTTONWOOD RIVER

The following are summaries of results from the altered hydrology analysis conducted on long-term gaging stations.

3.1 COTTONWOOD RIVER NEAR NEW ULM, MN (USGS# 05317000)

The USGS long-term, continuous flow gaging station in the Cottonwood River near New Ulm, MN (USGS# 05317000) drains approximately 1,300 square miles. The data record starts in 1909 and runs through 2023 (present day). The flow record was downloaded on December 18, 2023. The site includes both daily average streamflow records and peak flow measurements. **Figure 3** shows the cumulative streamflow (in inches per year) for the gaging site. Cumulative streamflow is used to determine a breakpoint between the benchmark condition and the altered condition (see **Section 2.3**).

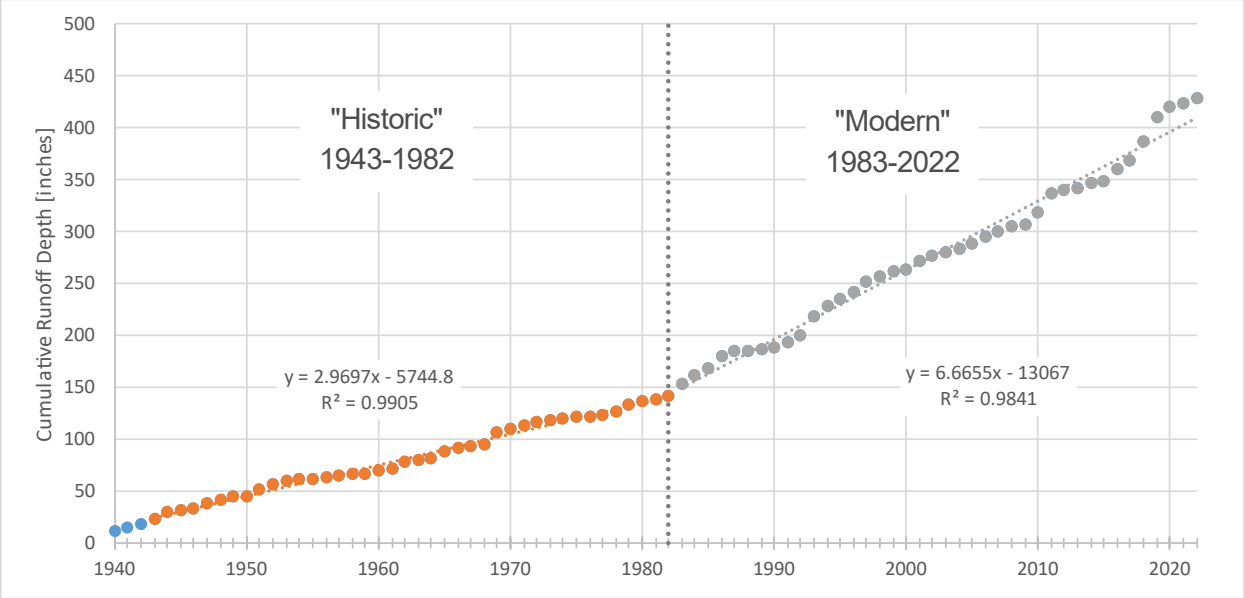


Figure 3. Cumulative streamflow for Cottonwood River near New Ulm, MN (USGS# 05317000).

According to the cumulative streamflow analysis, a breakpoint exists around 1983. Therefore, the benchmark ("historic") conditions will include data from 1943-1982 and the altered ("modern") will include data form 1983-2022.

A summary of the results from the altered hydrology analysis is provided in **Table 2.** A more detailed description of the results is provided in **Appendix A**. A summary of the storage goals based on the altered hydrology analysis are provided in **Section 4**.

Table 2: Altered Hydrology Summary for Cottonwood River near New Ulm, MN (USGS# 05317000).

Group	Metric	% Difference	Altered Hydrology Metric	Evidence of Altered Hydrology for Group
Aquatic Habitat	10-year, Annual Minimum 30-day Mean Daily Discharge	172.4%	+	Yes, Increasing
	10-year, Annual Minimum 7-day Mean Daily Discharge	219.5%	+	
	Median November (Winter Base) Flow	283.0%	+	
Aquatic Organism Life Cycle	Magnitude of Monthly Runoff Volumes	44.5%-to-360%	+	Yes, Increasing
	Distribution of Monthly Runoff Volumes	-37.8%-to-98.1%	o	
	Timing of Annual Peak Discharge	16.8%	+	
	Timing of Annual Minimum Discharge	-1.4%	o	
Riparian Floodplain (Lateral) Connectivity	10-year Peak Discharge Rate	42.9%	+	Yes, Increasing
	50-year Peak Discharge Rate	16.1%	+	
	100-year Peak Discharge Rate	5.9%	o	
	Average Cumulative Volume above the Historic 10-year Peak Discharge	-27.4%	-	
	Average Cumulative Volume above the Historic 50-year Peak Discharge	NA	NA	
	Average Cumulative Volume above the Historic 100-year Peak Discharge	NA	NA	
Geomorphic Stability and Capacity to Transport Sediment	1.5-year Peak Discharge Rate	72.1%	+	Yes, Increasing
	2-year Peak Discharge Rate	70.0%	+	
	Average Cumulative Volume above the Historic 1.5-year Peak Discharge	150.8%	+	
	Average Cumulative Volume above the Historic 2-year Peak Discharge	81.6%	+	
	Duration above the Historic 1.5-year Peak Discharge	158.5%	+	
	Duration above the Historic 2-year Peak Discharge	125.0%	+	
	Flow Duration Curve	30.7%-to-268.1%	+	

4.0 STORAGE GOALS

Goals for addressing the change in hydrology were estimated using four methods. Each method is based on different assumptions and altered the metrics for a specific "altered hydrology" group. The first method is focused on the aquatic habitat and geomorphic and ability to transport sediment metric group and uses the change in the cumulative volume for mean daily discharges, exceeding the 1.5-year return period event. The cumulative total volume when the daily average discharge exceeds the 1.5-year peak discharge includes all flows above the 1.5-year peak, i.e. can include storms with much larger return periods. This method is based on the changes in the observed data and since it includes all flows above the 1.5-year flow relies on the two periods to have a similar distribution of flows. The second method is based on the changes in hydrology across the entire annual hydrograph and integrates the differences in return period discharges between the modern and historic period and finding a probability-weighted representative change in flow rate. A volume is found by assuming a flow period equal to the change in flow period for the 1.5-year flow (i.e. the change in the number of days above the 1.5-year flow). This method assumes a constant flow over a representative duration to estimate the storage goal. Since a hydrograph typically changes over time, this method may over-estimate the storage goal. The third method is also based on addressing the effects through the entire flow range and is a revision to Method 2. Method 3 incorporates the observed change in the timing of the peak discharge for each return period event. This method uses the probability-weighted representative change in flow rate and multiples the flow rates by the change in the number of days exceeding the return period flow for each return period. Method 4 estimates a storage goal based on changes in the flow duration curve (FDC) (see **Figure A.6**). Method 4 integrates the changes in the FDC between two periods and applies the probability of each flow to occur. In statistics, this method would be referred to as the expected number of FDC.

This analysis presents a preliminary framework for defining altered hydrology, applying a method to determine whether altered hydrology has occurred, and establishing a goal for relating to proposed projects. The storage goals are provided in **Table 3** for each of the four methods. For planning purposes, we recommend a preliminary goal equal to a representative goal, taken as the average of the 4 methods, across the watershed, realizing that the altered hydrology goals should ideally be established at the 12-digit HUC scale. However, method 2 provides a storage goal nearly double the other three methods and method 3 shows no change in the number of days above the 10-year flow event, resulting in changes of zero for flows above the 10-year event. Inclusion of either method might result in a representative storage goal, leaving a storage goal based on the average of Methods 1 and 4. The average, representative storage goal is **0.93 inches** across the watershed, or **64,542 acre-feet**. The actual amount of mitigation needed may exceed the estimated range, as the methods used to achieve the goal are not expected to be 100% effective in removing volume from peak of the hydrograph. The means work to achieve the estimated mitigation goal may include the use of structural practices and management practices and should be specifically evaluated through completion of a hydrologic study or the use of appropriate tools and models.

Table 7: Storage goals for rivers in the Cottonwood River.

Stream	USGS ID	Storage Targets			
		Method 1	Method 2	Method 3	Method 4
Cottonwood River near New Ulm, MN	05317000	1.07 in.	1.80 in.	0.98 in.	0.79 in.

Details on calculations of the storage goals can be found in the Appendices.

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APPENDIX A: METRICS OF ALTERED HYDROLOGY FOR THE COTTONWOOD RIVER NEAR NEW ULM, MN (USGS# 05317000).

The following is the summary statistics used to determine the altered hydrology metrics in detail and develop the storage goals. A summary of these statistic is shown in **Table 2** in **Section 3.1**.

A.1 CONDITION OF AQUATIC HABITAT

The condition of aquatic habitat includes a group of metrics that primarily reflect the flow characteristics of the annual hydrograph, needed to maintain adequate habitat for fish and aquatic life. The 7-day low flow, the 30-day low flow, and the median November mean daily discharge are metrics used to represent changes in the availability of flow for aquatic habitat.

A.1.1 Annual minimum 30-day mean daily discharge

The annual minimum 30-day mean daily discharge is the minimum of the 30-day moving mean daily discharge within a year (an annual minimum series). **Figure A.1** shows the annual minimum 30-day mean daily discharge for select return periods (1.01-year, 1.5-year, 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year). **Table A.1** summarizes the data shown in **Figure A.1**.

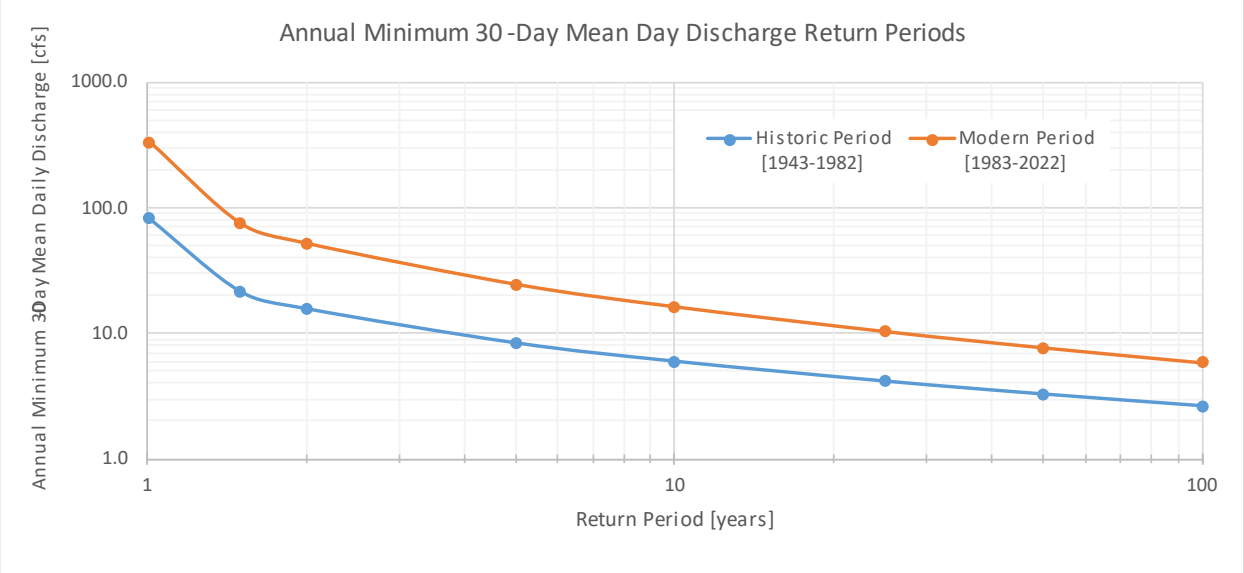


Figure A.1. Historical versus modern annual minimum 30-day mean daily discharge versus return period for Cottonwood River near New Ulm, MN (USGS# 05317000).

Table A.1: Summary of annual minimum 30-day mean daily discharge by return periods for the Cottonwood River near New Ulm, MN (USGS# 05317000).

Return Period	Historic Period [1943-1982]	Modern Period [1983-2022]	% Diff.	Altered Hydrology Criterion
1.01	82.5	332.9	303.5%	+
1.5	21.6	75.3	248.0%	+
2	15.8	52.1	230.6%	+
5	8.4	24.6	193.2%	+
10	6.0	16.3	172.4%	+
25	4.1	10.4	149.9%	+
50	3.3	7.7	135.2%	+
100	2.6	5.8	122.1%	+

+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period

A.1.2 Annual Minimum 7-Day Mean Daily Discharge

Like the annual minimum 30-day mean daily discharge, the annual minimum 7-day mean daily discharge is the minimum of the 7-day moving average flow in the year. **Figure A.2** shows the annual minimum 7-day mean daily discharges for select return periods (1.01-year, 1.5-year, 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year). **Table A.2** summarizes the data shown in **Figure A.2**.

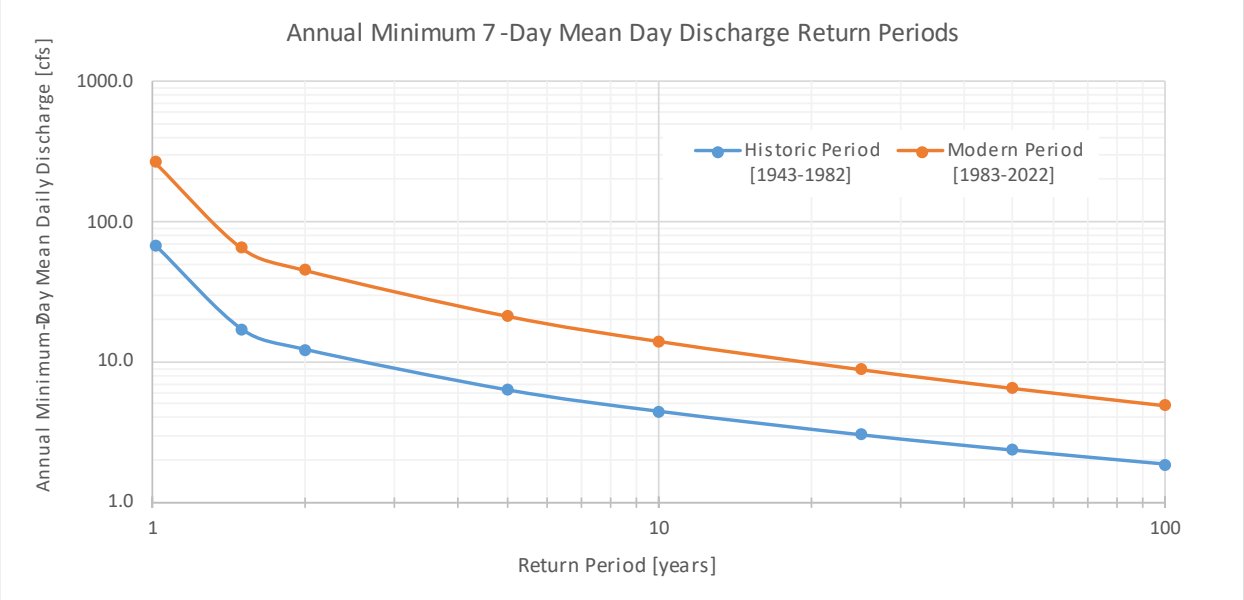


Figure A.2. Historical versus modern annual minimum 7-day mean daily discharge return periods for Cottonwood River near New Ulm, MN (USGS# 05317000).

Table A.2: Summary of annual minimum 7-day mean daily discharge return periods for the Cottonwood River near New Ulm, MN (USGS# 05317000).

Return Period	Historic Period [1943-1982]	Modern Period [1983-2022]	% Diff.	Altered Hydrology Criterion
1.0101	67.9	268.2	295.2%	+
1.5	17.0	65.2	283.9%	+
2	12.2	45.5	272.0%	+
5	6.3	21.5	240.0%	+
10	4.4	14.1	219.5%	+
25	3.0	8.9	195.5%	+
50	2.3	6.5	179.1%	+
100	1.9	4.9	163.9%	+

+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period

A.1.3 November Median Daily Discharge

The median daily mean discharge for November is another indicator of baseflow. This metric is intended to represent baseflow condition during the winter months. **Table A.3** provides the median November flow for each period.

Table A.3: Historical and modern median November flow for the Cottonwood River near New Ulm, MN (USGS# 05317000).

Return Period	Historic Period [1943-1982]	Modern Period [1983-2022]	% Diff.	Altered Hydrology Criterion
Period median November flow [cfs]	50.0	191.5	283.0%	+

+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period

A.2 AQUATIC ORGANISM LIFE CYCLE

The shape of the annual hydrograph and timing of discharges are associated with ecological cues. Metrics related to the aquatic organism life cycle include the shape of the annual hydrographs, timing of the annual minimum flow, and timing of the annual peak flow.

A.2.1 Annual Distribution of Discharges

The annual distribution of runoff is shown two ways: as average monthly runoff volume in acre-feet per month (**Figure A.3**) and as a percentage of average annual runoff volume (**Figure A.4**). **Table A.4** summarized the data used to generate **Figures A.3** and **A.4**.

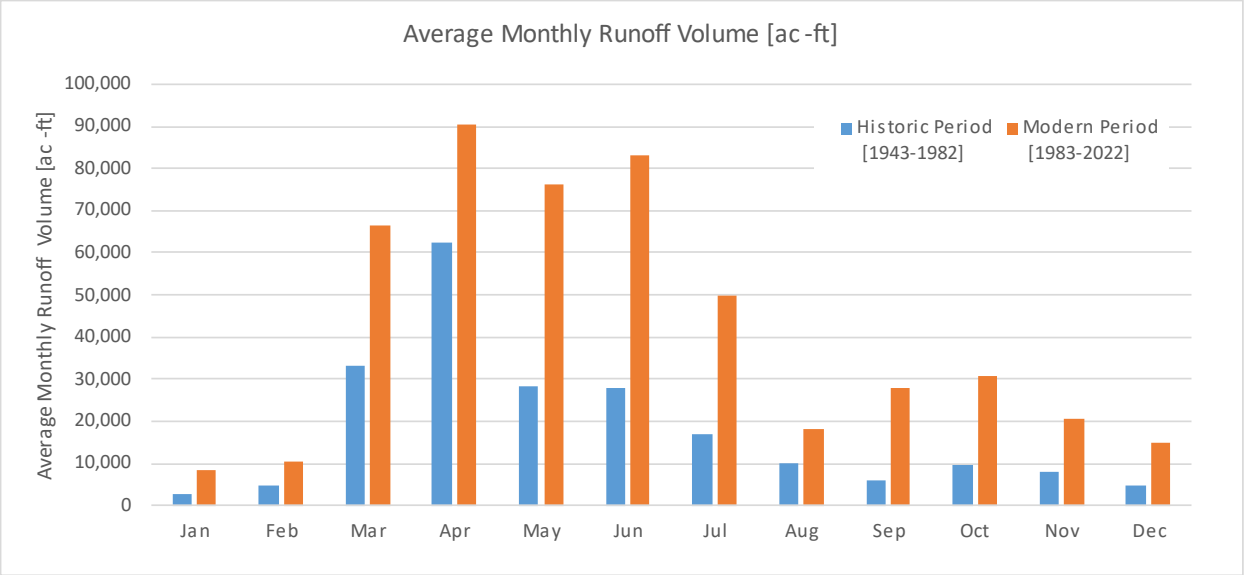


Figure A.3. Average monthly runoff volume [ac-ft] in the Cottonwood River near New Ulm, MN (USGS# 05317000).

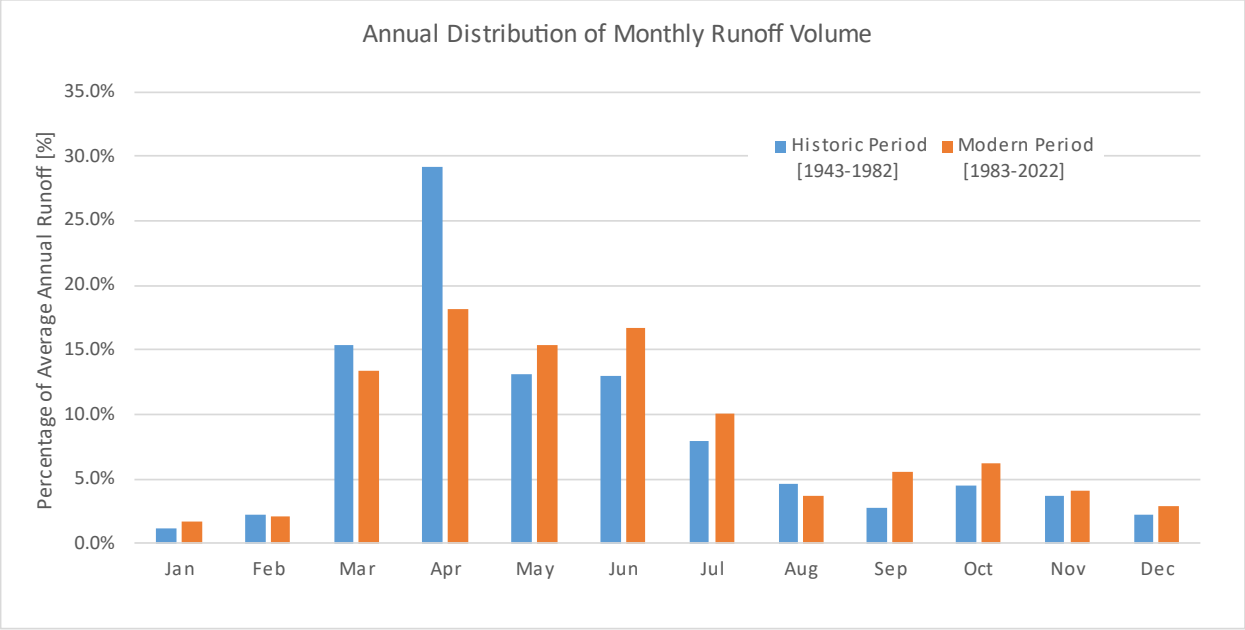


Figure A.4. Annual distribution of average monthly runoff volume as a percentage of annual total volume in the Cottonwood River near New Ulm, MN (USGS# 05317000).

Table A.4. Average monthly runoff volume and annual distribution of monthly runoff volumes in Cottonwood River near New Ulm, MN (USGS# 05317000).

Month	Average Monthly Volumes [ac-ft]				Distribution of Annual Volume			
	Historic Period [1943-1982]	Modern Period [1983-2022]	% diff.	AH	Historic Period [1943-1982]	Modern Period [1983-2022]	% diff.	AH
Jan	2,619	8,493	224.3%	+	1.2%	1.7%	39.6%	+
Feb	4,845	10,575	118.3%	+	2.3%	2.1%	-6.0%	o
Mar	33,023	66,335	100.9%	+	15.4%	13.3%	-13.5%	-
Apr	62,461	90,230	44.5%	+	29.2%	18.2%	-37.8%	-
May	28,171	76,274	170.7%	+	13.2%	15.3%	16.6%	+
Jun	27,783	83,075	199.0%	+	13.0%	16.7%	28.7%	+
Jul	17,040	49,948	193.1%	+	8.0%	10.1%	26.2%	+
Aug	9,928	18,269	84.0%	+	4.6%	3.7%	-20.8%	-
Sep	6,031	27,757	360.2%	+	2.8%	5.6%	98.1%	+
Oct	9,547	30,633	220.9%	+	4.5%	6.2%	38.1%	+
Nov	7,785	20,619	164.9%	+	3.6%	4.1%	14.0%	+
Dec	4,684	14,706	214.0%	+	2.2%	3.0%	35.2%	+

+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period
AH means altered hydrology criterion

A.2.2 Timing of Annual Maximum and Minimum Flows

The timing of the annual maximum daily discharge and annual minimum daily discharge are important metrics of the annual distribution of flows. The timing of the annual maximum typical occurs during the spring flood and the timing of the annual minimum usually occurs during the winter months. **Table A.5** provides statistics on the Julian day of the annual maximum flow and **Table A.6** provides the Julian day for the annual minimum flow. The statistics include the average, the median, and the standard deviation of the Julian days when the maximum or minimum flow occur.

Table A.5. Julian Day of annual maximum in the Cottonwood River near New Ulm, MN (USGS# 05317000).

Statistic	Historic Period [1943-1982]	Modern Period [1983-2022]	% diff.	AH
Average	27-Apr	17-May	16.84%	+
Median	8-Apr	15-May	37.76%	+
Standard Deviation	46 days	52 days	12.27%	+

[1]Based on 365-day year.
+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period
AH means altered hydrology criterion

Table A.6. Julian Day of annual minimum flow in the Cottonwood River near New Ulm, MN (USGS# 05317000).

Statistic	Historic Period [1943-1982]	Modern Period [1983-2022]	% diff.	AH
Average	15-Jul	12-Jul	-1.40%	o
Median	7-Sep	12-Sep	2.00%	o
Standard Deviation	111 days	113 days	2.50%	o

[1]Based on 365-day year.
+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period
AH means altered hydrology criterion

A.3 RIPARIAN FLOODPLAIN (LATERAL) CONNECTIVITY (PEAK FLOWS)

The riparian floodplain connectivity metrics represent the frequency and duration of flooding of the riparian area and the lateral connectivity between the stream and the riparian area. Functions include energy flow, deposition of sediment, channel formation and surface water – groundwater interactions. The riparian floodplain connectivity metrics include the discharge rates for the 10-year, the 25-year, the 50-year, and the 100-year peak discharges. The annual peak discharge rates for select return periods (1.01-year, 1.5-year, 2-year, 5-year, 10-year, 25-year, 50-year, 100-year, and 200-year) are shown in **Figure A.5**.

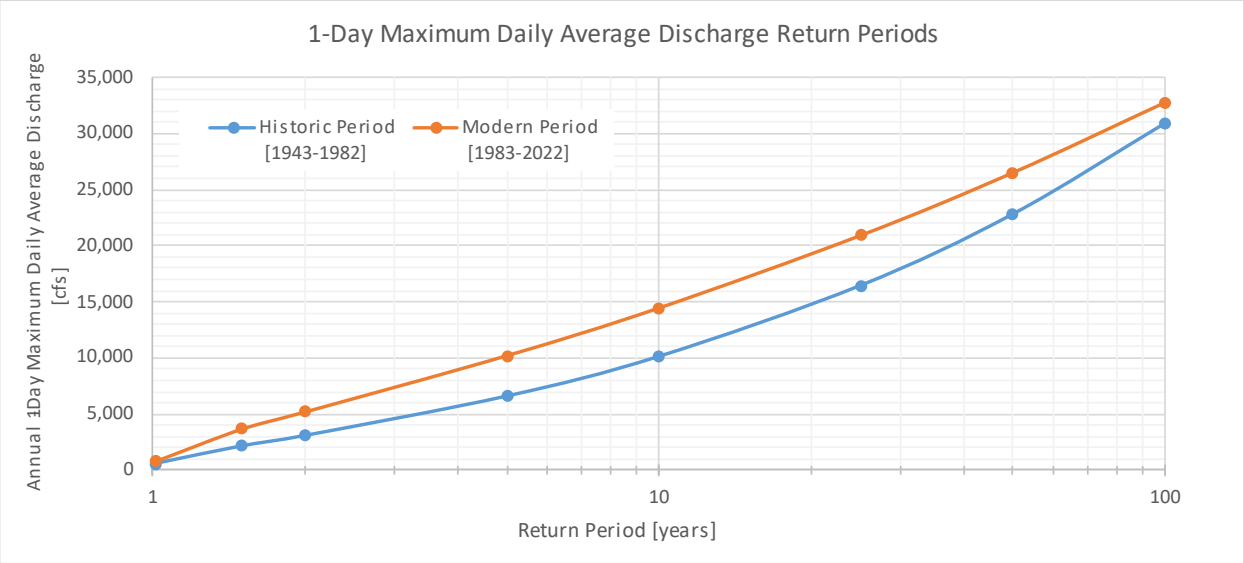


Figure A.5. Historical (1940-1975) versus modern (1980-2015) peak discharge return periods for Cottonwood River near New Ulm, MN (USGS# 05317000).

In addition, the number of years with discharges exceeding the historic peak discharge within a period, the average number of days above the historic peak discharge rates, and the average cumulative volume of discharge above the historic peak discharges are provide (**Table A.7**).

Table A.7. Riparian floodplain connectivity metrics for the Cottonwood River near New Ulm, MN (USGS# 05317000).

Flow Metric	Historic Period [1943-1982]	Modern Period [1983-2022]	% Diff.[1]	Altered Hydrology
5-Year Peak Discharge, Q(5) [cfs]	6,573	10,205	55.3%	+
Number of years with Discharge (Q) > Q_H (5)	7	13	85.7%	+
Average number of days per year Q > Q_H (5)	5	9	74.3%	+
Average annual cumulative volume > Q_H (5) [ac-ft]	56,445	64,216	13.8%	+
10-Year Peak Discharge, Q(10) [cfs]	10,122	14,460	42.9%	+
Number of years with Discharge (Q) > Q_H (10)	4	8	100.0%	+
Average number of days per year Q > Q_H (10)	4	5	23.5%	+
Average annual cumulative volume > Q_H (10) [ac-ft]	51,088	37,110	-27.4%	-
25-Year Peak Discharge, Q(25) [cfs]	16,450	20,912	27.1%	+
Number of years with Discharge (Q) > Q_H (25)	2	4	100.0%	+
Average number of days per year Q > Q_H (25)	3	2	-41.7%	-
Average annual cumulative volume > Q_H (25) [ac-ft]	36,496	8,802	-75.9%	-
50-Year Peak Discharge, Q(50) [cfs]	22,829	26,503	16.1%	+
Number of years with Discharge (Q) > Q_H (50)	2	0	NA	o
Average number of days per year Q > Q_H (50)	2	0	NA	o
Average annual cumulative volume > Q_H (50) [ac-ft]	5,764	0	NA	o
100-Year Peak Discharge, Q(100) [cfs]	30,950	32,765	5.9%	o
Number of years with Discharge (Q) > Q_H (100)	0	0	NA	o
Average number of days per year Q > Q_H (100)	0	0	NA	o
Average annual cumulative volume > Q_H (100) [ac-ft]	0	0	NA	o

[1]No events occurred above return period discharge.
+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period

A.4 GEOMORPHIC STABILITY AND CAPACITY TO TRANSPORT SEDIMENT

The geomorphic stability and capacity to transport sediment metrics are related to the channel forming discharge. An increase in these metrics would be interpreted as an increase in the risk of the stream channel susceptibility to erosion. These metrics include changes to the flow duration curves, the 1.5-year peak flow, the 2-year peak flow. The 1.5-year to 2-year peak flows are generally consider the range of channel forming flow. In addition, the number of years within a period exceeding the historic peak flows, the average number of days above the historic peak flow rates, and the average volume of flow above the

historic peak flows are provide (**Table A.8**). **Figure A.6** is the flow duration curves for the historic and modern periods and **Table A.8** provides a summary of flows for select percent exceedances. Both show that discharges across the flow spectrum have increased substantially, with the exception of the very high flows.

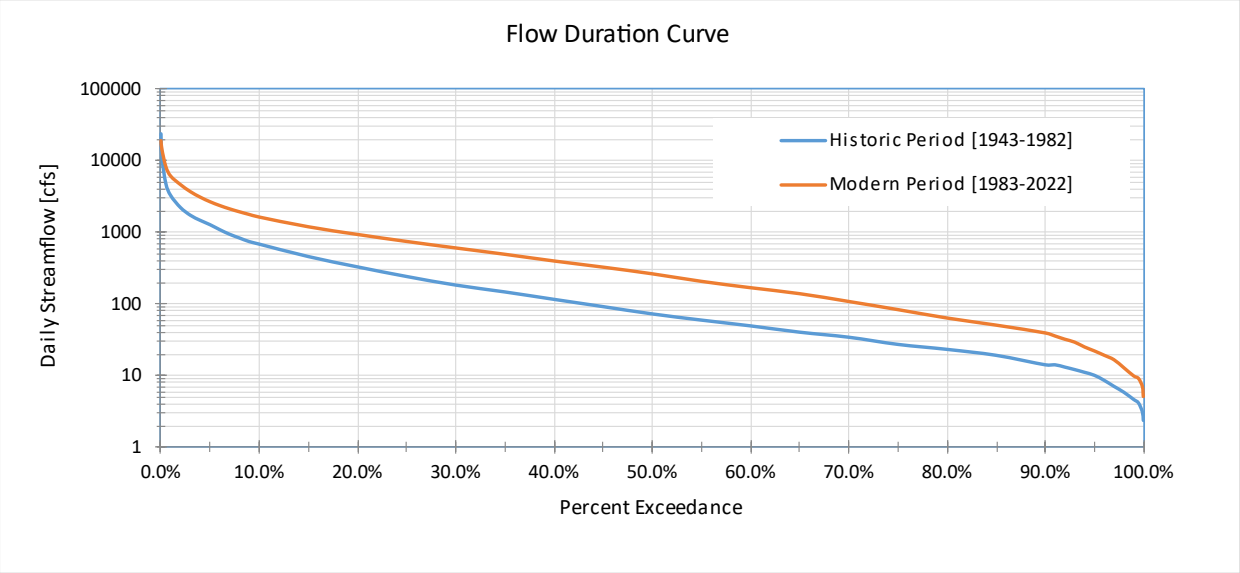


Figure A.6. Historical (1940-1975) versus modern (1980-2015) flow duration for Cottonwood River near New Ulm, MN (USGS# 05317000).

Table A.8. Select summary of the flow duration curves for the Cottonwood River near New Ulm, MN (USGS# 05317000).

Percent Exceedance	Historic Period [1943-1982]	Modern Period [1983-2022]	% Diff.	Altered Hydrology
0.10%	11,078	14,478	30.7%	+
1.0%	3,240	6,099	88.2%	+
10.0%	680	1,640	141.1%	+
25.0%	240	749	212.1%	+
50.0%	72	265	268.1%	+
75.0%	34	109	220.6%	+
90.0%	14	40	183.6%	+
99.0%	5	10	117.4%	+
99.9%	3	7	130.7%	+

+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period

Table A.9 provides the 1.5-year and 2-year annual peak flows and flow statistics, including peak discharge, number of years with flow rates above the historic return period flow, average number of days per year above the historic return period flow, and average volume above the historic return period flow.

Table A.9. Geomorphic stability and capacity to transport sediment metrics for the Cottonwood River near New Ulm, MN (USGS# 05317000).

Flow Metric	Historic Period [1943-1982]	Modern Period [1983-2022]	% Diff.	Altered Hydrology
1.5-Year Peak Discharge, Q(1.5) [cfs]	2,135	3,674	72.1%	+
Number of years with Discharge (Q) > Q_H (1.5)	28	35	25.0%	+
Average number of days per year Q > Q_H (1.5)	11	29	158.5%	+
Average annual cumulative volume > Q_H (1.5) [ac-ft]	49,070	123,090	150.8%	+
2-Year Peak Discharge, Q(2) [cfs]	3,061	5,204	70.0%	+
Number of years with Discharge (Q) > Q_H (2)	17	28	64.7%	+
Average number of days per year Q > Q_H (2)	9	21	125.0%	+
Average annual cumulative volume > Q_H (2) [ac-ft]	56,630	102,840	81.6%	+

+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period

A.5 SETTING GOALS

A summary of the storage goals is provided in **Table 4** in **Section 4.** The following are the methods used to develop those goals. Goals for addressing the change in hydrology were estimated using four methods. Each method is based on different assumptions and altered the metrics for a specific "altered hydrology" group (see Table 11). The first method is focused on the aquatic habitat and geomorphic and ability to transport sediment metric group and uses the change in the cumulative volume for mean daily discharges, exceeding the 1.5-year return period event. The cumulative total volume when the daily average discharge exceeds the 1.5-year peak discharge includes all flows above the 1.5-year peak, i.e. can include storms with much larger return periods. The change in average annual cumulative volume above the 1.5-year peak flow (see **Table A.9**) This method is based on the changes in the observed data and since it includes all flows above the 1.5-year flow relies on the two periods to have a similar distribution of flows. The storage goal based on observed flows is **74,021 AF or 1.07 inches** across the watershed.

The second method is based on the changes in hydrology across the entire annual hydrograph and integrates the differences in return period discharges between the modern and historic period (see **Table A.10**) and finding a probability-weighted representative change in flow rate. A volume is then found by assuming a flow period equal to the change in flow period for the 1.5-year flow (i.e. the change in the number of days above the 1.5-year flow; see **Table A.9**).

Table A.10. Estimated goal for the drainage area of the Cottonwood River near New Ulm, MN (USGS# 05317000) using method 2.

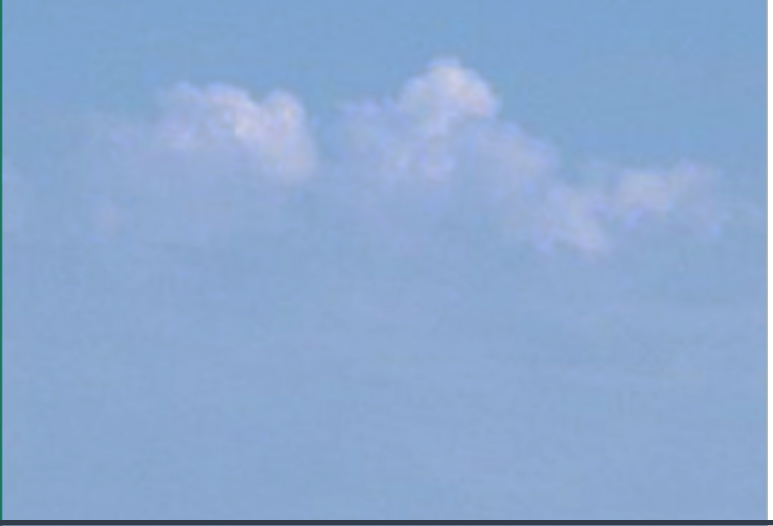
Return Period	Historic Period Discharges (cfs)	Modern Period Discharges (cfs)	Difference (cfs)	Probability of Occurrence	Difference*Probability (cfs)
1.5	2,135	3,674	1539	0.67	1,026.1
2	3,061	5,204	2143	0.50	1,071.4
5	6,573	10,205	3632	0.20	726.5
10	10,122	14,460	4338	0.10	433.8
25	16,450	20,912	4462	0.04	178.5
50	22,829	26,503	3673	0.02	73.5
100	30,950	32,765	1815	0.01	18.2
				Sum (cfs):	3,528
				Sum (ac-ft/day):	6,999
		Number of days:	18	**Total Volume Goal:**	124,835 AF (1.80 in.)

The third method is also based on addressing the effects through the entire flow range and is a revision to Method 2. Method 3 considers incorporates the observed change in the timing of the peak discharge for each return period event. This method uses the probability-weighted representative change in flow rate and multiples the flow rates by the change in the number of days exceeding the return period flow for each return period (see **Table A.11**).

Table A.11. Estimated goal for the drainage area of the Cottonwood River near New Ulm, MN (USGS# 05317000) using method 3.

Return Period	Change in Flow (Q_m-Q_h) [cfs]	Probability of Occurrence	Probability Weighted Flow [AF/day]	Change in number of days above flow (days)	Storage Volume
1.5	1,539	0.67	2,035.7	18	36,309
2	2,143	0.50	2,125.6	12	25,011
5	3,632	0.20	1,441.4	4	5,813
10	4,338	0.10	860.6	1	861
25	4,462	0.04	354.1	0	0
50	3,673	0.02	145.8	0	0
100	1,815	0.01	36.0	0	0
				Total Volume Goal:	67,993 AF (0.98 in.)

The fourth method integrates the changes in the FDC (see Figure A.6) and the probability of occurrence of each flow, also known as the expected number of the FDC. The fourth method estimated a storage goal of **55,063 AF, or 0.79 inches,** across the watershed.



Appendix G: Protection Priority Resources

Protection Priority Resources

Streams

Protection: High Value and Recreational Use

- Meadow Creek (07020008- 601) – WRAPS work group/ MPCA
- Unnamed Creek (07020008- 578) – WRAPS work group/ MPCA
- Unnamed Creek (07020008- 586) – WRAPS work group/ MPCA
- Unnamed Creek (07020008- 623) – WRAPS work group/ MPCA
- Judicial Ditch 9 (07020008- 548) – WRAPS work group/ MPCA
- Unnamed Creek (07020008- 584) – WRAPS work group/ MPCA
- Judicial Ditch 3 (07020008- 588) – WRAPS work group/ MPCA
- County Ditch 38 (07020008- 527) – WRAPS work group/ MPCA
- Unnamed Creek (07020008- 587) – WRAPS work group/ MPCA
- County Ditch 198 (07020008- 589) – WRAPS work group/ MPCA
- Cottonwood River (07020008- 507) – WRAPS work group/ MPCA
- County Ditch 54 (07020008- 543) – WRAPS work group/ MPCA
- County Ditch 68 (07020008- 561) – WRAPS work group/ MPCA
- Unnamed Ditch (07020008- 594) – WRAPS work group/ MPCA
- Unnamed Creek (07020008- 595) – WRAPS work group/ MPCA
- Judicial Ditch 35 (07020008-596) – WRAPS work group/ MPCA
- John's Creek - DNR

Protection: Recreational Use

- Spring Creek, Hindeman (07020007-573, -574) – WRAPS work group/ MPCA, DNR
- Little Cottonwood (07020007-676, -677) – WRAPS work group/ MPCA

- County Ditch 10, John's Creek (7020007-571) – WRAPS work group/ MPCA
- Morgan Creek (0702007-691) – WRAPS work group/ MPCA

Restoration: Barely impaired

- Dutch Charley Creek Reach 518 (impaired by TSS, within 5% of standard) – WRAPS work group/ MPCA
- Dutch Charley Creek Reach 517 (impaired by TSS, within 39% of standard) – WRAPS work group/ MPCA

Lakes

Protection: High recreational use and value or designated wildlife lakes

- Mahlke Marsh (42- 0060-0) – WRAPS work group/ MPCA, BWSR
- Leedom Slough (42- 0114-00) – WRAPS work group/ MPCA, DNR
- Round Lake (17-0048-01) – WRAPS work group/ MPCA, BWSR
- Lake Laura (Plum Creek County Park) (64-0150-00) – WRAPS work group/ MPCA, BWSR
- Willow (51- 0044-00) – WRAPS work group/ MPCA, DNR
- Christianson Marsh (42- 0008-00) – WRAPS work group/ MPCA, DNR
- Double-South (17-0056-00) – WRAPS work group/ MPCA
- Sleepy Eye Lake (08-0045- 00) – WRAPS work group/ MPCA, BWSR
- Augusta – BWSR, DNR
- Long – BWSR
- Wellner – Hageman Reservoir - BWSR

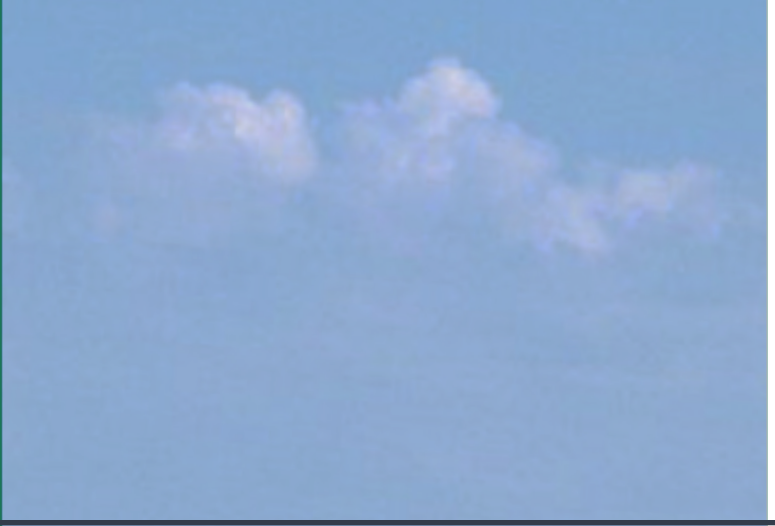
Protection: Nearly impaired

- Hurricane Lake (not impaired, within 6% of standard) – WRAPS work group/ MPCA
- Sleepy Eye Lake (not impaired, within 9% of standard) – WRAPS work group/ MPCA; Delisted

- Wellner-Hageman Reservoir (not impaired, within 14% of standard) – WRAPS work group/ MPCA
- Lake Laura (not impaired, within 18% of standard) – WRAPS work group/ MPCA

Restoration: Barely impaired

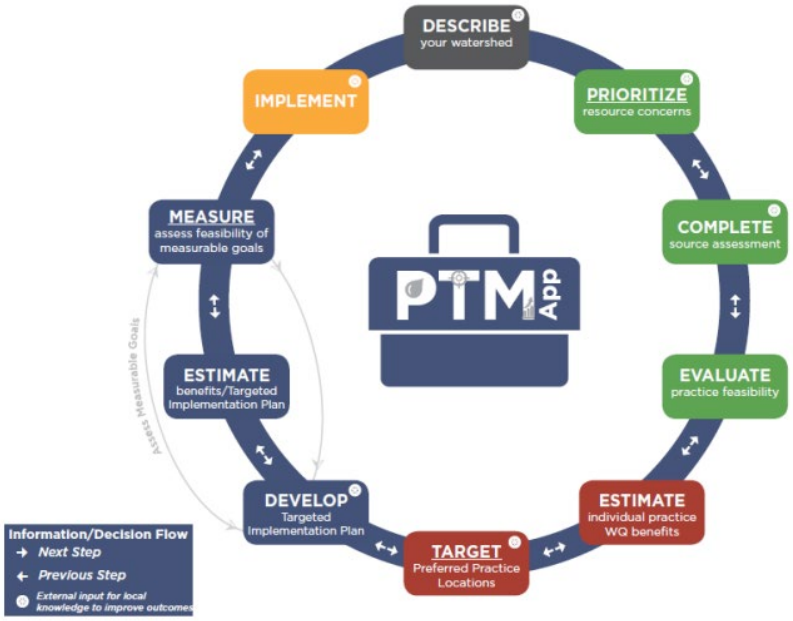
- Bean Lake (impaired by TP, within 40% of standard) – WRAPS work group/ MPCA, BWSR
- Double Lake (impaired by TP, within 38% of standard) – WRAPS work group/ MPCA
- Clear – BWSR
- Boise – BWSR
- Rock – BWSR
- Altermatt- BWSR



Appendix H: PTMApp Implementation Scenario

PTMApp Implementation Scenario

Actions in **Section 5. Implementation** of this plan are based on a PTMApp Implementation Scenario developed by the Steering Committee during the CMMW 1W1P planning process. For the purpose of planning, this implementation scenario is summarized more broadly in **Section 5** to enable flexibility during implementation. This Appendix details the decisions made and shows the best management practices (BMP) targeting maps that resulted from the implementation scenario.



Introduction

The Prioritize, Target, and Measure Application (PTMApp) is a program that can be used by practitioners as a technical bridge from general descriptions of implementation strategies in a local water plan to the identification of implementable on-the-ground BMPs and conservation practices.

PTMApp can be used by Soil and Water Conservation Districts (SWCD), watershed districts, county and local watershed planners, and agency staff and decision-makers to **prioritize** resources and the issues impacting them, **target** specific fields to place practices, and **measure** water quality improvement by estimating the expected nutrient and sediment load reductions delivered to priority resources.

The tool enables practitioners to build prioritized and targeted implementation scenarios, measure the cost-effectiveness of the scenario for improving water quality, and report the results to pursue funds for project implementation.

Table I represents a table of decisions needed to create the PTMApp implementation scenario to inform the Cottonwood-Middle Minnesota CWMP.

Table I: PTMApp decisions made during the 12/20/2023 Steering Committee meeting.

Decision	Implications	Local Decision (12/20/2023)
Criteria used to further screen practices	Criteria are used to further screen practices considered technically feasible for implementation but are not practicable to implement.	See Table 2.
Types of practices to include	Determines types of NRCS practices that are included in the implementation scenario.	See Table 3.
Costs	Costs can represent the "cost" share or total cost. For example, EQIP is the federal government cost share.	Double EQIP Costs (see Table 4) to capture the full cost of the practice + 20% for technical assistance. Include a $4,000 per practice cost for grade stabilization (based off local knowledge and expertise from other watersheds). Soil Health: $150/acre, based off local feedback on a realistic 3-year cost-share.
Spatial Scale	The decision reflects the spatial scale for application of the load reduction goals. For example, will the ability of the proposed BMPs to achieve the sediment, TP, and TN load reduction goal be assessed at the field edge or some other spatial scale. This decision also affects which BMPs are selected as best. The "best" practice locations tend to be near the location where the load reduction is desired. Using the edge of field will tend to spread practices more evenly across the landscape. Use of a planning region outlet will tend to concentrate the practices upstream of that location.	The "best" practices selected based on the highest load reduction at the edge of the field (spreads out practices within the planning region). Practices for the Projects and Support Implementation Program will be capped (initially) at $250,000 (rationale: anything over $250,000 is a Capital Improvement Project).
Parameters and method used to rank the "best" conservation practices.	The "best" conservation practices will differ depending on which parameters are used, and whether they are weighted.	Best conservation practices will be evaluated by sediment cost efficiency.
Process for identifying the number of practices which will be included in the Implementation Scenario.	Decision ultimately affects the "cost(s)" of the Implementation Scenario and ability to achieve the load reduction goals.	Number of practices that can be afforded under the Funding Level 2 (Current Funding + Watershed-Based Implementation Funding).

Using the screening criteria, practices with low potential for water quality benefits are removed from the analysis. Reduction efficiency criteria were set to immediately rule out structural or management practices that would be minimally effective. Two criteria were evaluated- BMPs must reduce loads by at least 10% and treat 50% of a 2-year rain event, and BMPs must reduce a significant amount of load (at least 0.25 tons of sediment/year and 0.25-0.5 lbs nutrients/year). Efficiencies for BMPs with N/A in Table 2 are uniform for all BMPs of a given type and are not screened by that criteria as a result.

Table 2: Recommended PTMApp Screening Criteria

Conservation Practice Name	PTMApp NRCS Practice Code	Remove BMPs with little runoff volume delivery or constituent removal efficiency				Remove BMPs with low removal magnitudes at the edge of field		
		Delivery and Reduction Efficiency Criteria (Value must be greater than)				Reduction Magnitude Selection Criteria (Value must be greater than)		
		Percent of 2-yr, 24-hr event treated	Sediment Reduction (%)	TP Reduction (%)	TN Reduction (%)	Sediment Reduction @ Catchment Outlet (tons/year)	TP Reduction @ Catchment Outlet (lbs/year)	TN Reduction @ Catchment Outlet (lbs/year)
Farm Pond/Wetland	378	50	10	10	10	0.25	0.25	0.5
Drainage Water Management	554	50	10	10	10	0.25	0.25	0.5
Water and Sediment Control Basin	638	50	10	10	10	0.25	0.25	0.5
Regional Wetland/Pond	656_1	50	10	10	10	0.25	0.25	0.5
Large Wetland Restoration	656_2	50	10	10	10	0.25	0.25	0.5
Riparian Buffer	390	50	10	10	10	0.25	0.25	0.5
Filtration Strip	393	50	10	10	10	0.25	0.25	0.5
Saturated Buffer	604	50	10	10	10	0.25	0.25	0.5
Denitrifying Bioreactor	605	50	10	10	10	0.25	0.25	0.5
Infiltration Trench/Small Infiltration Basin	350	50	10	10	10	0.25	0.25	0.5
Multi-stage Ditch (open channel)	582	50	10	10	10	0.25	0.25	0.5
Critical Area Planting	342	N/A				0.25	0.25	0.5
Grade Stabilization	410	N/A				0.25	0.25	0.5
Grassed Waterway	412	N/A				0.25	0.25	0.5
Lake and Wetland Shoreline Restoration	580	N/A				0.25	0.25	0.5
Perennial Crops	327	N/A				0.25	0.25	I
No till	329	N/A				0.25	0.25	I
Cover Crops	340	N/A				0.25	0.25	I
Reduced till	345	N/A				0.25	0.25	I
Forage / Biomass Planting	512	N/A				0.25	0.25	I

Conservation Practice Name	PTMApp NRCS Practice Code	Remove BMPs with little runoff volume delivery or constituent removal efficiency				Remove BMPs with low removal magnitudes at the edge of field		
		Delivery and Reduction Efficiency Criteria (Value must be greater than)				Reduction Magnitude Selection Criteria (Value must be greater than)		
		Percent of 2-yr, 24-hr event treated	Sediment Reduction (%)	TP Reduction (%)	TN Reduction (%)	Sediment Reduction @ Catchment Outlet (lbs/year)	TP Reduction @ Catchment Outlet (lbs/year)	TN Reduction @ Catchment Outlet (lbs/year)
Prescribed Grazing	528	N/A				0.25	0.25	I
Nutrient Management Plan of Groundwater	590_I	N/A				0.25	0.25	I
Nutrient Management Plan for Phosphorus	590_2	N/A				0.25	0.25	
Nutrient Management Plan for Nitrogen	590_3	N/A				0.25		I

After practices were screened, the remainder were ranked by their sediment cost efficiency at the catchment outlet from highest to lowest. Each NRCS conservation practice was allotted a certain amount of funding based on scenario estimates by the Steering Committee, as shown in **Table 3.** Targeted practices were selected from the highest position on the ranked list until each practice funding limit was reached.

Table 3: NRCS Conservation Practices and associated priority for funding (high, medium, or low)

Conservation Practice Name	NRCS Practice Code	Priority
Farm Pond/Wetland	378	M
Drainage Water Management	554	M
Water and Sediment Control Basin	638	H
Large Wetland Restoration	656_1†	M
Regional Wetland/Pond	656_2†	M
Riparian Buffer	390	L
Filtration Strip	393	L
Saturated Buffer	604	None
Denitrifying Bioreactor	605	L
Infiltration Trench/Small Infiltration Basin	350	None
Multi-stage Ditch (open channel)	582	None
Critical Area Planting	342	None
Grade Stabilization	410	H
Grassed Waterway	412	H
Lake and Wetland Shoreline Restoration	580	None (outside PTMApp)
Forage / Biomass Planting	512	None (part of soil health)

Table 4: Unit costs based on 2020 EQIP payment rates.

PTMApp Conservation Practice Name	NRCS Practice Name	PTMApp Treatment Group Code	Treatment Group	NRCS Codes	Previous Values		Updated Values				
					Cost per unit	Units	Cost per unit	Units	Typical Units Installed	Typical Cost	Suggested PTMApp Minimum Cost
bmp_pond	Farm Pond/Wetland	1	Storage	378	$ 2.70	cubic yard	$ 812.05	acre	1	$ 812.05	$ 203.01
bmp_drain	Drainage Water Management	1	Storage	554	$ 2.70	cubic yard	$ 5.54	acre	50	$ 277.00	$ 277.00
bmp_wascob	Water and Sediment Control Basin	1	Storage	638	$ 2.70	cubic yard	$ 4,500.00	each	1	$ 4,500.00	$ 4,500.00
bmp_reg_wet	Regional Wetland/Pond	1	Storage	656_1	$ 2.70	cubic yard	$ 20,439.57	acre	0.25	$ 5,109.89	$ 1,277.47
bmp_nut_wet	Large Wetland Restoration	1	Storage	656_2	$ 2.70	cubic yard	$ 20,439.57	acre	0.25	$ 5,109.89	$ 1,277.47
bmp_riparian*	Riparian Buffer	2	Filtration	390	NA	NA	$ 1,065.87	acre	3.00	$ 3,197.61	$ 799.40
bmp_filtst	Filtration Strip	2	Filtration	393	$ 474.07	acre	$ 496.08	acre	1	$ 496.08	$ 124.02
bmp_satbuff	Saturated Buffer	3	Biofiltration	604	$ 44.92	cubic yard	$ 1,367.78	acre†	0.92	$ 1,258.36	$ 1,258.36
bmp_denit	Denitrifying Bioreactor	3	Biofiltration	605	$ 44.92	cubic yard	$ 38.02	cu. yd‡	200	$ 7,604.00	$ 1,896.25
bmp_inftrech	Infiltration Trench/Small Infiltration Basin	4	Infiltration	350	$ 27,199.29	acre	$ 36.45	sq. yd'	111	$ 4,045.95	$ 1,011.49
bmp_ditch2s	Multi-stage Ditch (open channel)	4	Infiltration	582	$ 27,199.29	acre	$ 4,036.56	acre†	1.25	$ 5,045.70	$ 1,261.43
bmp_crit_plant	Critical Area Planting	5	Protection	342	$ 2,133.35	acre	$ 293.77	acre	1	$ 293.77	$ 73.44
bmp_protect	Grade Stabilization	5	Protection	410	$ 2,133.35	acre	$ 53.10	sq. yd	80	$ 4,248.00	$ 1,062.00
bmp_gwater	Grassed Waterway	5	Protection	412	$ 2,133.35	acre	$ 1,062.86	acre†	2.5	$ 2,657.16	$ 664.29
bmp_shore	Lake and Wetland Shoreline Restoration	5	Protection	580	$ 2,133.35	acre	$ 37.98	sq. yd	111	$ 4,215.78	$ 1,053.95
bmp_peren	Perennial Crops	6	Source Reduction	327	$ 30.87	acre	$ 480.80	acre	1	$ 480.80	$ 120.20
bmp_no_till	No Tillage	6	Source Reduction	329	NA	NA	$ 11.03	acre	100	$ 1,103.00	$ 275.75
bmp_covcrop	Cover Crops	6	Source Reduction	340	$ 30.87	acre	$ 33.52	acre	40	$ 1,340.80	$ 335.20
bmp_red_till	Reduced Tillage	6	Source Reduction	345	NA	NA	$ 11.03	acre	100	$ 1,103.00	$ 275.75
bmp_forage*	Forage / Biomass Planting	6	Source Reduction	512	NA	NA	$ 44.84	acre	40	$ 1,793.60	$ 448.40
bmp_grazing*	Prescribed Grazing	6	Source Reduction	528	NA	NA	$ 6.34	acre	40	$ 253.60	$ 63.40
bmp_no3	Nutrient Management of Groundwater	6	Source Reduction	590_1	$ 30.87	acre	$ 6.84	acre	40	$ 273.60	$ 68.40
bmp_p_mgmt	Nutrient Management for Phosphorus	6	Source Reduction	590_2	NA	NA	$ 6.84	acre	40	$ 273.60	$ 68.40
bmp_n_mgmt	Nutrient Management for Nitrogen	6	Source Reduction	590_3	NA	NA	$ 6.84	acre	40	$ 273.60	$ 68.40

* Costs are based on 2020 EQIP payment rates
† EQIP payment rate based on linear feet. An assumed practice width was applied to bmp_satbuff, bmp_ditch2s, and bmp_gwater (50ft, 60ft, and 100ft, respectively).
‡ Volume was calculated based on an assumed 1/8" runoff across the drainage area of the BMP
' EQIP payment rate based on cubic yards. A practice depth of 1.5 yd was assumed.

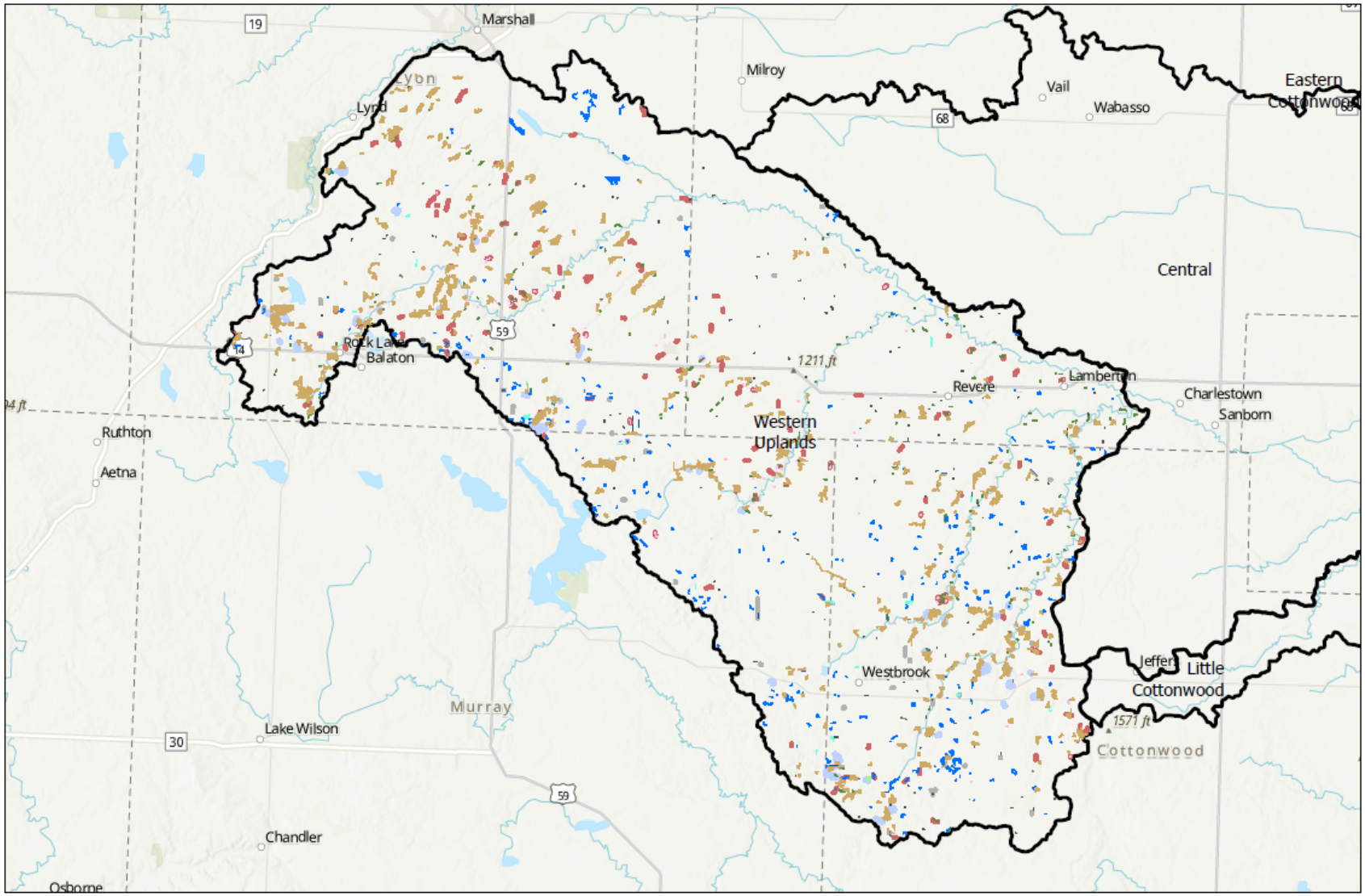
PTMApp Implementation Scenarios

Western Uplands

The Table below shows the PTMApp implementation scenario results for the Western Uplands Planning Region. The next page includes a map showing where practices are located.

Table 5. Western Uplands Planning Region PTMApp outputs.

BMP Treatment Group	Number of Practices	Total Cost ($)	Values at Catchment Outlet			Additional Water Storage (ac-ft)	BMP Surface Area (acres)
			Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
378 - Farm pond/wetland	38	$178,892.60	5,218	1,044	22,181	362	
554 - Drainage water management	329	$182,266.00	18,164	3,869	67,758	3,400	
638 - WASCOB	54	$486,000.00	5,436	465	6,806	190	
656_1 - Regional wetland	4	$187,553.72	761	77	2,204	27	
656_2 - Large wetland restoration	3	$186,644.59	773	40	1,911	25	
390 - Riparian Buffer	37	$79,150.49	910	144	2,982		
393 - Filtration Strip	166	$80,103.03	736	153	3,092		
605 - Denitrifying Bioreactor	1	$78,441.20	188	10	340		
410 - Grade Stabilization	122	$488,000.00	1,938	67	1,321		196
412 - Grassed Waterway	116	$485,461.39	2,309	77	1,531		228
340 - Cover Crops	454	$1,312,985.80	30,507	1,986	40,152		8,753
512 - Forage / Biomass Planting	378	$145,373.84	14,529	276	2,223		969
Scenario 1 Total	**1,702**	**$ 3,890,873**	**81,469**	**8,208**	**152,501**	**4,004**	**10,147**

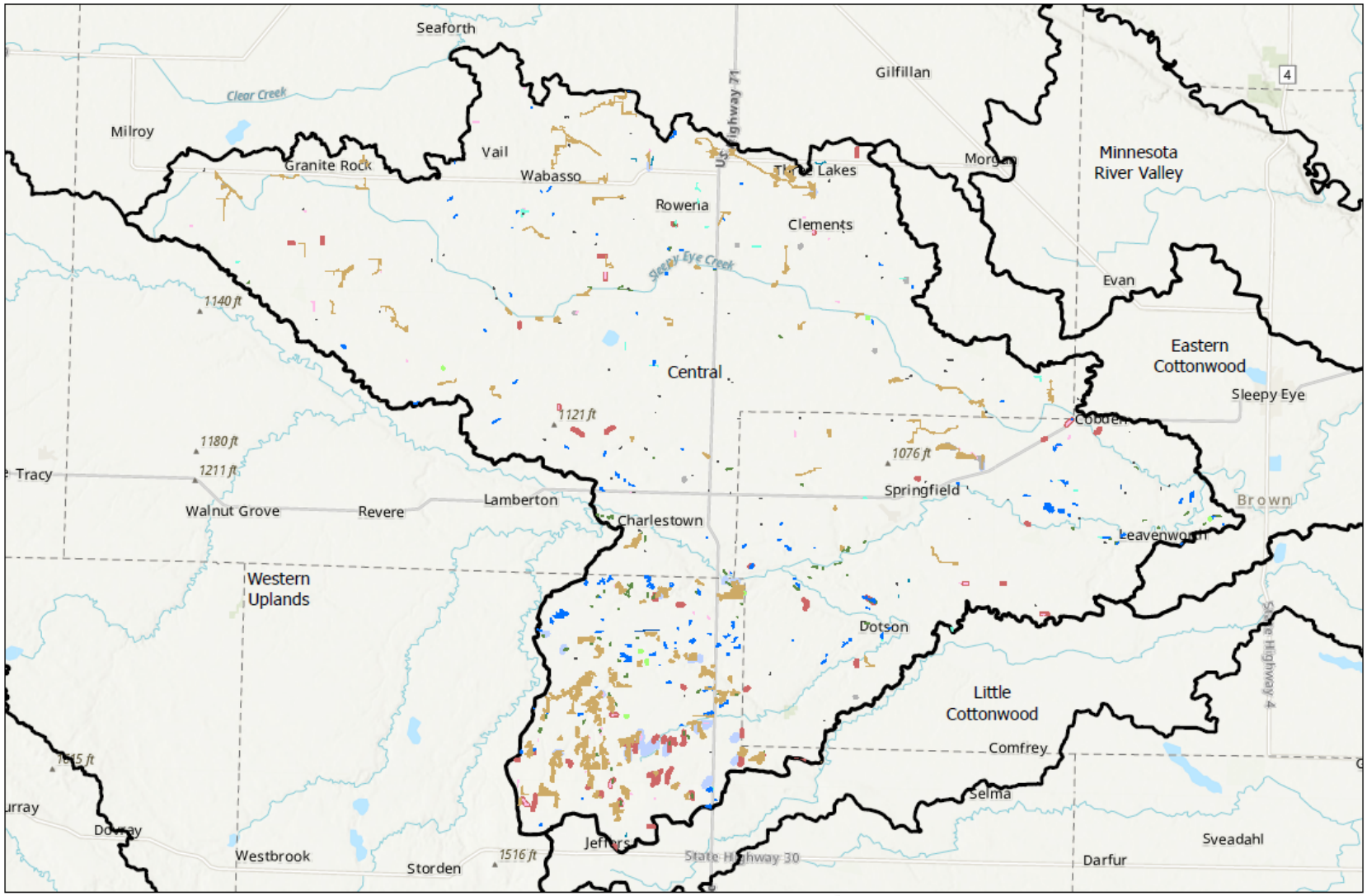

Marshall
Milroy
Vail
Wabasso
Eastern Cottonwood
Lyon
Lynd
Central
Rock Lake
Balaton
1211 ft
Revere
Lamberton
Charlestown
Sanborn
Ruthton
Aetna
Western Uplands
Westbrook
Jeffers
Little Cottonwood
1571 ft
Cottonwood
Murray
Lake Wilson
Chandler
Osborne
19
68
59
14
30
Planning Region Boundary
SANDPIPER BMPs
BMP Type (NRCS code)
Farm Pond (378)
Drainage Water Mgmt (554)
WASCOB (638)
Regional Wetland (656)
Nutrient Reduction Wetland (656)
Riparian Buffer (390)
Filtration Strip (393)
Denitrifying Bioreactor (605)
Grade Stabilization (410)
Grassed Waterway (412)
Cover Crops (340)
Forage/Biomass planting (512)
N
0 2 4 8 12
Miles

Central

The Table below shows the PTMApp implementation scenario results for the Central Planning Region. The next page includes a map showing where practices are located.

Table 6. Central Planning Region PTMApp outputs.

BMP Treatment Group	Number of Practices	Total Cost ($)	Values at Catchment Outlet			Additional Water Storage (ac-ft)	BMP Surface Area (acres)
			Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
378 - Farm pond/wetland	21	$81,867.66	2,033	829	17,610	208	
554 - Drainage water management	147	$81,438.00	6,105	1,853	31,900	980	
638 - WASCOB	24	$216,000.00	1,780	191	2,865	77	
656_1 - Regional wetland	4	$65,093.78	76	16	366	5	
656_2 - Large wetland restoration	6	$103,004.54	210	32	1,062	16	
390 - Riparian Buffer	12	$35,975.80	507	62	1,199		
393 - Filtration Strip	83	$36,072.07	404	117	2,408		
605 - Denitrifying Bioreactor	7	$34,093.36	36	4	123		
410 - Grade Stabilization	54	$216,000.00	715	35	661		97
412 - Grassed Waterway	61	$215,252.61	797	39	669		101
340 - Cover Crops	188	$598,269.71	11,790	904	18,285		3,988
512 - Forage / Biomass Planting	144	$52,986.46	3,783	100	810		353
Scenario 1 Total	**751**	**$ 1,736,054**	**28,236**	**4,182**	**77,959**	**1,286**	**4,539**

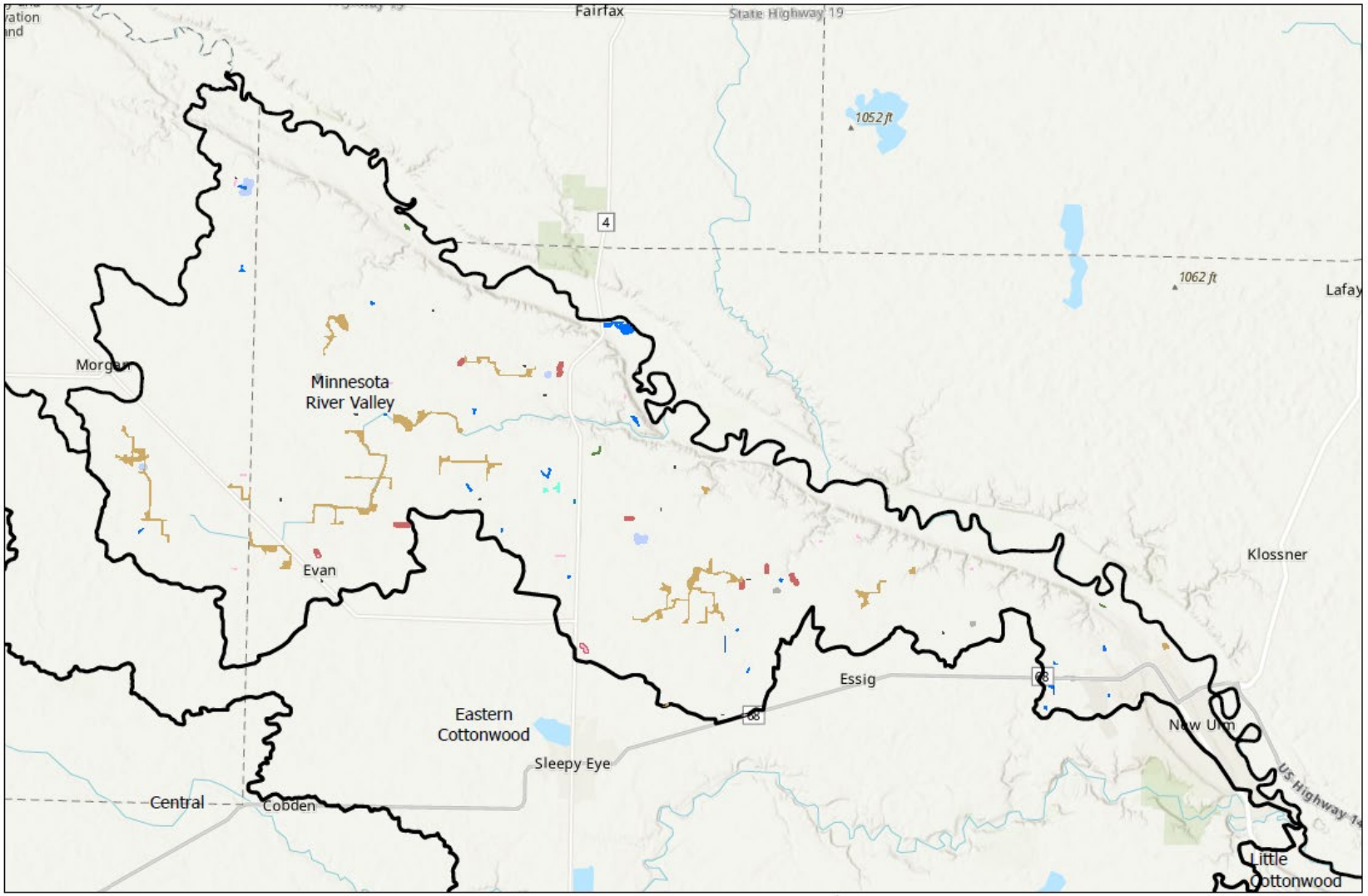

Seaforth
Clear Creek
Milroy
Granite Rock
Vail
Wabasso
Rowena
Clements
Gilfillan
Morgan
Three Lakes
Minnesota River Valley
Sleepy Eye Creek
1140 ft
Evan
Eastern Cottonwood
Central
Sleepy Eye
Cobden
1121 ft
1180 ft
1211 ft
1076 ft
Springfield
Tracy
Walnut Grove
Revere
Lamberton
Charlestown
Brown
Leavenworth
Western Uplands
Dotson
Little Cottonwood
Comfrey
Selma
Sveadahl
Darfur
Westbrook
Storden
1516 ft
Jeffers
State Highway 30
State Highway 4
Planning Region Boundary
SANDPIPER BMPs
BMP Type (NRCS code)
Farm Pond (378)
Drainage Water Mgmt (554)
WASCOB (638)
Regional Wetland (656)
Nutrient Reduction Wetland (656)
Riparian Buffer (390)
Filtration Strip (393)
Denitrifying Bioreactor (605)
Grade Stabilization (410)
Grassed Waterway (412)
Cover Crops (340)
Forage/Biomass planting (512)
N
0 1.75 3.5 7 10.5
Miles

Minnesota River Valley

The Table below shows the PTMApp implementation scenario results for the Minnesota River Valley Planning Region. The next page includes a map showing where practices are located.

Table 7. Minesota River Valley Planning Region PTMApp outputs.

BMP Treatment Group	Number of Practices	Total Cost ($)	Values at Catchment Outlet			Additional Water Storage (ac-ft)	BMP Surface Area (acres)
			Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
378 - Farm pond/wetland	3	$12,428.60	675	170	4,026	95	
554 - Drainage water management	22	$12,188.00	639	214	3,555	168	
638 - WASCOB	4	$36,000.00	184	37	544	12	
656_1 - Regional wetland	2	$23,910.15	46	10	242	4	
656_2 - Large wetland restoration	1	$4,091.09	15	2	67	1	
390 - Riparian Buffer	3	$4,861.65	53	16	329		
393 - Filtration Strip	14	$5,467.74	73	16	343		
410 - Grade Stabilization	9	$36,000.00	82	4	73		11
412 - Grassed Waterway	11	$30,870.52	132	5	94		15
340 - Cover Crops	21	$97,642.12	2,215	148	2,987		651
512 - Forage / Biomass Planting	4	$1,165.24	104	2	18		8
Scenario 1 Total	**94**	**$264,625**	**4,218**	**624**	**12,278**	**280**	**684**

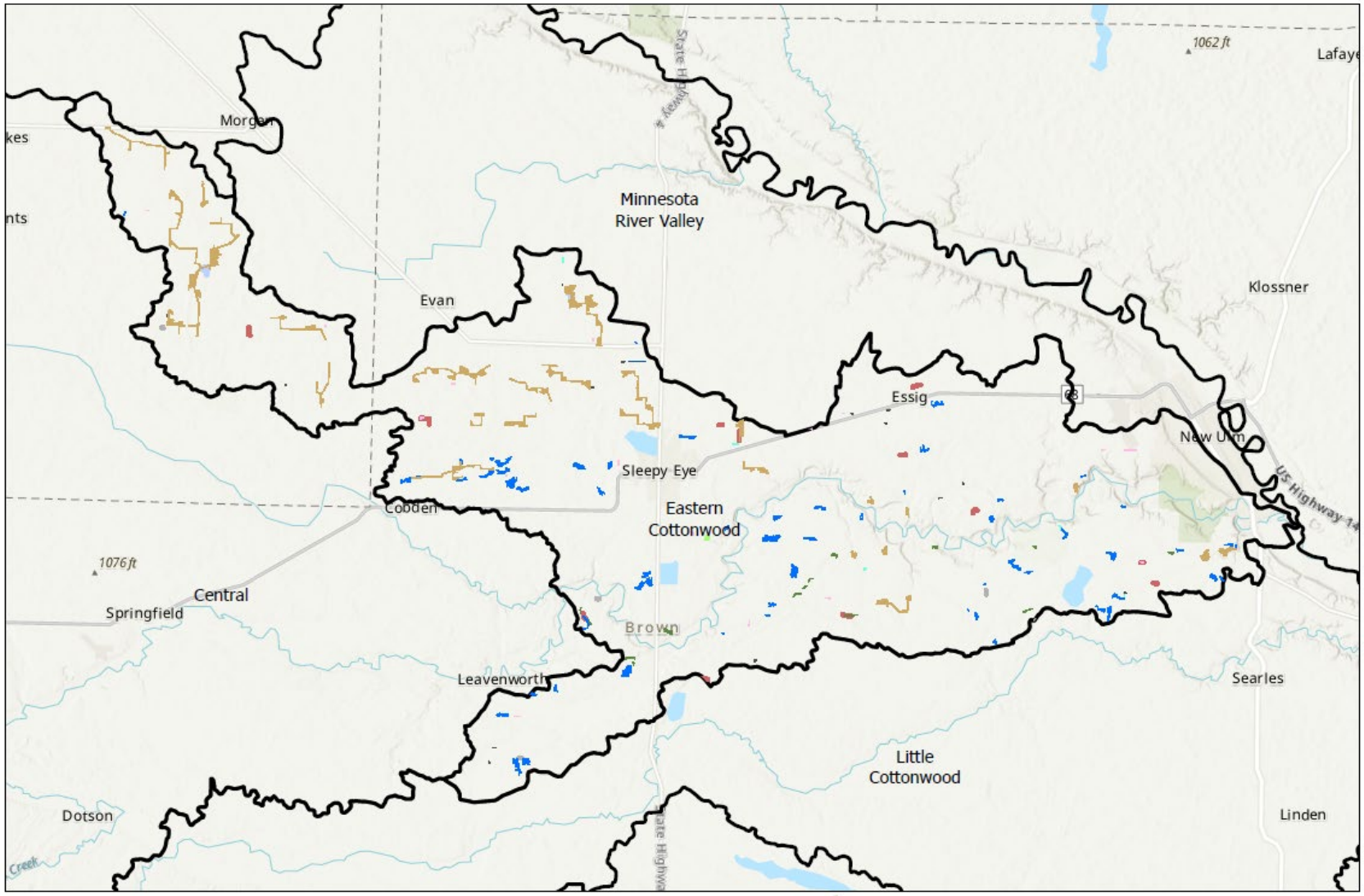

Fairfax
State Highway 19
1052 ft
1062 ft
Lafay
Morgan
Minnesota
River Valley
Evan
Klossner
Essig
Eastern
Cottonwood
New Ulm
Sleepy Eye
Central
Cobden
US Highway 14
Little
Cottonwood
Planning Region Boundary
SANDPIPER BMPs
BMP Type (NRCS code)
Farm Pond (378)
Drainage Water Mgmt (554)
WASCOB (638)
Regional Wetland (656)
Nutrient Reduction Wetland (656)
Riparian Buffer (390)
Filtration Strip (393)
Grade Stabilization (410)
Grassed Waterway (412)
Cover Crops (340)
Forage/Biomass planting (512)
N
0 1 2 4 6
Miles

Eastern Cottonwood

The Table below shows the PTMApp implementation scenario results for the Eastern Cottonwood Planning Region. The next page includes a map showing where practices are located.

Table 8. Eastern Cottonwood Planning Region PTMApp outputs.

BMP Treatment Group	Number of Practices	Total Cost ($)	Values at Catchment Outlet			Additional Water Storage (ac-ft)	BMP Surface Area (acres)
			Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
378 - Farm pond/wetland	6	$16,954.33	613	237	5,140	41	
554 - Drainage water management	81	$44,874.00	3,522	1,519	26,769	653	
638 - WASCOB	2	$18,000.00	159	20	279	8	
656_1 - Regional wetland	1	$19,182.66	11	5	125	2	
656_2 - Large wetland restoration	1	$7,273.05	9	1	69	1	
390 - Riparian Buffer	4	$7,028.23	99	32	653		
393 - Filtration Strip	17	$7,065.25	93	29	548		
605 - Denitrifying Bioreactor	1	$9,469.44	12	1	19		
410 - Grade Stabilization	11	$44,000.00	287	5	102		15
412 - Grassed Waterway	19	$50,329.19	181	10	153		24
340 - Cover Crops	39	$128,352.29	2,702	194	3,924		856
512 - Forage / Biomass Planting	18	$6,084.39	388	12	93		41
Scenario 1 Total	**200**	**$358,612.84**	**8,077**	**2,065**	**37,872**	**704**	**935**

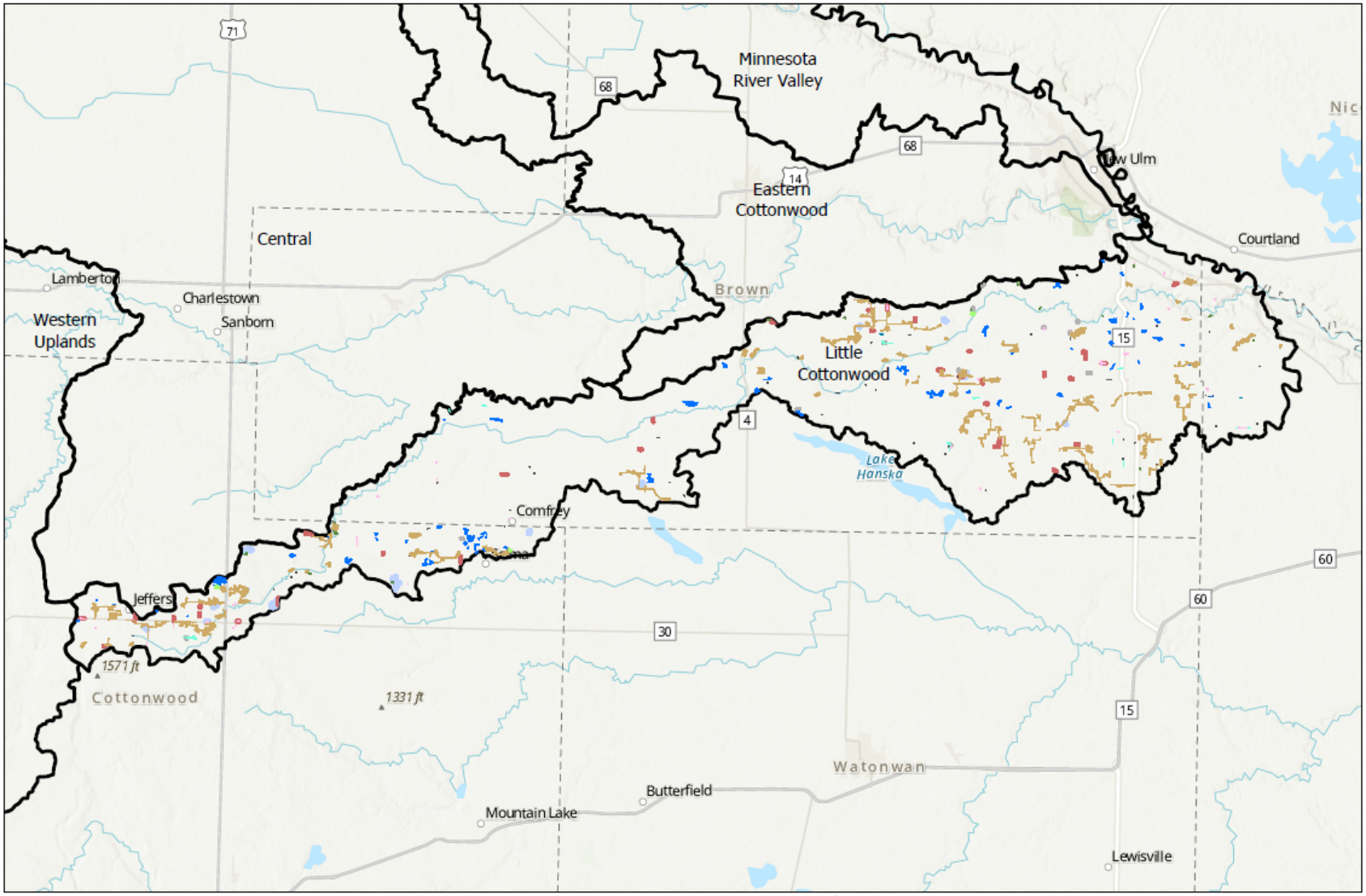

Morgan
Minnesota
River Valley
Evan
Klossner
Essig
New Ulm
Sleepy Eye
Cobden
Eastern
Cottonwood
1076 ft
Central
Springfield
Brown
Leavenworth
Searles
Little
Cottonwood
Dotson
Linden
1062 ft
Lafaye
US Highway 14
Planning Region Boundary
SANDPIPER BMPs
BMP Type (NRCS code)
Farm Pond (378)
Drainage Water Mgmt (554)
WASCOB (638)
Regional Wetland (656)
Nutrient Reduction Wetland (656)
Riparian Buffer (390)
Filtration Strip (393)
Denitrifying Bioreactor (605)
Grade Stabilization (410)
Grassed Waterway (412)
Cover Crops (340)
Forage/Biomass planting (512)
N
0 1 2 4 6
Miles

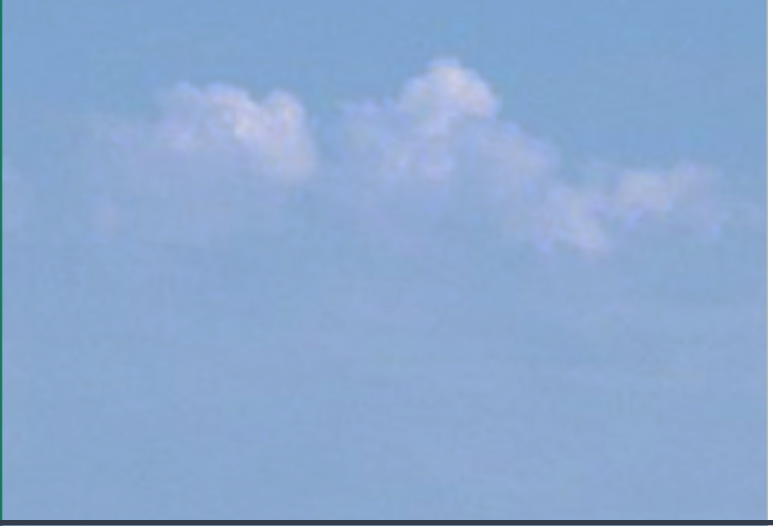
Little Cottonwood

The Table below shows the PTMApp implementation scenario results for the Little Cottonwood Planning Region. The next page includes a map showing where practices are located.

Table 9. Little Cottonwood Planning Region PTMApp outputs.

BMP Treatment Group	Number of Practices	Total Cost ($)	Values at Catchment Outlet			Additional Water Storage (ac-ft)	BMP Surface Area (acres)
			Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
378 - Farm pond/wetland	10	$47,564.66	975	364	7,891	66	
554 - Drainage water management	86	$47,669.56	4,128	1,299	23,176	592	
638 - WASCOB	15	$135,000.00	856	137	1,796	38	
656_1 - Regional wetland	1	$40,183.59	14	2	69	1	
656_2 - Large wetland restoration	2	$55,275.17	30	8	298	3	
390 - Riparian Buffer	12	$21,768.50	217	71	1,326		
393 - Filtration Strip	51	$20,977.32	239	63	1,276		
605 - Denitrifying Bioreactor	3	$18,468.43	19	2	71		
410 - Grade Stabilization	32	$128,000.00	340	15	266		40
412 - Grassed Waterway	44	$127,169.84	436	23	385		60
340 - Cover Crops	95	$378,339.33	6,058	572	11,571		2,522
512 - Forage / Biomass Planting	23	$6,056.37	340	11	92		40
Scenario 1 Total	**374**	**$1,026,473**	**13,562**	**2,569**	**48,218**	**699**	**2,662**


Minnesota River Valley
Eastern Cottonwood
Central
Western Uplands
Little Cottonwood
Brown
Lamberton
Charlestown
Sanborn
Comfrey
Jeffers
Cottonwood
1571 ft
1331 ft
Watonwan
Butterfield
Mountain Lake
Lewisville
Courtland
Lake Hanska
Planning Region Boundary
SANDPIPER BMPs
BMP Type (NRCS code)
Farm Pond (378)
Drainage Water Mgmt (554)
WASCOB (638)
Regional Wetland (656)
Nutrient Reduction Wetland (656)
Riparian Buffer (390)
Filtration Strip (393)
Denitrifying Bioreactor (605)
Grade Stabilization (410)
Grassed Waterway (412)
Cover Crops (340)
Forage/Biomass planting (512)
N
0 1.75 3.5 7 10.5
Miles

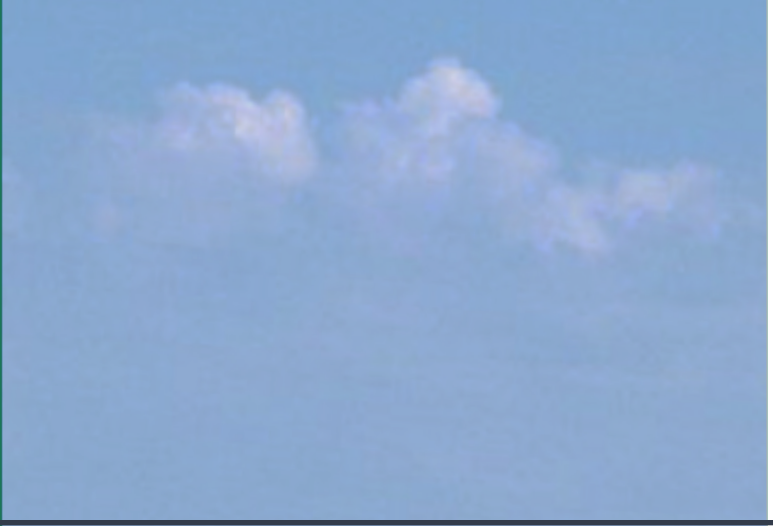


Appendix I: Regulatory Comparison Table

Appendix I. Regulatory Comparison Table

	Redwood	Brown	Cottonwood	Murray	Lyon
Shoreland Management	County ordinance	County ordinance	County ordinance	County ordinance	County ordinance
Floodplain Management	County ordinance	County ordinance	County ordinance	County ordinance	County ordinance
Subsurface Sewage Treatment System (SSTS)	County ordinance	County ordinance	County ordinance	County ordinance	County ordinance
Solid Waste Management	County	County	County ordinance	County	County
Hazard Management	County (Hazard Mitigation Plan)	County (All Hazard Mitigation Plan)	County (All Hazard Mitigation Plan)	County (All Hazard Mitigation Plan)	County (All Hazard Mitigation Plan)
Feedlots	N/A	Delegated	Delegated	Delegated	Delegated
Buffers	County ordinance + SWCD	BWSR is enforcing buffer law for Brown County	SWCD	County ordinance	County ordinance
Wetland Conservation Act	Redwood SWCD	Brown County	Cottonwood SWCD	Murray SWCD	Lyon SWCD

	Redwood	Brown	Cottonwood	Murray	Lyon
Aquatic Invasive Species (AIS)	County (AIS prevention plan)	Brown SWCD	County	County	County
Public Drainage Systems	County Board of Commissioners (520 mi ditches, 1100 miles of tile)	County Board of Commissioners (235 miles ditch, 449 miles of tile drainage)	County Board of Commissioners	County Board of Commissioners	County Planning & Zoning
Noxious weeds	County	County	County	County	County



Appendix J: Local Funding Authorities

Local Funding Authorities

Purpose: *This table provides an overview of Minnesota statutes and laws that provide authorities to local governments to fund water management projects, to be used by local governments while exploring funding options for locally funded water projects. Does not include fees, fines, or wetland banking, grants, etc. This is not a legal document and should not be considered comprehensive, complete, or authoritative.*

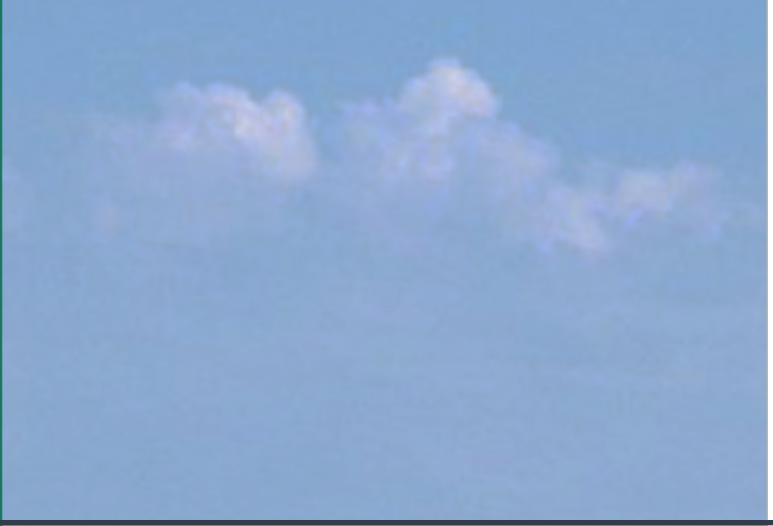
note: "metro" refers to Anoka, Carver, Dakota, Hennepin, Ramsey, and Washington counties or watershed organizations in the 7-county metro area.

Citation	Applies to	Summary *(please see details in the full text of each provision)*
§40A.152	Counties (metro)	Money from the county conservation account (see chapter 287) must be spent by the county to reimburse the county and taxing jurisdictions within the county for revenue lost under the conservation tax credit under §273.119 or the valuation of agricultural preserves under §473H.10. Money remaining in the account after reimbursement may be spent on: 1) agricultural land preservation and conservation planning and implementation of official controls under this chapter or chapter 473H; 2) soil conservation activities and enforcement of soil loss ordinances; 3) incentives for landowners who create exclusive agricultural use zones; 4) payments to municipalities within the county for the purposes of clauses 1-3.
§103B.241	Watershed districts & watershed management organizations (metro)	May levy a tax to pay for plan preparation costs & projects in the adopted plan necessary to implement the Metropolitan Water Management Program.
§103B.245	Watershed districts & watershed management organizations (metro)	May establish a watershed management tax district within the watershed to pay the costs of: planning required under §§103B.231 and 103B.235, the capital costs of water management facilities described in the capital improvement program of the plans, and normal & routine maintenance of the facilities.
§103B.251	Watershed districts & watershed management organizations (metro), counties	May certify for payment by the county all or any part of the cost of a capital improvement contained in the capital improvement program of plans developed in accordance with §103B.231. Counties may issue general obligation bonds to pay all or part of the cost of project. The county may pay the principal and interest on the bonds by levying a tax on all property located in the watershed or subwatershed in which the bonds are issued. Loans from counties to watershed districts for the purposes of implementing this section are not subject to the loan limit set forth in §103D.335.

Citation	Applies to	Summary *(please see details in the full text of each provision)*
§103B.331 Subdivisions 3 & 4	Counties	(3) May charge users for services provided by the county necessary to implement the local water management plan.
		(4) May establish one or more special taxing districts within the county and issue bonds to finance capital improvements under the Comprehensive Local Water Management Act. After adoption of the resolution, a county may annually levy a tax on all taxable property in the district.
§103B.335	Counties, municipalities, or townships	May levy a tax to implement the Comprehensive Local Water Management Act or a comprehensive watershed management plan (§103B.3363). A county may levy amounts needed to pay the reasonable costs to SWCDs and WDs of administering and implementing priority programs identified in an approved & adopted plan or comprehensive watershed management plan.
§103B.555 Subdivisions 1 & 3	Counties	(1) May establish a Lake Improvement District and impose service charges on the users of lake improvement district services within the district. May levy an ad valorem tax solely on property within the lake improvement district for projects of special benefit to the district; may impose or issue any combination of service charges, special assessments, obligations, and taxes.
		(3) A tax under Subd. 1 may be in addition to amounts levied on all taxable property in the county for the same/similar purposes.
§103C.331 Subdivision 16	County boards on behalf of soil and water conservation districts	May levy an annual tax on all taxable real property in the district for the amount that the board determines is necessary to meet the requirements of the district.
§103D.335	Watershed districts	A watershed district has the power to incur debts, liabilities, and obligations and to provide for assessments and to issue certificates, warrants, and bonds.
§103D.601	Watershed districts	May set up special taxing districts via petition to conduct larger, Capital Improvement Projects (CIP). The costs to the affected parties cannot exceed $750,000.
§103D.615	Watershed districts	May declare an emergency and order that work be done without a contract. The cost of work undertaken without a contract may be assessed against benefitted properties or raised by an ad valorem tax levy if the cost is not more than 25% of the most recent administrative ad valorem levy and the work is found to be of common benefit to the watershed district.

Citation	Applies to	Summary *(please see details in the full text of each provision)*
§103D.729	Watershed districts	May establish a water management district or districts in the territory within the watershed to collect revenues and pay the costs of projects initiated under §§103B.231, 103D.601, 103D.605, 103D.611, or 103D.730. (Guidelines for creating water management districts)
§103D.901	Watershed districts	County auditors assess the amount specified in an assessment statement filed by managers. The county may issue bonds (§103E.635). An assessment may not be levied against a benefited property in excess of the amount of benefits received.
§103D.905 Subdivisions 2,3, 7-9	Watershed districts	Established funds for watershed districts (not a complete list – see full statute language): **Organizational expense fund** - consisting of an ad valorem tax levy, shall be used for organizational expenses and preparation of the watershed management plan for projects. **General fund** - consisting of an ad valorem tax levy, shall be used for general administrative expenses and for the construction or implementation and maintenance of projects of common benefit to the watershed district. May levy a tax not to exceed 0.00798 percent of estimated market value to pay the cost attributable to projects initiated by petition. **Repair and maintenance funds** - established under §103D.631, Subd. 2. **Survey and data acquisition fund** - consists of the proceeds of a property tax that can be levied only once every 5 years and may not exceed 0.02418 percent of estimated market value. **Project tax levy** - a WD may levy a tax: 1. To pay the costs of projects undertaken by the WD which are to be funded, in whole or in part, with the proceeds of grants or construction or implementation loans under the Clean Water Partnership Law; 2. To pay the principal of, or premium or administrative surcharge (if any), and interest on, the bonds and notes issued by the WD pursuant to §103F.725; 3. To repay the construction or implementation loans under the Clean Water Partnership Law.
§103E.011 Subdivision 5	Drainage authorities	A drainage authority can accept and use external sources of funds together with assessments from benefited landowners in the watershed of the drainage system for the purposes of flood control, wetland restoration, or water quality improvements.
§103E.015 Subdivision 1a	Drainage authorities	When planning a "drainage project" or petitioned repair, the drainage authority must investigate the potential use of external sources of funding, including early coordination for funding and technical assistance with other applicable local government units.
§103E.601 §103E.635 §103E.641	Drainage authorities	Funding of all costs for constructed "**drainage projects"** are apportioned to benefited properties within the drainage system pro rata on the basis of the benefits determined (§103E.601). After the contract for the construction of a drainage project is awarded, the board of an affected county may issue bonds of the county

Citation	Applies to	Summary *(please see details in the full text of each provision)*
		in an amount necessary to pay the cost of establishing and constructing the drainage project. (§103E.635). Drainage authorities may issue drainage funding bonds (§103E.641).
§103E.728 §103E.731 §103E.735	Drainage authorities	Costs for drainage system **repairs** are apportioned pro rata on all benefited properties of record. The drainage authority may charge an additional assessment on property that is in violation of §103E.021 (ditch buffers) or a county soil loss ordinance (§103E.728). If there is not enough money in the drainage system account to make a repair, the board shall assess the costs of the repairs on all property and entities that have been assessed benefits for the drainage system (§103E.731). To create a repair fund for a drainage system to be used only for repairs, the drainage authority may apportion and assess an amount against all property and entities benefited by the drainage system, including property not originally assessed and subsequently found to be benefited according to law. (§103E.735).
Chapter 287	Counties	Counties participating in the agricultural land preservation program impose a fee of $5 per transaction on the recording or registration of a mortgage or deed that is subject to tax under §§287.05 and 287.21.
Chapter 365A	Towns	Townships may create subordinate service districts with special taxing authority. Requires a petition signed by at least 50 percent of the property owners in the part of the town proposed for the subordinate service district.
§373.475	Counties	A county board must deposit the money received from the sale of land under Laws 1998, chapter 389, article 16, section 31, subd. 3, into an environmental trust fund. The county board may spend interest earned on the principal only for purposes related to the improvement of natural resources.
Chapter 429	Municipalities	May levy special assessments against properties benefitting from special services (including curbs, gutters and storm sewer, sanitary sewers, holding ponds, and treatment plants).
§444.075	Municipalities	May collect stormwater utility fees to build, repair, operate & maintain stormwater management systems.
§462.358 Subdivision 2b(c)	Municipalities	May accept a cash fee for lots created in a subdivision or redevelopment that will be served by municipal sanitary sewer and water service or community septic and private wells. May charge dedication fees for the acquisition and development or improvement of wetlands and open space based on an approved parks and open space plan.
M. L. 1998, Chapter 389 Article 3, Section 29	Red River Watershed Management Board	Watershed Districts that are members of the Red River Watershed Management Board may levy an ad valorem tax not to exceed 0.04836 percent of the taxable market value of all property within their district. This levy is in excess of levies authorized by §103D.905.



Appendix K: Formal Review Comments

Cottonwood-Middle Minnesota Watershed CWMP

Formal Review Comments and Responses

#	Commenter	Section	Page	Comment	Material	Editoral	Note	Change Needed (Y/N)	Resolution
1	USFWS	2	N/A	Table 2-1: Are the WPA acres being counted twice: once in their category, and again as part of the USFWS lands below?	x			Y	Upon review of the GIS data, the WPAs line up with the USFWS areas that are also WPAs so they are being counted twice, and are reflected in the USFWS lands acres as well as their own line. WPA line will be removed to avoid duplication.
2	Cottonwood SWCD	4	N/A	Page 4-4 last paragraph, "Implementing agricultural and urban conservation practices"…… later in same paragraph, "implementing agricultural and urban conservation"……		x		Y	Text revised as recommended
3	Cottonwood SWCD	4	N/A	Page 4-14 last paragraph after "rain gardens and stormwater ponds", and non-structural BMPs such as urban forestry and vegetated swales.		x		Y	Text revised as recommended
4	Cottonwood SWCD	5	N/A	Page 5-7, 5-13, and 5-29 LC WU7 Stormwater management practices Add urban forestry to the list of practices. ….stormwater ponds and infrastructure, urban forestry.		x		Y	Text added as recommended so LGUs can apply to other sources of funding dealing with EAB. Added to all actions.
5	MPCA	General	N/A	The planning effort was responsive to the MPCA's priorities, concerns and comments throughout the effort. The Steering Committee incorporated all of the MPCA priorities, and successfully addressed the comments and revisions as part of the CWMP. The MPCA is appreciative that the Watershed Approach documents (Monitoring & Assessment, Stressor ID, Total Maximum Daily Loads [TMDLs] and Watershed Restoration and Protection Strategy [WRAPS]) were utilized in this process.			x	N	Comment noted, with thanks!
6	MDH	LWRN	N/A	Page 2-12, third paragraph, second sentence – remove number of water suppliers. Recommend editing "Of the 31 public water suppliers in the watershed.." to "Of the community public water suppliers in the watershed…"		x		Y	Text revised as recommended
7	MDH	Goals	N/A	Page 4-9, first paragraph, second sentence - recommend editing "…or have high nitrate testing results" to "…or have nitrate testing results above the drinking water standard."		x		Y	Text revised as recommended
8	DNR	Implementation	31	Row R1 DNR is listed as the lead entity for quantifying the volume and temporal variability of stormwater runoff entering rivers. While DNR works with USGS, MPCA and other entities to maintain the Cooperative Stream Gaging network throughout the state, this action would require additional input that may be outside of our current ability. DNR will continue to assist with this effort as possible, however, please remove DNR as the lead entity for these efforts.		x		Y	DNR removed as lead and added as partner
9	DNR	Programs	Table 6-1	Row 7 Water level/flow. DNR maintains a network of groundwater monitoring wells, including 56 in the Cottonwood River watershed. Please include "GW" in this row under the "DNR" heading.	x			Y	GW added to DNR column
10	DNR	Issues, Goals	3-8. 4-12	Stream Habitat and Connectivity - lists maintenance of in-stream debris as a medium-priority issue, but no action or funding are addressed on page 5-8. Please note that woody debris plays a significant role in providing habitat for aquatic organisms, however, we also understand that significant impacts to infrastructure and stream bank stability can occur in excess debris situations. If any debris removal is proposed, please incorporate considerations for aquatic habitat into the decision-making process.	x			Y	New collaborative action item added in Education and Outreach action table: "Collaborate with DNR, MPCA, Federal partners, and cities to effectively manage debris balancing flooding and impacts of infrastructure with water quality, aquatic habitat and hydrology." Partner funding added.
11	DNR	Implementation and Programs	5-32, 6-7	Capital Improvement Projects (CIP) – Table on 5-32 includes several bridge replacements and a drainage improvement project. We suggest that criteria should be included within the Capital Improvements section on page 6-7 to clarify when a CIP would be eligible for funding under this plan.	x			Y	All bridge replacement projects removed (89509, 89510, 89565, L6539). Drainage improvement project description expanded to summarize the water quality components of drainage management and drainage management planning efforts. Include flood water retention / water quality enhancements with the replacements. CSAH 4 Dam will remain.

#	Commenter	Section	Page	Comment	Material	Editoral	Note	Change Needed (Y/N)	Resolution
12	BWSR	Executive Summary	Table 1-3	• Funding- implementation cost Table 1-3 not including other (non-state) funds appearing that all goals can be met without non-state funding. • This should be comprehensive and not just showing what can be accomplished with potential Funding.		x		Y	Title revised to "Baseline + State Funding" and Level 3 will be further expanded to include partner / federal costs.
13	BWSR	3- Priority Issues	N/A	• Insure all Medium Priority Issues have an associated Measurable Goal i.e. Debris	x			Y	See response to Comment #10
14	BWSR	4- Measurable Goals	N/A	Stream Habitat and Connectivity o Maintenance of debris should have a measurable goal tied to this.	x			Y	See response to Comment #10
15	BWSR	5- Implementation	N/A	Table 5-1- The use of WBIF watershed-based implementation Funding: suggest using state funding label instead of WBIF o No source or amount of partner funds.	x			Y	Title revised to "Baseline + State Funding" and Level 3 will be further expanded to include partner / federal costs.
16	BWSR	5- Implementation	N/A	Action tables not having dollar amount for partner funds for watershed wide and each planning region.	x			Y	Partner funding added to projects as able with a visual at the end of the plan communicating resource benefits of additional sources of funding.
17	BWSR	5- Implementation	N/A	Table 5-2 indicates cost to meet goals is $24.09 Million over 10 years but is missing non-state funding.			x	Y	Correct, this summary is for "Baseline + State Funding". Title will be revised accordingly. Other sources of funding also added as column.
18	BWSR	5- Implementation	N/A	Capital Improvements Page 5-32 o Project 89509, 89510, 89565, L6539 & CSAH 4 Dam ▪ Should identify plan goals to be addressed o Project JDI8CM ▪ Needs to be clear on plan goals to be addressed and 103E definition of "drainage improvement".	x			Y	All bridge replacement projects removed (89509, 89510, 89565, L6539). Drainage improvement project description expanded to summarize the water quality components of drainage management.
19	BWSR	7- Plan Administration and Coordination	N/A	Funding Table 7-1 suggest funding level 2 to be called Baseline + State Funding and Level 3 to have a better estimate of amount.	x			Y	Title revised to "Baseline + State Funding" and Level 3 will be further expanded to include partner / federal costs.
20	BWSR	7- Plan Administration and Coordination	N/A	Table 7-2 $0.00 for federal? They have been doing work here what is the estimate for the future.	x			Y	Language added to emphasize that this budget estimate is looking backwards on how the "Baseline" was calculated, rather than forwards. Replace $0 in Federal column with "partner funding with a variable annual amount"
21	BWSR	7- Plan Administration and Coordination	N/A	Page 7-5 state funding include WBIF language		x		Y	WBIF language added to "State Funding" paragraph
22	BWSR	7- Plan Administration and Coordination	N/A	Page 7-6 Suggest adding examples of collaborative partner grants pursued and funded prior to plan adoption i.e. Water Storage.		x		Y	Collaborative partner grant examples included in "Additional Funding" paragraph as suggested
23	BWSR	7- Plan Administration and Coordination	N/A	Table 7-3 include WBIF funding under BWSR		x		Y	Funding added as suggested
24	BWSR	7- Plan Administration and Coordination	N/A	Page 7-9 include paragraph on WBIF		x		Y	Paragraph about WBIF added as suggested
25	BWSR	7- Plan Administration and Coordination	N/A	Plan Amendments page 7-11 o Suggest removal of first paragraph o Second paragraph sentence 5 remove state statue reference. O Make sure the use of Amendment is clear, don't interchange revision and amendment.	x			Y	Amendments section simplified and clarified as suggested with statute language removed. Amendments may be proposed by member LGU. Bylaws will also clarify amendment process about what committee initiates.
26	MDA	7- Plan Administration and Coordination	Table 7-3	Section 7-Table 7-3 (pg. 120) In addition to the current MDA programs listed, please add the MDA's "Soil Health Financial Assistance Program Grant". The Soil Health Financial Assistance Grant provides cost-share for the purchase and retrofit of soil health equipment. Adopting soil health practices often requires expensive and specific pieces of equipment, creating a need for a cost-share opportunity to offset those costs.		x		Y	Funding program added to table with thanks